BellBendCOLPEm Resource

From: Sgarro, Rocco R [rrsgarro@pplweb.com]
Sent: Friday, September 18, 2009 7:59 AM
To: Imboden, Stacey; 'Bruce.Mcdowell@pnl.gov'
Cc: 'Beecher, Kimberly A'; 'Perdomo, Federico R'
Subject: FW: BNP-2009-266 BB ER RAI Letter #4
Attachments: BNP-2009-266 - Bell Bend ER RAIs - Part 1 of 5.pdf

Stacey, Bruce:

Five part electronic copy of response #4 forthcoming. Questions, pls advise.

Thanks!

Rocky

R. R. Sgarro
Manager - Nuclear Regulatory Affairs
PPL Bell Bend, LLC
W: 570.802.8102 (Bell Bend)
610.774.7552 (Allentown)
M: 610.657.4667
EM: rrsgarro@pplweb.com

From: Beecher, Kimberly A [mailto:Kimberly.Beecher@unistarnuclear.com]
Sent: Thursday, September 17, 2009 5:21 PM
To: Sgarro, Rocco R
Subject: BNP-2009-266 BB ER RAI Letter #4

Rocky,

I have split the letter up into five parts for mailing. They are clearly labeled for reassembly.

Thank you,
Kim Beecher
UniStar Nuclear Energy
410-470-5544

Hearing Identifier: BellBend_COL_Public
Email Number: 353

Mail Envelope Properties (3F32C3D9CA6A66468ED9A8E78108212F17A3C139)

Subject: FW: BNP-2009-266 BB ER RAI Letter #4
Sent Date: 9/18/2009 7:59:13 AM
Received Date: 9/18/2009 7:59:52 AM
From: Sgarro, Rocco R

Created By: rrsgarro@pplweb.com

Recipients:
"'Beecher, Kimberly A'" <Kimberly.Beecher@unistarnuclear.com>
Tracking Status: None
"'Perdomo, Federico R'" <Federico.Perdomo@unistarnuclear.com>
Tracking Status: None
"Imboden, Stacey" <Stacey.Imboden@nrc.gov>
Tracking Status: None
"'Bruce.Mcdowell@pnl.gov'" <Bruce.Mcdowell@pnl.gov>
Tracking Status: None

Post Office: leh-mail-2.ppl.com

Files	**Size**	**Date & Time**
MESSAGE	1573	9/18/2009 7:59:52 AM
BNP-2009-266 - Bell Bend ER RAIs - Part 1 of 5.pdf	6180652	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

R. R. Sgarro
Manager, Nuclear Regulatory Affairs

PPL Bell Bend, LLC
38 Bomboy Lane, Suite 2
Berwick, PA 18603
Tel. 570.802.8102 FAX 570.802.8119
rrsgarro@pplweb.com

September 17, 2009

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

BELL BEND NUCLEAR POWER PLANT
RESPONSE TO ENVIRONMENTAL
REQUESTS FOR ADDITIONAL
INFORMATION, FOURTH SUBMITTAL
BNP-2009-266 Docket No. 52-039

References: 1) Letter from U.S. NRC Document Control Desk to R.R. Sgarro (PPL), "Requests for Additional Information Related to the Environmental Review for the Combined License Application for Bell Bend Nuclear Power Plant," dated July 10, 2009

The purpose of this letter is to respond to several Environmental Report (ER) requests for additional information (RAIs) identified in the referenced NRC correspondence to PPL Bell Bend, LLC. These RAIs address environmental issues, as discussed in Part 3 of the Bell Bend Nuclear Power Plant Combined License Application (COLA).

Enclosure 1 provides the current ER RAI response status and the planned submittal dates for the remaining responses. The planned submittal date for some of the RAIs has been changed as compared to the schedule provided in PPL letter BNP-2009-217, dated September 11, 2009. These RAIs are identified with a footnote in Enclosure 1.

PPL plans to continue to transmit a series of responses to the RAIs on or before the planned submittal dates provided in Enclosure 1. The planned submittal schedule is subject to change as PPL collects/develops the information required for the responses. PPL will keep the NRC staff informed of schedule changes during our weekly status updates in addition to updates in our subsequent submittals. Enclosure 2 provides responses to 17 RAIs. Several RAIs include revised COLA content. A Licensing Basis Document Change Request has been initiated to incorporate these changes in a future revision of the COLA.

The commitment contained in this submittal is the future revision of the COLA as indicated in Enclosure 2.

Enclosure 3 contains Susquehanna River withdrawal data in an MS Excel file format as well as portable document format (pdf) in support of the response to RAI H 2.3-1. Enclosure 4 contains Susquehanna Steam Electric Station/Susquehanna River Basin Commission extended power uprate files that also support the RAI H 2.3-1 response. Enclosure 5 contains Pennsylvania Department of Environmental Protection data, in MS Excel format and pdf, on water withdrawals in support of the RAI H 2.3-2 response.

If you have any questions, please contact the undersigned at 570-802-8102.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on September 17, 2009

Respectfully,

Rocco R. Sgarro

RRS/kw

Enclosures: 1) Response Status for Environmental Requests for Additional Information, Bell Bend Nuclear Power Plant, Luzerne County Pennsylvania

2) Responses to Environmental Requests for Additional Information, Bell Bend Nuclear Power Plant, Luzerne County Pennsylvania

3) RAI H 2.3-1, Susquehanna River Withdrawal Data, (MS Excel & Portable Document Format), Luzerne County Pennsylvania, (One Compact Disc)

4) RAI H 2.3-1, Susquehanna Steam Electric Station/Susquehanna River Basin Commission, Extended Power Uprate Files, Luzerne County Pennsylvania

5) RAI H 2.3-2, PADEP Water Withdrawal Data, Luzerne County Pennsylvania, (One Compact Disc)

cc: Mr. Joseph Colaccino
Branch Chief
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

Mr. Samuel J. Collins
Regional Administrator
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406-1415

Mr. Michael Canova
Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

Ms. Stacey Imboden
Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

bcc: M. Caverly
T. Harpster
G. Kuczynski
V. Lopiano
R. Sgarro
J. Freels
B. Snapp
D. Repka
G. Gibson
M. Yox
D. Lutchenkov
W. Massie
C. Fleming
D. Sullivan
K. Leigh (w/enclosure)

Enclosure 1

Response Status for Environmental Requests for Additional Information
Bell Bend Nuclear Power Plant
Luzerne County Pennsylvania

NRC Response Status for Environmental Requests for Additional Information		
RAI	**Review Plan Section**	**Planned Submittal Schedule**
ACC 7.1-1	ESRP 7.1 10	Submitted August 10, 2009
ACC 7.1-2	ESRP 7.1	Submitted August 5, 2009
ACC 7.2-1	ESRP 7.2	Submitted August 10, 2009
ACC 7.2-2	ESRP 7.2	Submitted August 10, 2009
ACC 7.2-3	ESRP 7.2	Submitted August 10, 2009
ACC 7.2-4	ESRP 7.2	Submitted August 10, 2009
ACC 7.2-5 (revised response)	ESRP 7.2	September 25, 2009[1]
ACC 7.2-6	ESRP 7.2	Submitted August 10, 2009
ACC 7.3-1	ESRP 7.3	Included in Enclosure 2
ACC 7.3-2	ESRP 7.3	Submitted August 10, 2009
ACC 7.3-3	N/A	Submitted August 10, 2009
ACC 7.3-4	N/A	September 25, 2009[1]
ACC 7.3-5	N/A	Submitted August 10, 2009
MET 2.7-1	ESRP 2.7	October 16, 2009[1]
MET 2.7-2	ESRP 2.7	September 25, 2009[1,2]
MET 2.7-3	ESRP 2.7	Submitted September 11, 2009
MET 2.7-4	ESRP 2.7	Included in Enclosure 2
MET 5.3-1	ESRP 2.7, ESRP 5.3.3.1	September 25, 2009[1,2]
MET 5.3-2	ESRP 2.7, ESRP 5.3.3.1	Submitted August 10, 2009
MET 5.3-3	ESRP 5.3.3.1	Submitted August 10, 2009
MET 5.3-4	ESRP 5.3.3.1	Submitted September 11, 2009
MET 5.3-5	ESRP 5.3.3.1	Submitted August 10, 2009
MET 6.4-1	ESRP 2.7, ESRP 6.4	Included in Enclosure 2
MET 6.4-2	ESRP 6.4	Included in Enclosure 2
ALT 9.3-1	ESRP 9.3	September 25, 2009[1,2]
ALT 9.3-2	ESRP 9.3	September 25, 2009[1]
ALT 9.3-3	ESRP 9.3	Submitted September 11, 2009
ALT 9.3-4	ESRP 9.3	September 25, 2009[1]
ALT 9.3-5	ESRP 9.3	September 25, 2009[1]
AE 2.3-1	ESRP 2.3.1	September 25, 2009[1]
AE 2.3-2	ESRP 2.3.1	Submitted August 5, 2009
AE 2.3-3	ESRP 2.3.1	September 25, 2009[1]
AE 2.4-1	ESRP 2.4.2	Submitted August 5, 2009
AE 2.4-2	ESRP 2.4.2	Submitted August 5, 2009
AE 2.4-3	ESRP 2.4.2	Submitted August 5, 2009
AE 2.4-4	ESRP 2.4.2	Submitted August 5, 2009
AE 2.4-5	ESRP 2.4.2	Submitted August 5, 2009
AE 3.4-1	ESRP 3.4.2	Submitted August 10, 2009
AE 3.4-2	ESRP 3.4.2	September 25, 2009[1,2]
AE 3.4-3	ESRP 3.4.2	Submitted August 10, 2009
AE 3.4-4	ESRP 3.4.2	Submitted August 10, 2009
AE 4.3-1	ESRP 4.3.2	Submitted August 5, 2009
AE 4.3-2	ESRP 4.3.2	January 15, 2010[1]
AE 4.3-3	ESRP 4.3.2	September 25, 2009[1]
AE 4.3-4	ESRP 4.3.2	September 25, 2009[1]
AE 5.3-1	ESRP 5.3.1.2	Submitted August 10, 2009
AE 5.3-2	ESRP 5.3.1.2	Submitted August 5, 2009
AE 9.3-1	ESRP 9.3	September 25, 2009[1]
AE 9.3-2	ESRP 9.3	Included in Enclosure 2
AE 9.3-3	ESRP 9.3	Included in Enclosure 2
AE 9.3-4	ESRP 9.3	September 25, 2009[1]
CR 2.5-1	ESRP 4.1.3, ESRP 5.1.3	Submitted August 10, 2009
CR 2.5-2	ESRP 4.1.3	Submitted August 10, 2009

