PMBelCOL PEmails

From: Creek, Carolyn P [cpcreek@tva.gov]
Sent: Friday, June 06, 2008 4:51 PM
To: AGAUGHTM@SOUTHERNCO.COM; AMONROE@scana.com; D. Lindgren; David.Waters@pgnmail.com; Dorothy Boland; ED Cummins; erg-xl@cox.net; fredwanz@enercon.com; George Serviere; Joseph Sebrosky; Mallecia Hood; neilhaggerty@comcast.net; Ray, Phillip M; skowkabany@enercon.com; William_Maher@fpl.com; x2gabeck@SOUTHERNCO.COM
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Subject: Copy of letter mailed to NRC on June 6, 2008
Attachments: ER Ltr 08_Attachment A-1_Figure H-8-1 ERCW Pipeline Evaluation[1].pdf; ER Ltr 08 _Attachment A-2_Figure H-8-2 ERCW Trench Location[1].pdf; ER Ltr 08_Attachment A-3 _Table H-8-1 Groundwater Travel Calc[1].pdf; ER Ltr 08_Attachment B_TVA Drawing 7KW0506-KE-06_from NUSTART001-ER-3[1].4-BCALC-001.pdf; ER Ltr 08_Attachment C_H-41_DWG 5 year flood palinNUSTART001-004 S1 RA[1].pdf; Letter to NRC- No. 8 AR Coal Gasification.pdf; TVA Letter - ER Ltr 08 - Enclosure_Response to NRC Info Needs - Hydrology_FINAL to TVA.pdf

Here is a copy of the Letter that was mailed on June 6, 2008.

Carolyn Creek
Management Assistant
Nuclear Generation Development
1101 Market Street, LP 5A
Chattanooga, Tn. 37402
(423) 751-6518 Fax: (423)-751-6509
<<ER Ltr 08_Attachment A-1_Figure H-8-1 ERCW Pipeline Evaluation[1].pdf>> <<ER Ltr 08_Attachment A-2_Figure H-8-2 ERCW Trench Location[1].pdf>> <<ER Ltr 08_Attachment A-3_Table H-8-1 Groundwater Travel Calc[1].pdf>> <<ER Ltr 08_Attachment B_TVA Drawing 7KW0506-KE-06_from NUSTART001-ER-3[1].4-BCALC-001.pdf>> <<ER Ltr 08_Attachment C_H-41_DWG 5 year flood palinNUSTART001-004 S1 RA[1].pdf>>

<<Letter to NRC- No. 8 AR Coal Gasification.pdf>> <<TVA Letter - ER Ltr 08 - Enclosure_Response to NRC Info Needs - Hydrology_FINAL to TVA.pdf>>

Hearing Identifier: Bellefonte_COL_Public_EX
Email Number: 867

Mail Envelope Properties (28921B76CDD05940A918AEEC9EBCA7C007B4BF4D)

Subject: Copy of letter mailed to NRC on June 6, 2008
Sent Date: 6/6/2008 4:51:01 PM
Received Date: 6/6/2008 4:56:07 PM
From: Creek, Carolyn P