NRC Response Status for Environmental Requests for Additional Information (continued)		
RAI	**Review Plan Section**	**Planned Submittal Schedule**
CR 2.5-3	ESRP 4.1.3, ESRP 5.1.3	Submitted August 10, 2009
CR 2.5-4	ESRP 4.1.3, ESRP 5.1.3	Submitted August 10, 2009
CR 2.5-5	ESRP 2.5.2, ESRP 2.5.3	Submitted August 10, 2009
CR 2.5-6	ESRP 2.5.2, ESRP 2.5.3	September 25, 2009[1, 2]
CR 2.5-7	ESRP 4.1.3, ESRP 5.1.3	September 25, 2009[1]
CR 2.5-8	ESRP 4.1.3, ESRP 5.1.3	September 25, 2009[1]
STO 1-1	N/A	September 25, 2009[1]
STO 2.1-1	ESRP 2.2, 2.4, 2.5, and 4.3	September 25, 2009[1]
STO 2.1-2	ESRP 2.1	Submitted August 10, 2009
STO 2.2-1	ESRP 2.2	Included in Enclosure 2
STO 2.3-1	ESRP 2.3	September 25, 2009[1]
GEO 2.6-1	ESRP 2.6	Submitted September 11, 2009
H 2.3-1	ESRP 2.3-2	Included in Enclosure 2
H 2.3-2	ESRP 2.3-2	Included in Enclosure 2
H 3.4-1	ESRP 3.4.1	September 25, 2009[1]
H 3.6-1	ESRP 3.6.1	Included in Enclosure 2
H 3.6-2	ESRP 3.6.1	Submitted August 5, 2009
H 4.2-1	ESRP 4.2.1	September 25, 2009[1,2]
H 5.2-1	ESRP 5.2.2	September 25, 2009[1]
H 5.3-1	ESRP 5.3.2.1	September 25, 2009[1,2]
H 6.3-1	ESRP 6.3	October 12, 2009[1]
H 9.3-1	ESRP 9.3	September 25, 2009[1]
H 9.4-1	ESRP 9.4.2	Submitted August 10, 2009
H 9.4-2	ESRP 9.4.2	Submitted August 10, 2009
H 9.4-3	ESRP 9.4.2	Submitted September 11, 2009
LU 2.2-1	ESRP 2.2.1	Submitted August 5, 2009
LU 3.7-1	ESRP 4.1	January 15, 2010[1,2]
LU 4.1-1	ESRP 4.1	January 15, 2010[1,2]
LU 5.1-1	ESRP 4.1	January 15, 2010[1,2]
LU 5.1-2	ESRP 4.1	January 15, 2010[1,2]
NRHH 10.5-1	N/A	Submitted August 10, 2009
RHH 4.5-1	ESRP 4.5, ESRP 5.4-2	Submitted August 10, 2009
RHH 4.5-2	ESRP 4.5	October 12, 2009[1]
RHH 4.5-3	ESRP 4.5	September 25, 2009[1,2]
RHH 5.4-1	ESRP 5.4.2	Submitted September 11, 2009
SE 2.5-1	ESRP 2.5.1	Submitted August 5, 2009
SE 2.5-2	ESRP 2.5.1	October 12, 2009[1]
SE 2.5-3	ESRP 2.5.2	October 12, 2009[1]
SE 2.5-4	ESRP 2.5.2	September 25, 2009[1,2]
SE 2.5-5	ESRP 2.5.2	Submitted August 10, 2009
SE 2.5-6	ESRP 2.5.2	Submitted August 5, 2009
SE 2.5-7	ESRP 2.5.2	September 25, 2009[1,2]
SE 2.5-8	ESRP 2.5.2	September 25, 2009[1,2]
SE 2.5-9	ESRP 2.5.2	Submitted September 11, 2009
SE 2.5-10	ESRP 2.5.4	Included in Enclosure 2
SE 2.5-11	ESRP 2.5.4	Submitted August 10, 2009
SE 2.5-12	ESRP 2.5.4	Submitted August 10, 2009
SE 2.5-13	ESRP 2.5.4	Included in Enclosure 2
SE 4.4-1	ESRP 4.4.1	Submitted August 10, 2009
SE 4.4-2	ESRP 4.4.1	Submitted August 10, 2009
SE 4.4-3	ESRP 4.4.2	September 25, 2009[1]
SE 4.4-4	ESRP 4.4.2	September 25, 2009[1]
SE 4.4-5	ESRP 4.4.2	Submitted August 5, 2009
SE 4.4-6	ESRP 4.4.2	Submitted August 10, 2009

NRC Response Status for Environmental Requests for Additional Information (continued)		
RAI	**Review Plan Section**	**Planned Submittal Schedule**
SE 4.4-7	ESRP 4.4.2	Included in Enclosure 2
SE 4.4-8	ESRP 4.4.2	Included in Enclosure 2
SE 4.4-9	ESRP 4.4.2	September 25, 2009[1]
SE 4.4-10	ESRP 4.4.2	Included in Enclosure 2
SE 4.4-11	ESRP 4.4.2	September 25, 2009[1,2]
SE 4.4-12	ESRP 4.4.2	September 25, 2009[1]
SE 4.4-13	ESRP 4.4.2	September 25, 2009[1,2]
SE 4.4-14	ESRP 4.4.3	Included in Enclosure 2
SE 5.8-1	ESRP 5.8.2	Included in Enclosure 2
SE 5.8-2	ESRP 5.8.2	Submitted August 5, 2009
CB 10.4-1	ESRP 10.4.2	September 25, 2009[1]
TE 2.4-1	ESRP 2.2.1	Submitted August 10, 2009
TE 2.4-2	ESRP 2.2.1	Submitted August 5, 2009
TE 2.4-3	ESRP 2.4.1	Submitted September 11, 2009
TE 2.4-4	ESRP 2.4.1	Submitted August 10, 2009
TE 2.4-5, (revised response)	ESRP 2.4.1	Submitted September 11, 2009
TE 2.4-6	ESRP 2.4.1	October 16, 2009[1]
TE 2.4-7	ESRP 2.4.1	January 15, 2010[1]
TE 2.4-8	ESRP 2.4.1	October 16, 2009[1]
TE 4.3-1	ESRP 4.3.1	January 15, 2010[1]
TE 4.3-2	ESRP 4.3.1	January 15, 2010[1]
TE 4.3-3	ESRP 4.3.1	Submitted September 11, 2009
TE 4.3-4	ESRP 4.3.1	January 15, 2010[1]
TE 4.3-5	ESRP 4.3.1	Submitted August 10, 2009
TE 4.3-6	ESRP 4.3.1	Submitted August 10, 2009
TE 4.3-7	ESRP 4.3.1, ESRP 9.3	January 15, 2010[1]
TE 4.3-8	ESRP 4.3.1	October 16, 2009[1]
TE 4.3-9	ESRP 4.3.1	September 25, 2009[1]
TE 4.3-10	ESRP 4.3.1	January 15, 2010[1]
TR 4.7-1	ESRP 4.7	September 25, 2009[1]
TR 4.7-2	ESRP 4.7	Submitted August 10, 2009

USACE Response Status for Environmental Requests for Additional Information	
RAI	**Planned Submittal Schedule**
USACE-1	October 16, 2009[1]
USACE-1a	September 25, 2009[1]
USACE-1b	October 16, 2009[1]
USACE-2	October 16, 2009[1]
USACE-2a	October 16, 2009[1]
USACE-2b	October 16, 2009[1]
USACE-2c	October 16, 2009[1]
USACE-2d	October 16, 2009[1]
USACE-2e	October 16, 2009[1]
USACE-2f	October 16, 2009[1]
USACE-2g	September 25, 2009[1]
USACE-2h	October 16, 2009[1]
USACE-3	October 16, 2009[1]

[1]The responses to these RAIs were requested to be provided within 30 calendar days. Based on vendor review and input, the time required to complete the necessary work will exceed this timeframe and PPL requests additional time, as indicated above.