Created By: cpcreek@tva.gov

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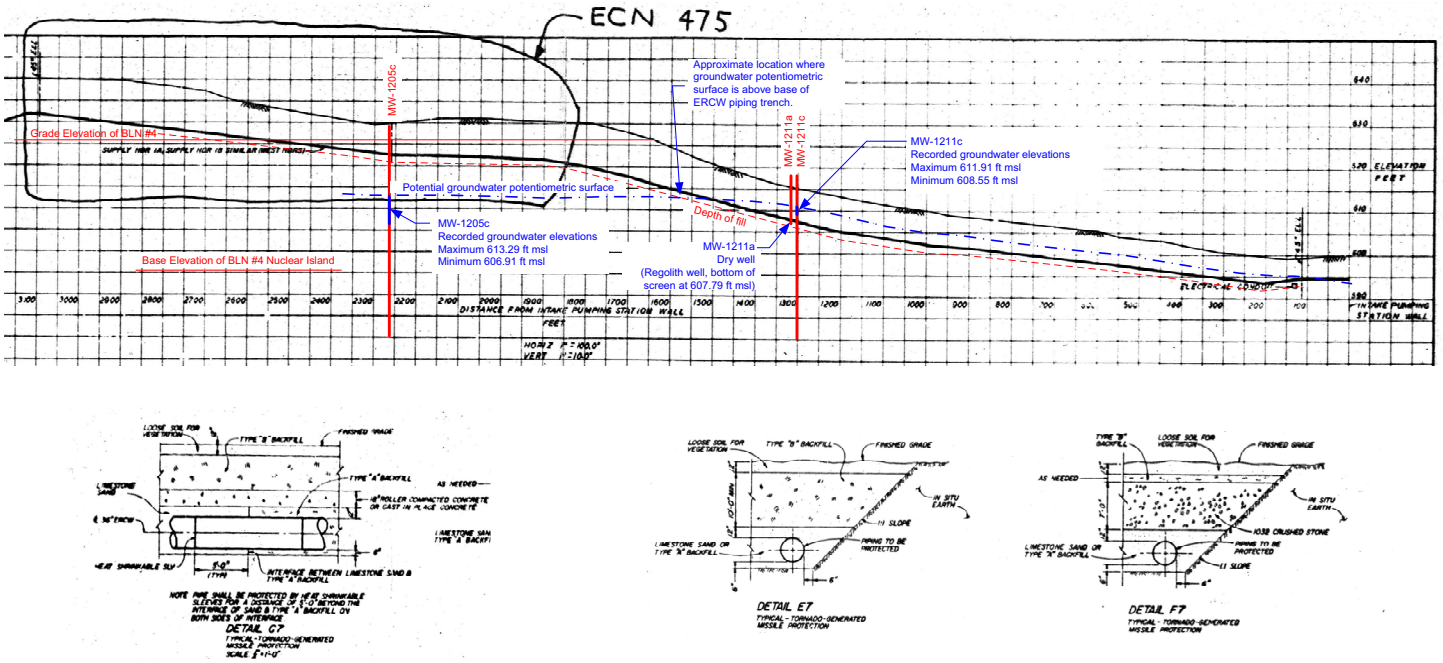
Files	**Size**	**Date & Time**
MESSAGE	828	6/6/2008 4:56:07 PM
ER Ltr 08_Attachment A-1_Figure H-8-1 ERCW Pipeline Evaluation[1].pdf	1793099	
ER Ltr 08_Attachment A-2_Figure H-8-2 ERCW Trench Location[1].pdf	458870	
ER Ltr 08_Attachment A-3_Table H-8-1 Groundwater Travel Calc[1].pdf	24129	
ER Ltr 08_Attachment B_TVA Drawing 7KW0506-KE-06_from NUSTART001-ER-3[1].4-BCALC-001.pdf	485619	
ER Ltr 08_Attachment C_H-41_DWG 5 year flood palinNUSTART001-004 S1 RA[1].pdf	1249333	
Letter to NRC- No. 8 AR Coal Gasification.pdf	604441	
TVA Letter - ER Ltr 08 - Enclosure_Response to NRC Info Needs - Hydrology_FINAL to TVA.pdf	293688	

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



Assumptions:
BLN #4 Grade Elevation – 628.6 ft. msl
BLN #4 Nuclear Island Base Floor Elevation – 595.1 ft. msl
MW-1205c maximum recorded groundwater level – 9/21/06: 613.29 ft. msl
MW-1211c maximum recorded groundwater level – 7/11/06: 611.91 ft. msl
Supply header line depicted shows the centerline of the 36" diameter ERCW pipeline
Projected fill depth is based on 18" ERCW pipeline radius and 6" fill beneath the pipeline.
Due to the quality of the base drawing, all depicted items are approximate in location.