[2]The planned submittal date for these RAI responses has been revised since the September 11, 2009, RAI response submittal.

Enclosure 2

Responses to Environmental Requests for Additional Information
Bell Bend Nuclear Power Plant
Luzerne County Pennsylvania

ACC 7.3-1

ESRP 7.3

Summary: *Provide a justification for why only the top 50% contributing cutsets of CDF were evaluated in the ER.*

Full Text: The ER states that only the "top 100 cutsets that "represent the approximately 50% of the total CDF … were evaluated." Justify how looking at the cutsets that contribute only 50% of the CDF establishes that all possible design alternatives for the US EPR were addressed. In addition, discuss why large release frequency (LRF) cutsets were not evaluated to establish alternatives.

Response:

Evaluation of Level 1 PRA

The evaluation of the top 100 Level 1 PRA cutsets is appropriate to identify plant-specific modifications for inclusion in the comprehensive list of Severe Accident Mitigation Design Alternatives (SAMDA) candidates, because:

- All significant cutsets are included in the top 100 CDF cutsets. "Significant" is defined in Regulatory Guide 1.200 as greater than one percent or collectively contributing ninety-five percent to the CDF. As stated in the U.S. EPR FSAR Section 19.1.4.1.2.3 (Significant Cutsets and Sequences), ninety-five percent of the total CDF is represented by over 12,000 cutsets for the U.S. EPR plant. The top 100 Level 1 cutsets include all cutsets contributing more than one percent to the total CDF and equates to approximately 50 percent of the total CDF.

- Contribution of cutsets beyond the top 100 is very small. The individual contribution to the total core damage frequency (CDF) for the 101st cutset was 0.10 percent. Individual cutsets below that point have little influence on CDF and are therefore not likely contributors for identification of cost-beneficial enhancements.

Evaluation of Level 2 PRA

In addition to the top 100 CDF cutsets, the top 100 Large Release Frequency (LRF) cutsets are also evaluated to identify plant-specific modifications that could reduce the likelihood of the dominant containment challenges.

The model used for this evaluation was developed to respond to U.S. EPR FSAR RAI 22, Question 19-160 (ML083110520). This model is the U.S. EPR FSAR Level 2 PRA model with the following LRF sequence removed: main steam line break inside of containment leading to an overcooling event, resulting in overpressure failure of the containment. This sequence of events was shown not to lead to core damage in the response to Question 19-160. Removing this sequence addresses the staff concern that the overly conservative treatment of that event would artificially reduce the relative importance of other failure modes.

The top 100 LRF cutsets include all cutsets contributing greater than one percent to the total LRF. For the U.S. EPR plant this equates to approximately 50 percent of the total U.S. EPR plant LRF. The individual contribution to the total LRF for the 101st cutset is 0.10 percent.

Examination of the top 100 LRF cutsets yielded no additional SAMDA candidates beyond those that were initially identified in Table 3-1 of the "AREVA NP Environmental Report Standard Design Certification" (ANP-10290 Rev. 0). This is due to the exhaustive nature of the original SAMDA analysis, as it identified numerous enhancements related to containment phenomena and containment bypass.

When the contribution from the containment failure due to main steam line break inside containment is removed, a clear and consistent picture emerges from the Level 2 results for internal events, fire, and flooding.

Four containment failure mechanisms can be found within the top 100 LRF cutsets:

- Early containment failure due to hydrogen flame acceleration
- Steam generator tube rupture (pressure-induced or creep-induced)
- Interfacing system LOCAs
- Containment isolation failures

Each of these phenomena is reviewed against the list of existing SAMDA candidates to evaluate if additional SAMDA would need to be considered to address these phenomena.

Hydrogen Flame Acceleration

Containment failure due to hydrogen flame acceleration appears in more than 50 of the top 100 LRF cutsets. It is a dominant contributor to LRF, contributing approximately 40 percent to internal event LRF (U.S. EPR FSAR RAI 22, Supplement 3, Table 19-160-6), and approximately 80 percent to flood and fire LRF (U.S. EPR FSAR Tables 19.1-54 and 19.1-79).

The following SAMDA candidates from Table 3-1 of the ANP-10290 Rev. 0 apply to containment failures due to hydrogen phenomena:

- Provide post-accident containment inerting capability (CP-07)
- Install an independent power supply to the hydrogen control system using either new batteries, a non-safety grade portable generator, existing station batteries, or existing AC/DC independent power supplies, such as the security system diesel (CP-19)
- Install a passive hydrogen control system (CP-20)

Steam Generator Tube Rupture (SGTR)

Containment bypass due to SGTR appears in approximately 40 of the top 100 LRF cutsets.

Initiating events "SGTR" and "Induced SGTR" (i.e., pressure-induced tube ruptures prior to core damage) are a dominant contributor to LRF, contributing almost half of the internal event LRF (Response to U.S. EPR FSAR RAI 22, Supplement 3, Table 19-160-5).

The following SAMDA candidates from Table 3-1 of the ANP-10290 Rev. 0 apply to containment bypass due to steam generator tube rupture:

- Institute maintenance practice to perform a 100% inspection of steam generator tubes during each refueling outage (CB-09)
- Replace steam generator with a new design (CB-10)
- Increase the pressure capacity of the secondary side so that an SGTR would not cause the relief valves to lift (CB-11)
- Provide improved instrumentation to detect SGTRs, such as Nitrogen-16 monitors (CB-14)
- Route the discharge from the main steam safety valves (MSSV) through a structure where a water spray would condense the steam and remove most of the fission products (CB-15)
- Install a highly reliable (closed loop) SG shell-side heat removal system that relies on natural circulation and stored water sources (CB-16)
- Revise emergency operating procedures (EOPs) to direct isolation of a faulted SG (CB-17)
- Direct SG flooding after an SGTR, prior to core damage (CB-18)
- Vent MSSVs in containment (CB-19)

Creep-induced steam generator tube ruptures during severe accident sequences at high pressure contribute approximately 17 percent to LRF (U.S. EPR FSAR Tables 19.1-50 and 19.1-75). The following SAMDA candidates from Table 3-1 of ANP-10290 Rev. 0 deal specifically with reducing primary system pressure during severe accident sequences, which is the preferred method for arresting the mechanism of induced steam generator tube rupture during high pressure core damage sequences:

- Install a redundant spray system to depressurize the primary system during an SGTR (CB-12)
- Proceduralize use of pressurizer vent valves during SGTR sequences (CB-13)

Interfacing System LOCA

ISLOCAs appear in four of the top 100 LRF cutsets and are a small contributor to LRF, approximately 3 percent of the internal events LRF (Response to U.S. EPR FSAR RAI 22, Supplement 3, Table 19-160-2).

The following SAMDA candidates from Table 3-1 of the ANP-10290 Rev. 0 address the issues associated with interfacing system LOCA:

- Install additional pressure or leak monitoring instruments for detection of interfacing system loss of coolant accidents (ISLOCA) (CB-01)
- Increase leak testing of valves in ISLOCA paths (CB-03)
- Locate residual heat removal (RHR) inside containment (CB-05)
- Ensure that ISLOCA releases are scrubbed. One method is to plug drains in potential break areas so that break point will be covered with water (CB-06)
- Revise EOPs to improve ISLOCA identification (CB-07)
- Improve operator training on ISLOCA coping (CB-08)
- Install relief valves in the component cooling water system (CB-20)

Containment Isolation Failure

Containment isolation failures appear in four of the top 100 LRF cutsets and are a small contributor to LRF. Response to U.S. EPR FSAR RAI 22, Supplement 3, Table 19-160-2 and

U.S. EPR FSAR Tables 19.1-50 and 19.1-75 show that the containment isolation failures account for about 8 percent of LRF for internal events, 5 percent of LRF from flooding events, and 2 percent of LRF for fire events.

The following SAMDA candidates from Table 3-1 of the ANP-10290 Rev. 0 address containment isolation failure.

- Add redundant and diverse limit switches to each containment isolation valve (CB-02)
- Install self-actuating containment isolation valves (CB-04)

Conclusion

When evaluating the top 100 LRF cutsets no additional SAMDA candidates were identified. Therefore, the list of SAMDA candidates provided in Table 3-1 of ANP-10290 Rev. 0 is a comprehensive list of SAMDA candidates for the U.S. EPR plant.

COLA Impact
BBNPP COLA ER Section 7.3.1 will be revised as follows in a future revision of the COLA:

7.3.1 SAMDA ANALYSIS METHODOLOGY

The methodology used to develop a comprehensive list of U.S. EPR SAMDA candidates, define the screening criteria used to categorize the SAMDA candidates, and the cost-benefit evaluation is summarized in this section based on the U.S. EPR DC ER (AREVA, 2007) for the U.S. EPR.

The comprehensive list of SAMDA candidates was developed for the U.S. EPR by reviewing industry documents for generic PWR enhancements and considering plant-specific enhancements. The SAMDA candidates were defined as enhancements to the U.S. EPR plant that have the potential to prevent core damage and significant releases from the containment. The primary industry document supporting the development of U.S. EPR generic PWR SAMDA candidates was NEI 05-01 (NEI, 2005).