References:
Base map extracted from:
Tennessee Valley Authority, Mechanical Essential Raw Cooling Water:
Drawing 7YW0401-KE-07, Revision 2, April 9, 1982
Drawing 7YW0401-KE-08, Revision 3, August 20, 1978

Figure H-8-1: Elevation Evaluation of Groundwater/Trench Fill Interface

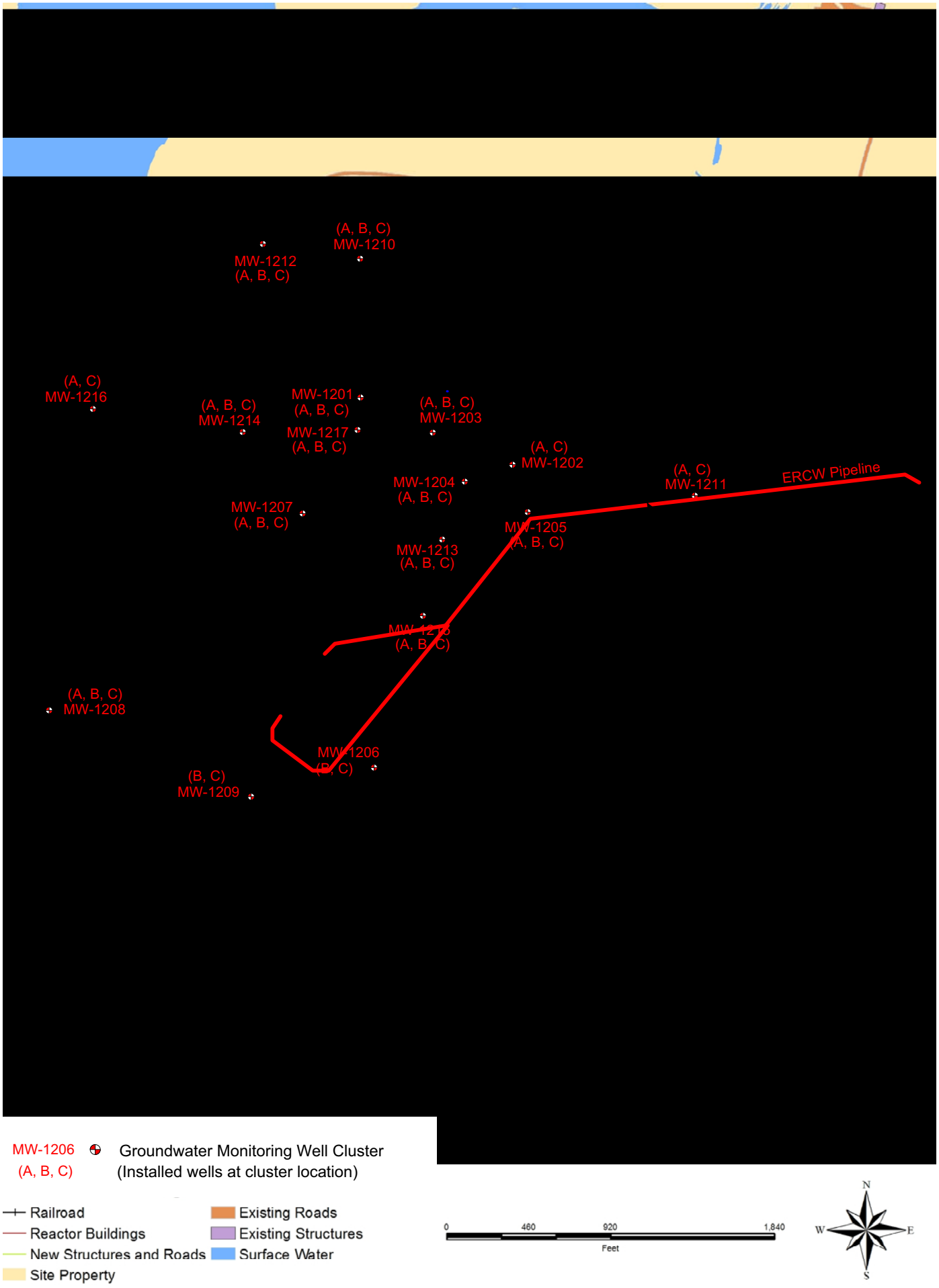


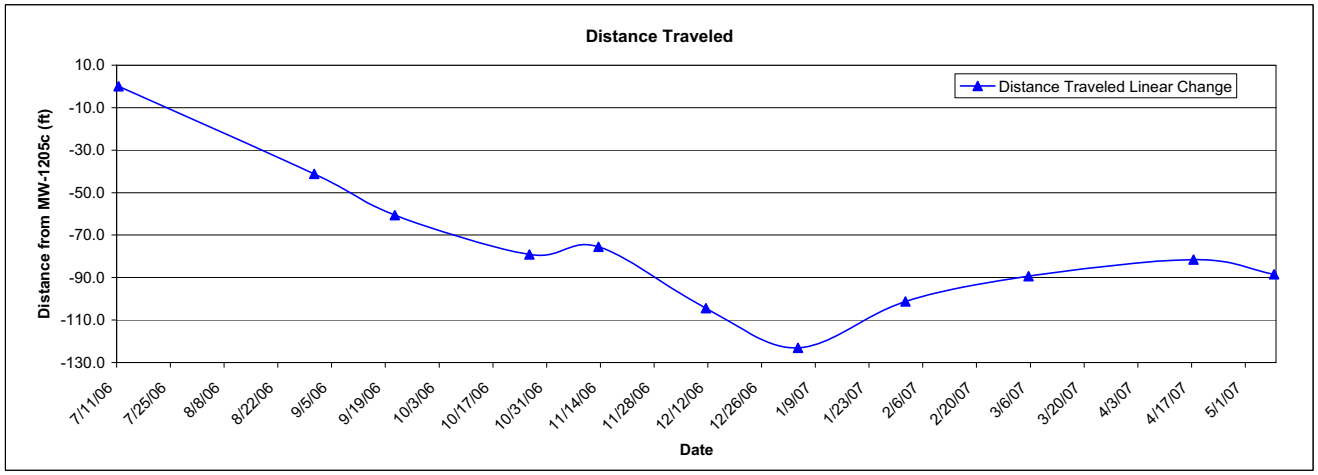
Figure H-8-2: Distance to Groundwater/Trench Fill Interface

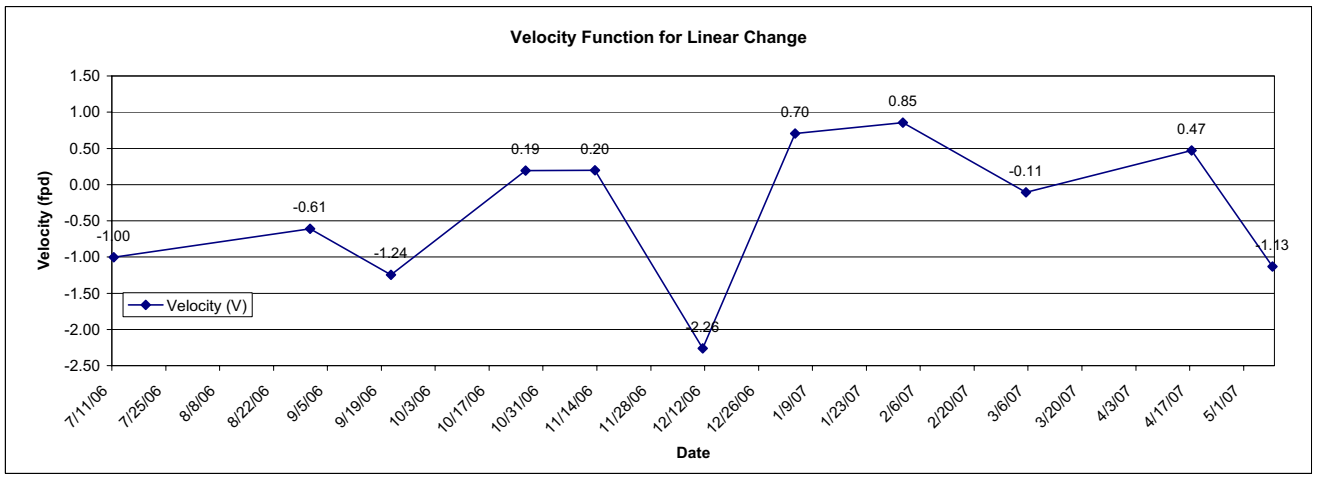
Table H-8-1
Groundwater Travel Distance from MW-1205c to MW-1211c