~~The top 100 U.S. EPR Level 1 PRA cutsets were evaluated to identify plant-specific modifications for inclusion in the comprehensive list of SAMDA candidates. The top 100 cutsets represent approximately 50 percent of the total core damage frequency (CDF) for the U.S. EPR. The percentage of contribution to the total CDF for the cutsets below the top 100 was minimal. Therefore, these cutsets were not likely contributors for identification of cost beneficial enhancements for the U.S. EPR design.~~

~~An extensive evaluation of the top 100 cutsets was completed in order to establish that all possible design alternatives for the U.S. EPR were addressed. Through the evaluation, numerous U.S. EPR specific operator actions and hardware-based SAMDA candidates were developed. The U.S. EPR DC ER (AREVA, 2007) provides a detailed list of the SAMDA candidates for the U.S. EPR. The SAMDA candidates identified in the U.S. EPR DC ER are applicable to BBNPP.~~

In addition to the generic SAMDA candidates, the results of the Level 1 and Level 2 PRA were reviewed to identify plant-specific modifications for inclusion in the comprehensive list of SAMDA candidates.

The U.S. EPR top 100 core damage frequency (CDF) cutsets were evaluated to identify those modifications that would reduce the likelihood of occurrence of the significant core damage sequences. As stated in the U.S. EPR FSAR Section 19.1.4.1.2.3 (Significant Cutsets and Sequences), ninety-five percent of the total CDF is represented by over 12,000 cutsets for the U.S. EPR; however, the top 100 cutsets include all cutsets contributing >1 percent to the total CDF. For the U.S. EPR application, this equates to approximately 50 percent of the total CDF. In fact the selection of the top 100 cutsets conservatively includes cutsets of low importance. For example, the percentage of the individual contribution to the total CDF for the 101st cutset was 0.10 percent.

The U.S. EPR top 100 large release frequency (LRF) cutsets were evaluated to identify those modifications that would reduce the likelihood of occurrence of the significant containment challenges. This population of cutsets specifically excluded the contribution to LRF of the core damage sequences due to Main Steam Line Break (MSLB) inside containment with main feedwater unisolated, as this sequence of events was determined not to lead to core damage or LRF. This exclusion ensures that the conservative treatment of an event does not artificially reduce the importance of other containment failure mechanisms. The top 100 LRF cutsets include all cutsets contributing greater than 1 percent to the total LRF. For the U.S. EPR application this equates to approximately 50 percent of the total LRF, and includes many low importance cutsets that contribute only 0.10 percent to the total LRF.

Consistent with current regulatory guidance and industry practice, the risk significant design alternatives for the U.S. EPR have been addressed by detailed evaluations of the top 100 CDF and LRF cutsets to identify plant-specific modifications for inclusion in the comprehensive list of U.S. EPR SAMDA candidates. Through the evaluation of the top 100 Level 1 PRA cutsets, numerous U.S. EPR specific operator actions and hardware-based SAMDA candidates were developed. When evaluating the top 100 LRF cutsets no additional SAMDA candidates were identified. The U.S. EPR DC ER (AREVA, 2007) provides a detailed list of the SAMDA candidates for the U.S. EPR. The SAMDA candidates identified in the U.S. EPR DC ER are applicable to BBNPP.

The SAMDA candidates developed for the U.S. EPR design were qualitatively screened using seven categories. The intent of the screening is to identify the candidates for further risk-benefit calculation. For each SAMDA candidate, a screening criteria and basis for screening was identified to justify the implementation or exclusion of the SAMDA candidate in the U.S. EPR. The seven categories used during the screening process included:

- Not applicable. The SAMDA candidates were identified to determine which are definitely not applicable to the U.S. EPR. Potential enhancements that are not considered applicable to the U.S. EPR are those developed for systems specifically associated with boiling water reactors (BWR) or with specific PWR equipment that is not in the U.S. EPR design.

- Already implemented. The SAMDA candidates were reviewed to ensure that the U.S. EPR design does not already include features recommended by a particular SAMDA candidate. Also, the intent of a particular SAMDA candidate may have been fulfilled by another design feature or modification. In these cases the SAMDA candidates are already implemented in the U.S. EPR plant design. If a SAMDA candidate has already been implemented at the plant, it is not retained.

- Combined. If one SAMDA candidate is similar to another SAMDA candidate, and can be combined with that candidate to develop a more comprehensive or plant-specific SAMDA candidate, only the combined SAMDA candidate is retained for screening.

- Excessive implementation cost. If a SAMDA candidate requires extensive changes that will obviously exceed the maximum benefit even without an implementation cost estimate and therefore incurs an excessive implementation cost, it is not retained.

- Very low benefit. If a SAMDA candidate is related to a non-risk significant system for which change in reliability is known to have negligible impact on the risk profile, it is deemed to have a very low benefit and is not retained.

- Not required for design certification. Evaluation of any potential procedural or surveillance action SAMDA candidates are not appropriate until the plant design is finalized and the plant procedures are being developed. Therefore, if a SAMDA candidate is related to any of these enhancements, it is not retained for this analysis.

- Considered for further evaluation. If a particular SAMDA candidate was not categorized by any of the preceding categories, then the SAMDA candidate is considered for further evaluation and subject to a cost-benefit analysis.

The screening categories were chosen based on guidance from NEI 05-01, Revision A. The U.S. EPR DC ER contains a detailed description of each of the categories. The screening categories are applicable to BBNPP.

After the screening process was completed, the SAMDA candidates that were placed in the Considered for Further Evaluation category would require a cost-benefit evaluation. The cost-benefit evaluation of each SAMDA candidate would determine the cost of implementing the specific SAMDA candidate with the maximum averted cost risk from the implementation of the specific SAMDA candidate. The maximum averted cost risk, typically referred to as the maximum benefit, equates to the cost obtained by the elimination of all severe accident risk.

MET 2.7-4

ESRP 2.7

Summary: *Provide a description of how the recirculation correction factor (RCF) values listed in Table 2.7-128 were calculated and how the values are used in the AEOLUS3 model for calculating relative concentration and deposition from normal operations.*

Full Text: In accordance with ESRP 2.7, the NRC staff has a confirmatory role in evaluating relative concentration and deposition estimates for routine releases to the atmosphere. In Section 2.7.6.1.1 of the ER, site-specific recirculation correction factors (RCFs) were developed and used in calculating relative concentration and deposition estimates. NRC staff intends to verify the applicability and appropriateness of the RCFs used in this analysis. Therefore, provide documentation on how the RCFs were calculated for the BBNPP site and how the values are used within the AEOLUS3 model.

Response: Recirculation correction factors are calculated as the ratio between the χ/Q values calculated by two methods: the first takes into account the effects of changing wind speed, direction, and stability with time, and the second does not. The two codes used to determine site-specific recirculation correction factors for BBNPP were MESODIF-II and XOQDOQ, respectively.

AEOLUS3 allows the user to input site-specific recirculation correction factors as part of the receptor data. The site-specific recirculation correction factors are applied to the dispersion and deposition parameters as multipliers.

COLA Impact:
No changes to the BBNPP COLA ER are required as a result of this RAI response.

MET 6.4-1

ESRP 2.7

ESRP 6.4

Summary: *The SSES meteorological tower is within five obstruction heights of the existing SSES cooling towers. In Section 6.4.1.6 of the ER, a study is mentioned that concludes the cooling towers' effect on wind speed measurements is minimal. Provide the details of the study and explain the reasons for the conclusion that "the impact of the cooling towers on wind speed measurements is minimal and the effect on wind direction measurements is nearly non-existent."*

Full Text: ESRP 2.7 and 6.4 states that for "no discernable influence on measurements, towers should be located at least ten obstruction heights away from major obstructions. For towers located more than five obstruction heights away from major obstructions, the influence should be minimal." The SSES meteorological tower is within five obstruction heights of the SSES cooling towers. In Section 6.4.1.6 of the ER, a study is mentioned (but not referenced) which concludes that the cooling towers do not appreciably affect wind measurements made on the SSES meteorological tower. Provide justification for this conclusion.

Response: A study was performed to determine the effects of the presence of plant structures on the meteorological measurements at the Susquehanna Steam Electric Station (PPL, 2009). The structures included were the cooling towers, turbine building, reactor building, control building, and the radwaste building. The study examined the differences between windfields generated by a model when the structures were absent and present. Results indicated that the impact of plant structures on the measured wind speed was minimal, and the impact on the measured wind direction nearly non-existent.

In addition, the local meteorology tends to minimize the effects of plant structures on the meteorological measurements. The predominant wind direction over the last 25 years has been from the east-northeast at the 10-m level and the north-northeast at the 60-m level. The secondary wind direction peak has been from the southwest at both measurement levels. The plant structures modeled are located west to northwest of the meteorological tower. Winds from those three sectors (W, WNW, and NW) occur less than 10% of the time at the 10-m level and about 12% of the time at the 60-m level on average. When stable atmospheric conditions are considered in conjunction with wind from those three sectors, these percentages become 0.1% of the time at the 10-m level and about 0.4% of the time at the 60-m level.

Reference cited in response: BNP-2009-184, Bell Bend Nuclear Power Plant Submittal of Additional Information, from R. R. Sgarro (PPL), to Document Control Desk (NRC), dated July 30, 2009.

COLA Impact:
No changes to the BBNPP COLA ER are required as a result of this RAI response.

MET 6.4-2

ESRP 6.4

Summary: *In Section 6.4.2 of the ER, the proposed operational meteorological program for the BBNPP site is described. As shown in Figure 6.4-1 of the ER, a new meteorological tower will be constructed and this tower will be within ten obstruction heights of both the existing SSES and the proposed BBNPP cooling towers, where influence to wind measurements may be possible. Provide justification that the location for the BBNPP meteorological tower is adequate for supporting operations at the BBNPP site.*

Full Text: ESRP 6.4 directs staff to evaluate the operational meteorological monitoring program. Section 6.4.2 of the ER describes the proposed operational meteorological program, which includes a new BBNPP meteorological tower. Figure 6.4-1 shows that the proposed BBNPP meteorological tower will be within ten obstruction heights of both the SSES and BBNPP cooling towers, where influence to wind measurements may be possible. Provide justification that the proposed location for the BBNPP meteorological tower is adequate for supporting operations at the BBNPP site (i.e., will be no more than minimally affected by the SSES and BBNPP cooling towers.)

Response: ESRP 2.7 and 6.4 states that for "no discernable influence on measurements, towers should be located at least ten obstruction heights away from major obstructions. For towers located more than five obstruction heights away from major obstructions, the influence should be minimal." Information provided in ER Table 6.4-4, "Distances from the U.S. EPR Major Buildings to the BBNPP Meteorological Tower", indicates that the new BBNPP meteorological tower will be located more than five obstruction heights away from both the existing SSES cooling towers and the proposed BBNPP cooling towers.

In addition, the local meteorology will tend to minimize the effects of plant structures on the meteorological measurements. The predominant wind direction at SSES over the last 25 years has been from the east-northeast at the 10-m level and the north-northeast at the 60-m level. The secondary wind direction peak has been from the southwest at both measurement levels. The BBNPP cooling towers will be located northwest of the BBNPP meteorological tower. Winds from that sector occur less than 4% of the time at both the 10-m and 60-m levels on average. When stable atmospheric conditions are considered in conjunction with wind from the northwest, these percentages become less than 0.1% of the time at the 10-m and 60-m levels. The SSES cooling towers are located northeast of the BBNPP meteorological tower. Winds from that sector occur about 10% of the time at both the 10-m and 60-m levels on average. When stable atmospheric conditions are considered in conjunction with wind from northeast, these percentages become less than 0.1% of the time at the 10-m and 60-m levels.

COLA Impact:
No changes to the BBNPP COLA ER are required as a result of this RAI response.

AE 9.3-2

ESRP 9.3

Summary: *Martin's Creek Alternative Site.*

Describe the nature of the river bottom at the Martin's Creek site and describe whether dredging of sediment would be needed. Describe whether or not cofferdams and excavation would be used.

Describe construction methods for the intake system versus the discharge system.

Describe any open-water ponds, creeks or other water features and direct or indirect impacts to these features by construction, including lineal feet or acreage of impacts.

Provide a discussion of whether the dwarf wedge mussel occurs in the river at the Martins Creek Site, and if it is there, the potential for impacts related to installation (including dredging) of the Circulating Water System, and the potential that the discharge plume could affect the mussel.

Provide information from the study "Dwarf Wedge Mussel (DWM) Habitat Study on the Upper Delaware" conducted by USFWS.

Provide a copy of the report documenting the T&E species at the Martins Creek Site. "EDR, 2008b. Environmental Data Resources Incorporated, Martins Creek Site Inquiry Number 2290046.27S, August 12, 2008."

Describe the Foul Rift Natural Heritage Priority Site and its relation to the proposed site.

Describe the range of the Atlantic sturgeon and shortnose sturgeon in the Delaware River and indicate whether either species has been found near the Martins Creek site.

Describe any commercial or recreational fisheries near the proposed intake/discharge areas in the Delaware River and the presence of any nuisance species (zebra mussel, Corbicula) in the area.

Describe the potential effluents from the CWS construction at Martin's Creek and Best Management Practices to manage them.

Provide any impingement or entrainment data available from the retired coal plant that would allow estimation of potential impacts from the proposed plant.

Full Text: ER Rev 1, p. 9-71 states that construction-related impacts would be similar to those at the Montour site with respect to dredging, or any other activity related to intake/discharge construction. Provide information about the Delaware River bottom to support the supposition that impacts at the Martin's Creek site would be similar to Montour. Observations made during the alternative site visit indicated that river flows were different at the intake and discharge areas. The Delaware River at the proposed discharge location is swiftly flowing with noticeable small rapids. It is likely that the river bottom here is primarily rocky and installation of the discharge would be similar to that for BBNPP. The river flow is fairly slow at the location of the proposed intake located opposite the former coal plant. The river bottom here may have

accumulated some sediment that would need dredging or excavation to install the intake system. Please describe the actual conditions.

Buckhorn Creek, which occurs on part of the site, was observed during the alternative site visit. Describe it.

The text (ER Rev 1, p. 9-71) states that there are no Federally endangered species on the Site. Later (p. 9-71), the text mentions the Federally endangered dwarf wedge mussel as occurring in the Delaware River in Warren County and discusses potential impacts to larvae because of entrainment. Explain.

PPL (and the Corps) is involved in the Dwarf Wedge Mussel study conducted by USFWS. The study was to be completed in 2008.

Assess impacts to the Foul Rift Natural Heritage Priority Site that is shown in the January 27, 2009 letter from NJ DEP to the NRC.

Identify potential construction effluents and discuss possible BMPs to manage them.

Response: The alternative site screening process described in ER Section 9.3 of the COLA has been superseded by a revised process. Using the new process, the entire alternative site evaluation has been performed again (PPL, 2009). The revised evaluation has resulted in the elimination of the Martin's Creek site as an alternative to the Bell Bend site.

Reference cited in response: (PPL, 2009) BNP-2009-257, Bell Bend Nuclear Power Plant Alternative Site Evaluation, from R. R. Sgarro (PPL), to Document Control Desk (NRC), dated September 9, 2009.

COLA Impact:
No changes to the BBNPP COLA ER are required as a result of this RAI response.

AE 9.3-3

ESRP 9.3

Summary: *Sandy Bend Alternative Site*

Describe any open-water ponds, creeks or other water features and direct or indirect impacts to these features by construction, including lineal feet or acreage of impacts.

Describe the nature of the river bottom at the Sandy Bend site and describe whether dredging of sediment would be necessary. Describe whether or not cofferdams and excavation would be used.

Provide more detailed information about "ephemeral/fluctuating natural pool" community that is listed in Table 9.3-5 and the potential impacts to this community from construction and operation of a new plant.

Describe the potential impacts from construction and operation of a new plant to the three statelisted mussel species—the yellow lampmussel (S3S4), the elktoe (S4), and the triangle floater (S3S4)—named in Table 9.3-5.

Provide a copy of the report documenting the threatened and endangered species at the Sandy Bend Site. "EDR, 2008c. Environmental Data Resources Incorporated, Sandy Bend Site Inquiry Number 2290046.36S, August 12, 2008."

Describe any commercial or recreational fisheries near the proposed intake/discharge areas in the Juniata River, including any nuisance species (e.g.,zebra mussel, Corbicula).

Describe the location, construction and associated impacts of any bridges that need to be built across the Juniata River for access to the plant or for relocation of the railroad.

Full Text: ER Rev 1, p. 9-75 states "There are several small ponds located on the site that may not be regulated. Any impacts to these bodies of water would need to be coordinated through USACE and the Commonwealth of Pennsylvania prior to construction activities. Therefore, the impacts to bodies of water at the site would be SMALL."

ER Rev 1, p. 9-75 states that construction-related impacts would be similar to those at the BBNPP and the Montour sites. Explain why dredging, or any other activity related to intake/discharge construction for Sandy Bend is similar to such activities at the BBNPP and Montour sites. Describe the Juniata River bottom to support the supposition that impacts would be similar to BBNPP or Montour. The river current in this area appears very slow, so it is likely that the river bottom is muddy in the area. The river bottom near shore appeared muddy.

ER Rev 1, p. 9-75 states "No federally-listed or state-listed species are located in the immediate vicinity of the site (EDR, 2008c)." Table 9.3-5 lists "ephemeral/fluctuating natural pool" as state-listed community. Table 9.3-5 also lists three mussel species that are state-listed—the yellow lampmussel (S3S4), the elktoe (S4), and the triangle floater (S3S4). Explain.

Assess whether there is a need to build two railroad bridges to accommodate the shifting of the tracks from "behind" the site to the opposite side of the Juniata River.

Assess the need to construct a bridge in the river to accommodate a new access road.

Response: The alternative site screening process described in Section 9.3 of the ER has been superseded by a revised process. Using the revised process, the entire alternative site evaluation has been performed again (PPL, 2009). The revised evaluation has resulted in the Sandy Bend site being eliminated as an alternate to Bell Bend.

Reference cited in response: (PPL, 2009) BNP-2009-257, Bell Bend Nuclear Power Plant Alternative Site Evaluation, from R. R. Sgarro (PPL), to Document Control Desk (NRC), dated September 9, 2009.