Date		07/11/06	08/31/06	09/21/06	10/26/06	11/13/06	12/11/06	01/04/07	02/01/07	03/05/07	04/17/07	05/08/07
Elevation High (Eh)	**ft**	607.14	607.95	606.91	611.15	610.98	607.18	612.90	611.61	610.59	610.59	607.41
Elevation Low (El)	**ft**	608.55	608.81	608.66	610.88	610.70	610.36	611.91	610.41	610.74	609.93	609.00
Hydraulic Gradient (Eh-El)/L	**ft**	-1.52E-03	-9.25E-04	-1.88E-03	2.90E-04	3.01E-04	-3.42E-03	1.06E-03	1.29E-03	-1.61E-04	7.10E-04	-1.71E-03
Days			51	21	35	18	28	24	28	32	43	21
Velocity (V)	**ft/day**	-1.00	-0.61	-1.24	0.19	0.20	-2.26	0.70	0.85	-0.11	0.47	-1.13
Distance Traveled	**ft**	0.0	-41.2	-19.5	-18.4	3.5	-28.9	-18.7	21.8	11.9	7.8	-6.9
Total Distance Traveled	**ft**	0.0	-41.2	-60.7	-79.1	-75.6	-104.4	-123.1	-101.3	-89.4	-81.6	-88.5

Pathway Distance (L)	**ft**	930
Hydraulic Conductivity (Kh)	**cm/sec**	4.20E-03
	ft/sec	1.38E-04
	ft/day	11.906
porosity (η)		0.018