COLA Impact:
No changes to the BBNPP COLA ER are required as a result of this RAI response.

STO 2.2-1

ESRP 2.2

Summary: *Provide an assessment of the need for upgrading any portions of the exiting rail spur to SSES or any portions of the main line including any road crossings or bridges.*

Full Text: State whether there is any need to upgrade the rail spur or mainline due to the large size of components for the U.S. EPR. If so, provide an assessment of the impacts of such an upgrade.

Response: A report is available titled "Project Report – UniStar Project Leo Transportation Study," AREVA NP Inc, June 28, 2007. The purpose of the study was to perform a high level feasibility analysis for transporting major NSSS components by rail and/or highway from the ports along the northeast coast of the United States to PPL's proposed site at the Susquehanna Nuclear Station in Salem Township, Luzerne County, Pa.

The study focused specifically on identifying potential routes that could potentially support the physical size and weight of the shop fabricated reactor pressure vessel and steam generators, and to identify specific areas or issues that will require further evaluation.

The report states that, "In recent years PPL replaced the LP Turbine rotor on Unit 2. The shipping skid was 12' wide and 15' tall and weighed 180 tons. Shipment was from Port Elizabeth, New Jersey directly to the site."

The study focused on the US EPR Reactor Pressure Vessel (RPV) and the US EPR Steam Generator (SG) because they are the largest, heaviest items that will be transported from France to the BBNPP site. The data on each piece of equipment is as follows:

US EPR Reactor Pressure Vessel Details	
Outer Diameter at Flange (without RCS Nozzles)	18.9'
Diameter at RCS Nozzles	24.5'
Height (flange to bottom of dome)	34.6'
Weight of RPV Body	450 Tons

US EPR Steam Generator Details	
Steam Drum Outer Diameter (without nozzles)	17.0'
Steam Drum Outer Diameter with nozzles	19.0'
Lower Section Outer Diameter	12.0'
Diameter at RCS Nozzles	24.5'
Overall Height	80.8'
Total Weight	605 Tons

The study examined the ports in Baltimore, MD, Port Elizabeth, NJ, Philadelphia, PA, Port Deposit, MD and Great Lakes ports such as Buffalo, NY, Rochester, NY, and Erie, PA.

In conclusion, the report states, "AREVA construction and transportation personnel performed a high level feasibility study for transporting major NSSS components by rail and/or highway from the ports along the northeast coast of the United States to PPL's proposed site at the Susquehanna Nuclear Station (the new station is now named Bell Bend Nuclear Power Plant) in Salem Township, Luzerne County, PA." The study focused specifically on identifying potential routes that could potentially support the physical size and weight of the shop fabricated reactor pressure vessel and steam generators, and to identify specific areas or issues that will require further evaluation.

"The results of this study found that the RPV for the US EPR is smaller in diameter and nearly half the length and weight of the RPV for Units 1 & 2 (for Susquehanna). The study also found that equipment and technology available for transporting components by rail and roadway is far improved over the technology available in the late 70's and early 80's."

"The results of these surveys indicate that the RPV and SG's can be transported to Susquehanna from one of several locations around Baltimore and Philadelphia via rail, roadway, or a combination of the two with a 90% level of confidence."

However, the report does state that, "Additional detailed route studies need to be performed with the assistance of a transport company, the PA Department of Transportation, and a railroad service provider such as Norfolk Southern or CSX."

The further studies that must be made will be performed during detailed design and procurement of equipment.

With respect to local conditions at the Bell Bend site railroad spur, the potential to alter the means of transport from rail to road can provide an alternative here as well as at any other location along the route if necessary.

The report is available in the Bell Bend Electronic Reading Room.

COLA Impact:
No changes to the BBNPP COLA ER are required as a result of this RAI response.

H 2.3-1

ESRP 2.3-2

Summary: *Provide the daily withdrawal and return flow rates from SSES Units 1 and 2 for a two-year period. This period should span times when both units are operating as well as an outage/refueling.*

In addition, provide the application to the SRBC for the Extended Power Uprate for SSES, and the SRBC response.

Full Text: The applicant's experience with water withdrawals at the nearby SSES, and their interaction with the SRBC for additional withdrawals from the Susquehanna River, will inform the staff on how agencies might handle similar requests involving the BBNPP.

Response: Data regarding SSES consumptive use, SSES Susquehanna River water withdrawal data, and total discharge flows from 2007 to 2009 are combined into one Excel file which can be found in Enclosure 3.

SSES Units 1 and 2 operate approximately two years between major refueling outages. In even numbered years Unit 1 has a refueling outage and during odd numbered years, Unit 2 has a refueling outage. These refueling outages typically occur in a March-April time frame. This is reflected in the annual water data presented in Enclosure 3.

The following documents regarding SSES/SRBC extended power uprate interactions support this RAI response and can be found in Enclosure 4.

1 Surface Water application

2 Request to extend duration of SRBC approval

3 SSES Groundwater application required by SRBC in addition to surface water

4 Attachments to no. 3, groundwater application: Ground-Water Withdrawal Instructions and Application

5 Attachments to no. 3, groundwater application: Ground-Water Withdrawal Application

6 SRBC approval for surface water and groundwater withdrawal and consumptive use

PPL (SSES) continues to work with SRBC in developing a water metering plan to meet the requirements of item no. 6 (SRBC approval).

COLA Impact:
No changes to the BBNPP COLA ER are required as a result of this RAI response.

H 2.3-2

ESRP 2.3-2

Summary: *Provide additional detail regarding withdrawal quantity and frequency of use from users identified on ER Figures 2.3-66 and 2.3-67.*

Full Text: Staff discussed this request and ER Figures 2.3-66 and -67 with the applicant during the site audit.

Response: Figure 2.3-66 illustrates "Surface Water Withdrawal Within Luzerne County" and Figure 2.3-67 shows the location of "Surface Water Withdrawal Within 5-mile Radius."

In Pennsylvania, the consumptive surface water use is managed by the Pennsylvania Department of Environmental Protection (PADEP) and regulated by the Susquehanna River Basin Commission (SRBC).

According to the PADEP, the Water Resources Planning Act (Act 220) requires the PADEP to conduct a statewide water withdrawal and use registration and reporting program (PADEP, 2008). Each public water supply agency, each hydropower facility (irrespective of the amount of withdrawal), and each person who withdraws or uses more than 10,000 gallons of water per day (gpd) (37,854 lpd) over any 30-day period, must register their withdrawal or withdrawal use.

The use of water from the Susquehanna River is regulated by the SRBC, an agency created by a compact between the federal government and the states hosting the Susquehanna River. Operations subject to the SRBC are those that exceed the consumption rate of 20,000 gpd (75,708 lpd) over a 30-day average (SRBC, 2007). Consumption rates less than the 20,000 gpd fall under Pennsylvania Act 220.

PADEP maintains the PA Commonwealth Water Use Data System (WUDS) which contains information on water withdrawals for all use sectors. PADEP has reprocessed data extract, and has included the Environment, Facility Application, Compliance Tracking System (eFACTS) Client ID and Site ID for surface water withdrawals for Luzerne County. Withdrawal volumes are displayed in gallons. PADEP also mentioned that this is an inclusive list of the surface water withdrawal reports received for Luzerne County for 2005-2008.

PADEP data on water withdrawals can be found in Enclosure 5 (in both MS Excel format and pdf). These withdrawal data provided by PADEP include groundwater and surface water users within Luzerne County.

PADEP is building a website, which will provide a download tool for the public to access water withdrawal information directly. This will facilitate the US Nuclear Regulatory Commission in obtaining more detailed information regarding water withdrawals near the BBNPP Site.

References cited in the response:

PADEP, 2008, "Water Withdrawal and Use Registration," Pennsylvania Department of Environmental Protection, Website: http://www.depweb.state.pa.us/watershedmgmt/cwp/view.asp?a=1426&q=513271&watershedmgmtNavPage=| Accessed: February 6, 2008.

SRBC, 2007, “Pennsylvania Agricultural Consumptive Water Use. January, 2007,” Susquehanna River Basin Commission, Website: http://www.srbc.net/pubinfo/docs/Agricultural%20Water%20Use%20(1_07).PDF Accessed: May 5, 2008.

COLA Impact:
No changes to the BBNPP COLA ER are required as a result of this RAI response.

H 3.6-1

ESRP 3.6.1

Summary: *Provide supplemental information on the intake source water quality data presented in ER Table 3.6-3. Include information on seasonal values of chemical analytes in intake and receiving waters.*

Full Text: ESRP 3.6.1 identifies the need for average, maximum, and seasonal variations of principal constituents of intake and receiving waters and any minor or trace materials that may be of environmental relevance. The ER reports only yearly-average values.

Response: Attached is Table 1, Susquehanna River Water Quality at Intake, that presents the results of (approximate) quarterly river sampling that was conducted in 2006 and 2007. Also attached are associated charts of selected, representative river sampling data (from near the intake) that show the results of quarterly monitoring data over time for this two year period. For some "total" metals and suspended solids, the results for this two-year monitoring period are skewed by the results for one sampling event (total aluminum, 3/15/2007) in the first quarter of 2007.

Table 2, Susquehanna River Water Quality at Discharge, and associated charts show the river water quality in the vicinity of the planned discharge location (the receiving water). This table and charts presents the river sampling data for the same quarterly sampling events as the "intake" water discussed above. The sampling location is downstream of the SSES discharge.

All referenced tables and charts are included below.

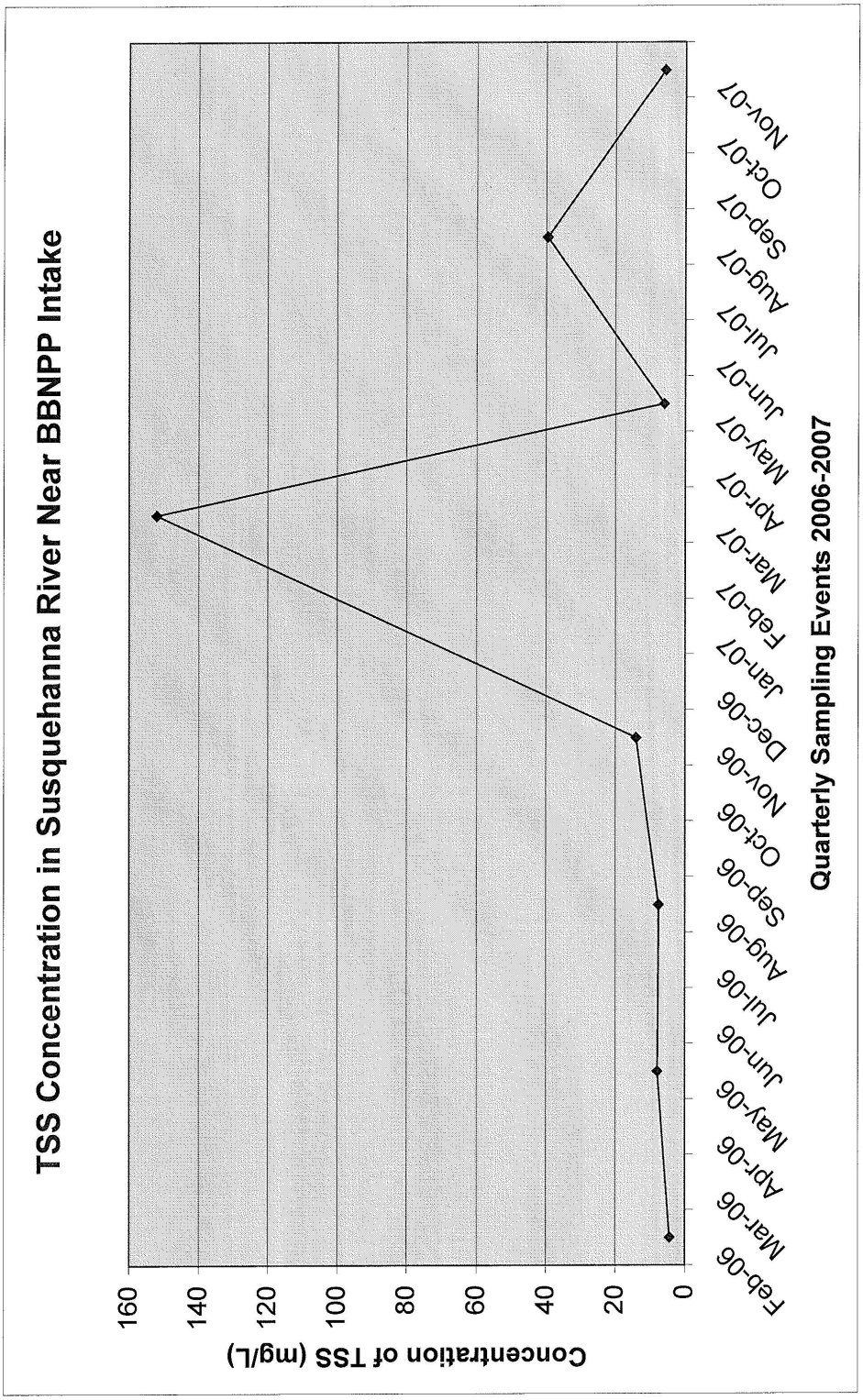
COLA Impact:
No changes to the BBNPP COLA ER are required as a result of this RAI response.