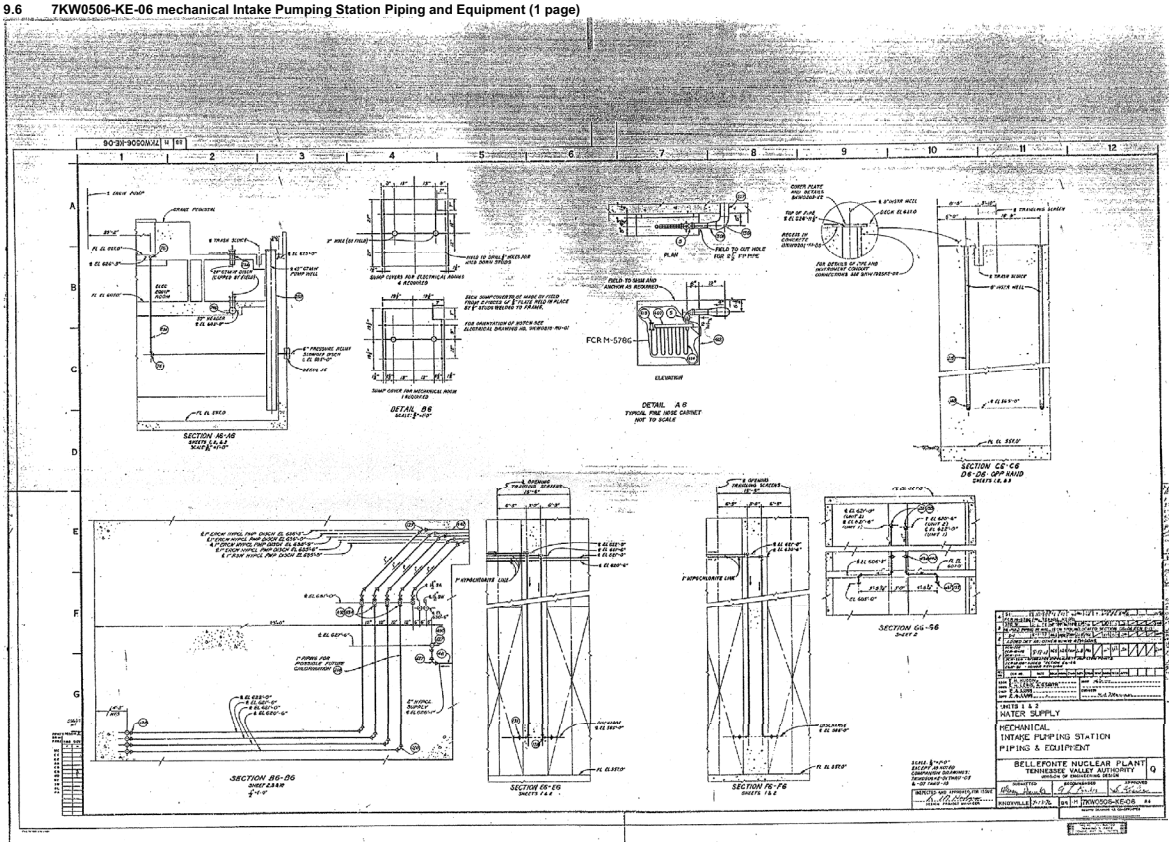
Assumptions: Hydraulic gradient is between MW-1205c (Eh) and MW-1211c (El)
Negative values denote groundwater flow from MW-1211c twords MW-1205c.
Pathway distance is from MW-1205c to MW-11c (930 feet).
Equation for Velocity: V = (Kh (Eh-El)/L)/n Darcy equation for Average Linear Velocity
Equations for Travel Time: T = L/V
Conversions: 1day = 86,400 seconds; 1 foot = 30.48 centimeters; 1 year = 365.25 days
Assupmtion for Total Distance Traveled is that groundwater velocity changes linearly from one interval to the next interval.