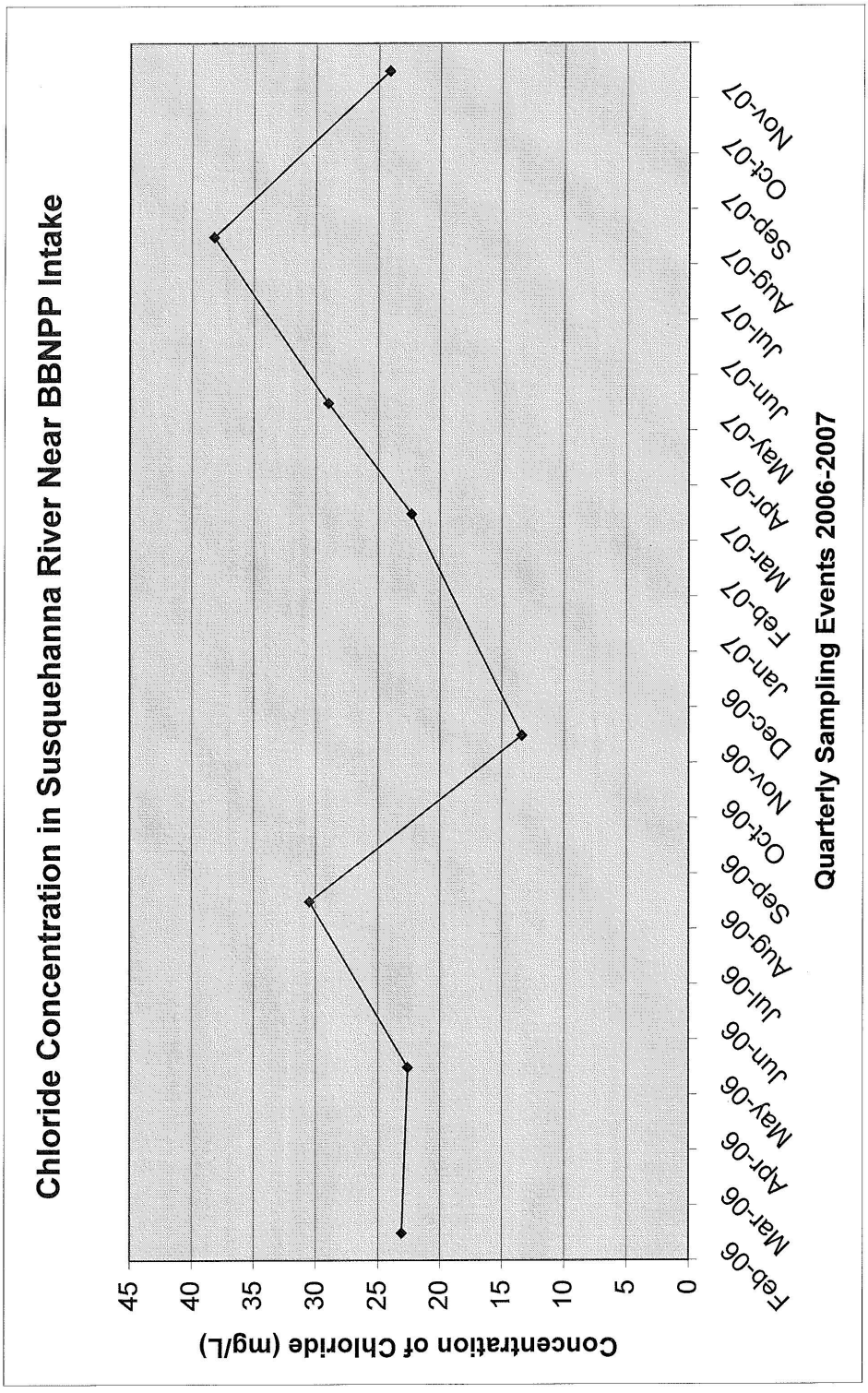
Table 1

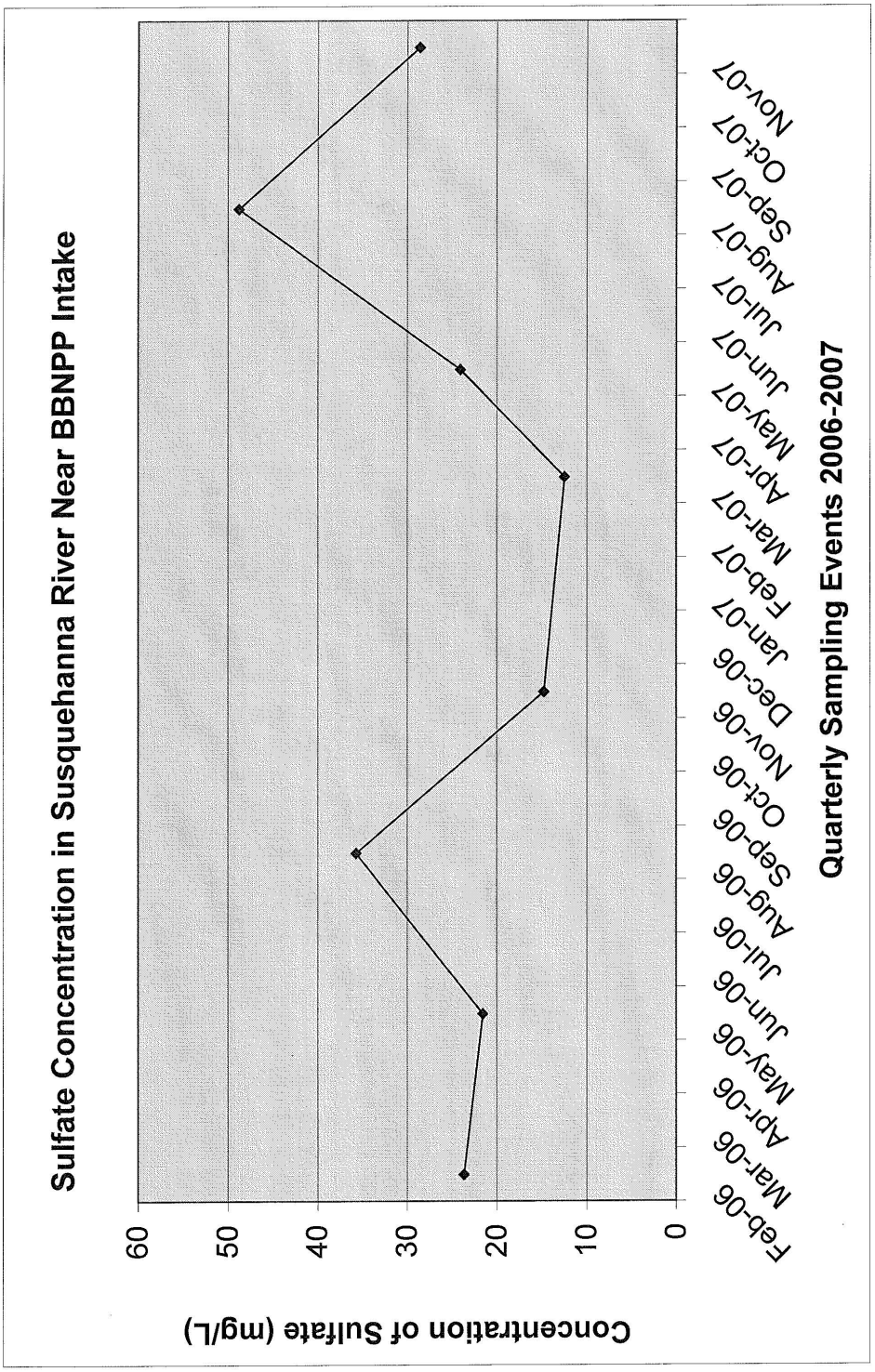
Susquehanna River Water Quality at Intake

Location Sample Date		SSES 2/23/2006	SSES 5/18/2006	SSES 8/16/2006	SSES 11/16/2006	SSES 3/15/2007	SSES 5/21/2007	SSES 8/23/2007	SSES 11/7/2007	MIN	MAX	AVE	% Difference
Parameter	Units												
pH Lab		7.61	8.04	7.9	7.72	8.75	8.91	8.8	7.78				
Total Alkalinity	mg/L	56	62	94	44	39	65	58	60	39	94	59.8	83
Total Suspended Solids	**mg/L**	**4.3**	**8**	**7.6**	**14**	**152**	**6**	**39.6**	**5.8**	4.3	152	29.7	189
Silicon Dioxide	mg/L	3.9	0.2	3.77	4.69	3.31	0.22	1.96	4.46	0.2	4.69	2.8	184
Bicarbonate as CaCO3	mg/L	68.3	75.6	94	44	39	65	58	60	39	94	63.0	83
Chloride	**mg/L**	**23.1**	**22.6**	**30.5**	**13.4**	**22.3**	**29**	**38.2**	**24.1**	13.4	38.2	25.4	96
Fluoride	mg/L	0.05	0.06	0.09	0.06	<0.05	0.07	0.1	0.05	0.05	0.1	0.1	67
Nitrate as NO3	mg/L	3.4	1.2	1.8	2	3	1.3	1.9	2.5	1.2	3.4	2.1	96
Nitrate as N	mg/L	0.8	0.3	0.4	0.4	0.7	0.3	0.4	0.6	0.3	0.8	0.5	91
Phosphorus as PO4	mg/L	0.092	0.135	0.104	0.353	0.736	0.117	0	0.132	0	0.736	0.2	200
Sulfate	**mg/L**	**23.7**	**21.6**	**35.7**	**14.8**	**12.5**	**24.1**	**48.8**	**28.6**	12.5	48.8	26.2	118
Aluminum, Total	**ug/L**	***50***	**104**	**124**	**308**	**2740**	**112**	**127**	**103**	50	2740	458.5	193
Barium, Total	ug/L	25	30	34	25	58	28	32	30	25	58	32.8	80
Calcium, Dissolved	mg/L	25.9	24.4	38.5	19.1	17.3	28.4	29.6	27.6	17.3	38.5	26.4	76
Calcium, Total	mg/L	25.6	24.3	38.5	19	17.9	28.3	29	27.5	17.9	38.5	26.3	73
Iron, Dissolved	mg/L	0.17	0.07	0.07	0.11	0.04	0.03	0.06	0.28	0.03	0.28	0.1	161
Iron, Total	mg/L	0.56	0.51	0.61	0.81	5.86	0.58	0.71	0.83	0.51	5.86	1.3	168
Magnesium, Dissolved	mg/L	5.56	5.15	8.52	3.82	3.45	6.22	10	6.08	3.45	10	6.1	97
Magnesium, Total	mg/L	5.52	5.19	8.56	3.89	4.29	6.24	9.99	6.06	3.89	9.99	6.2	88
Manganese, Dissolved	ug/L	88	26	48	37	42	53	145	102	26	145	67.6	139
Manganese, Total	ug/L	5.52	5.19	120	53	257	100	223	129	5.19	257	111.6	192
Potassium, Dissolved	mg/L	1.13	1.28	1.69	1.5	1.46	1.58	2.24	1.76	1.13	2.24	1.6	66
Potassium, Total	mg/L	1.1	1.31	1.73	1.54	1.86	1.6	2.24	1.76	1.1	2.24	1.6	68
Sodium, Dissolved	mg/L	13.3	13	18.8	8.6	12.6	17.2	23	14.8	8.6	23	15.2	91
Sodium, Total	mg/L	13.3	12.9	1.73	1.54	12.3	16.9	22.7	14.6	1.54	22.7	12.0	175
Strontium, Total	ug/L	88	79	152	56	54	103	167	110	54	167	101.1	102
Zinc, Total	ug/L	N.D.	N.D	N.D.	*10*	26	*10*	N.D.	N.D.	10	26	5.8	89
Arsenic, Total	ug/L	*0.5*	*0.5*	*0.5*	*0.5*	2.9	<1.0	1.2	<1.0	0.5	2.9	0.8	141
Lead, Total	ug/L	N.D.	N.D.	N.D.	N.D.	5	N.D.	N.D.	N.D.	5	5	0.6	0
TMS Corrected	**mg/L**	**133.55**	**126.68**	**195.74**	**94.28**	**147.03**	**147.03**	**190.5**	**145.81**	94.28	195.74	147.6	70
Calcium Hardness	mg/L	64.7	60.9	96.1	47.7	70.9	70.9	73.9	68.9	47.7	96.1	69.3	67
Total Hardness	**mg/L**	**86.7**	**82**	**131**	**63.5**	**96.4**	**96.4**	**114**	**93.6**	63.5	131	95.5	106

Based on quarterly river sampling for 2006 and 2007. Laboratory analysis performed by PPL Laboratory, Hazleton, PA. Ref. BBNPP Water Balance 38-9080906-001.


TSS Concentration in Susquehanna River Near BBNPP Intake
Concentration of TSS (mg/L)
0
20
40
60
80
100
120
140
160
Feb-06
Mar-06
Apr-06
May-06
Jun-06
Jul-06
Aug-06
Sep-06
Oct-06
Nov-06
Dec-06
Jan-07
Feb-07
Mar-07
Apr-07
May-07
Jun-07
Jul-07
Aug-07
Sep-07
Oct-07
Nov-07
Quarterly Sampling Events 2006-2007


Chloride Concentration in Susquehanna River Near BBNPP Intake
Concentration of Chloride (mg/L)
0
5
10
15
20
25
30
35
40
45
Feb-06
Mar-06
Apr-06
May-06
Jun-06
Jul-06
Aug-06
Sep-06
Oct-06
Nov-06
Dec-06
Jan-07
Feb-07
Mar-07
Apr-07
May-07
Jun-07
Jul-07
Aug-07
Sep-07
Oct-07
Nov-07
Quarterly Sampling Events 2006-2007


Sulfate Concentration in Susquehanna River Near BBNPP Intake
Concentration of Sulfate (mg/L)
0
10
20
30
40
50
60
Feb-06
Mar-06
Apr-06
May-06
Jun-06
Jul-06
Aug-06
Sep-06
Oct-06
Nov-06
Dec-06
Jan-07
Feb-07
Mar-07
Apr-07
May-07
Jun-07
Jul-07
Aug-07
Sep-07
Oct-07
Nov-07
Quarterly Sampling Events 2006-2007