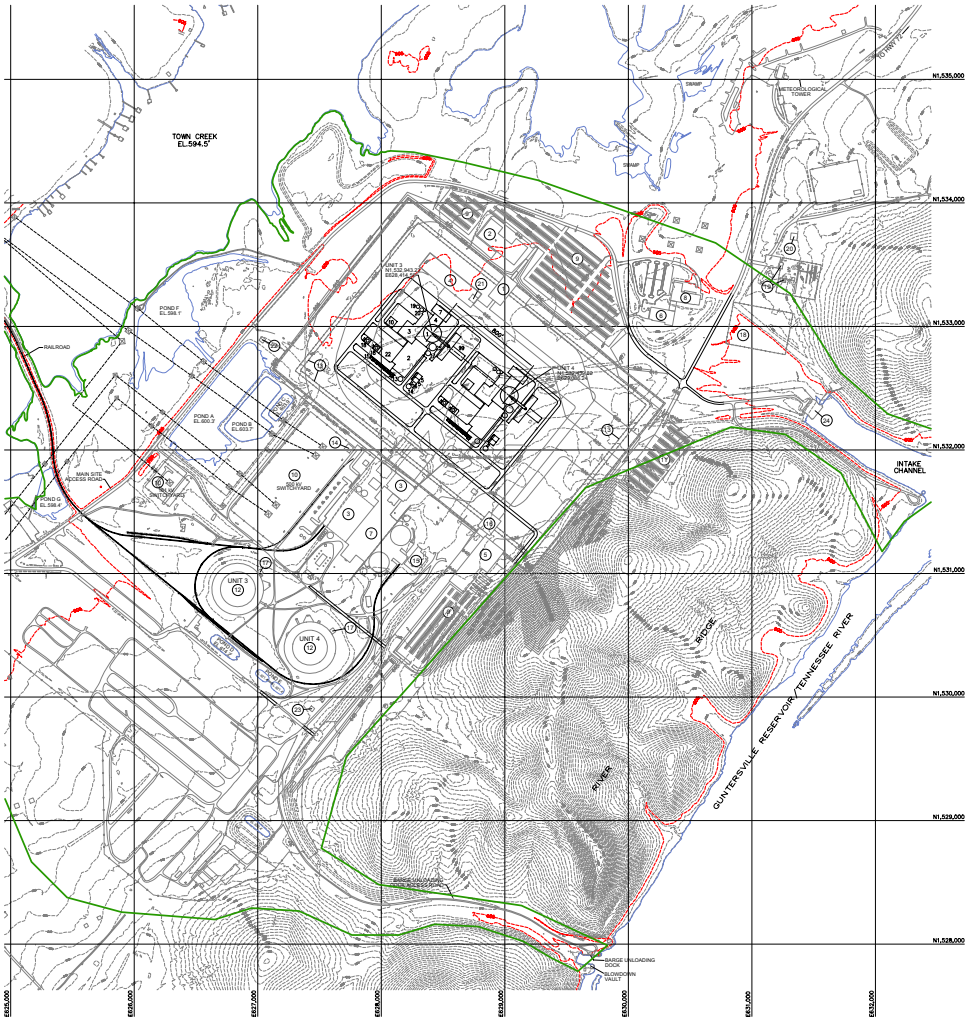




ENERCON SERVICES, INC.	CALCULATION CONTROL SHEET	CALC. NO. NUSTART001-ER-3.4-BCALC-001	
		REV.	1
		PAGE NO.	1 of 1

9.6 7KW0506-KE-06 mechanical Intake Pumping Station Piping and Equipment (1 page)





GRAPHIC SCALE (FEET)
1 INCH = 300 FT

TRUE NORTH
AL EAST GRID (NAD 83)

Bellefonte Nuclear Plant
Flood Elevations

Tennessee River Mile	100-Year Flood Elevation	500-Year Flood Elevation	Landmark
390.00	600.3	601.6	
390.50	600.5	601.8	Barge Loading Area
391.00	600.7	602.1	
391.50	600.8	602.3	Nuclear Plant
392.00	601.0	602.5	
392.10	601.0	602.5	Inlet Channel
393.00	601.3	602.9	
393.57	601.4	603.1	Town Creek

NEW UNITS 3 & 4 GENERATION FACILITY LEGEND:

1. CONTAINMENT/SHIELD BUILDING
2. TURBINE BUILDING
3. ANNEX BUILDING
4. AUXILIARY BUILDING
5. SWS COOLING TOWERS
7. RADWASTE BUILDING
10. DIESEL GENERATOR BUILDING
13. FIRE WATER/CLEARWELL STORAGE TANK
14. FIRE WATER STORAGE TANK
15. TRANSFORMER AREA
17. CONDENSATE STORAGE TANK
18. DIESEL GENERATOR OIL STORAGE TANKS
19. DEMINERALIZED WATER STORAGE TANK
20. BORIC ACID STORAGE TANK
22. TURBINE BUILDING LAYDOWN AREA
25. PASSIVE CONTAINMENT COOLING ANCILLARY WATER STORAGE TANK
26. DIESEL-DRIVEN FIRE PUMP/ENCLOSURE
99. T-PAD FOR CRANE

BUILDING LEGEND:

1. NEW PRIMARY ACCESS PORTAL & SECONDARY ALARM STATION
2. NEW ADMINISTRATION BUILDING
3. REMOVE EXIST BLDGS.
4. NEW MAINTENENCE BUILDING
5. NEW MATERIAL RECEIVING & SALLY PORT BUILDING
6. EXISTING SIMULATOR BUILDING
7. EXISTING UNIT 1 & 2 BUILDINGS
8. EXISTING SITE TRAINING BLDG
9. NEW SITE PARKING
10. EXISTING SWITCHYARD
11. NEW OUTAGE PARKING
12. EXISTING COOLING TOWERS
13. NEW SECURITY FENCE ASSY.
14. NEW SWITCHYARD BUILDING
15. EXISTING STORAGE AREA
16. NEW SECURITY ACCESS BLDG
17. NEW CIRCULATING PUMPS
18. NEW PSO SWITCHYARD FACILITY
19. EXISTING SECURITY RANGE FACILITY
20. NEW SECURITY TRAINING BUILDING
21. NEW TECH SUPPORT CENTER (WITHIN MAINTENENCE BUILDING)
22. NEW H2 STORAGE BUILDING
23. NEW HAZ. WASTE STORAGE BUILDING
24. EXISTING INTAKE PUMPING STATION

POND LEGEND:

POND A - YARD DRAINAGE POND
WWRB - WASTE WATER RETENTION BASIN
POND C - CONCENTRATED CHEMICAL TREATMENT POND (LINED)
POND D - DESILTING POND
POND E - ALUM SLUDGE PONDS

500-YEAR FLOODPLAIN
ARCHAEOLOGICAL APE

NOTES:

1. ELEVATIONS SHOWN ARE BASED ON MEAN SEA LEVEL (MSL).
2. EXISTING CONDITIONS AND TOPOGRAPHIC CONTOURS BASED UPON THE SANBORN MAP COMPANY, INC. PHOTOGRAMMETRIC SURVEY PERFORMED ON MARCH 26,2006 PROJECT NO. 060319.
3. CONTOUR INTERVAL IS 5 FEET.
4. 1000 FOOT GRID AND COORDINATE VALUES ARE BASED UPON AL EAST STATE PLANE COORDINATE SYSTEM NAD 83.
5. THE 500-YEAR FLOOD ELEVATION AT THE BELLEFONTE SITE VARIES FROM ELEVATION 601.8 AT THE BARGE LOADING AREA (TRM 390.5) TO ELEVATION 603.1 AT TOWN CREEK (TRM 393.57). THE TOWN CREEK EMBAYMENT 500-YEAR FLOOD ELEVATION IS ALSO 603.1. THE 605-FOOT CONTOUR HAS BEEN HIGHLIGHTED ON THE MAP TO APPROXIMATE THE 500-YEAR FLOODPLAIN. ANY ACTIVITIES PLANNED BELOW THE 605-FOOT CONTOUR WOULD NEED TO BE REVIEWED DURING THE PLANNING STAGE.

CAD FILE: DWG-NUSTART001-004 S1 RA
THIS IS A COMPUTER GENERATED DRAWING. DO NOT REVISE MANUALLY.

REV	DATE	DESCRIPTION

APPROVALS

PREPARER	DATE
D.RADICE	05/08/2008
REVIEWER	DATE
ENGINEER	DATE
PROJECT MANAGER	DATE

ENERCON SERVICES, INC.
MOUNT ARLINGTON, NEW JERSEY

TVA / BLN

COMBINED OPERATING LICENSE APPLICATION PROJECT
UNITS 3 & 4
500-YEAR FLOODPLAIN AND ARCHAEOLOGICAL APE

DOC. / PROJECT NO.	DOC. NO.	REV.
E NUSTART-001	DWG-NUSTART001-004	A
SCALE 1" = 300'-0"	SHEET 1 OF 1	

DWG-NUSTART001-004 R1

Tennessee Valley Authority, 1101 Market Street, LP 5A, Chattanooga, Tennessee 37402-2801

June 6, 2008

10 CFR 52.79

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

In the Matter of) Docket Numbers 52-014 and 52-015
Tennessee Valley Authority)

NUCLEAR REGULATORY COMMISSION (NRC) – BELLEFONTE NUCLEAR PLANT (BLN) – RESPONSE TO NRC INFORMATION NEEDS RELATED TO RESERVOIR VITAL SIGNS MONITORING REPORTS AND COAL GASIFICATION PROJECT ENVIRONMENTAL IMPACT STATEMENT

Reference: Letter from Ashok Bhatnagar (TVA) to Mr. R. William Borchardt (NRC), "Application for Combined License for BLN Units 3 and 4," dated October 30, 2007

The purpose of this letter is to provide responses to three NRC information needs that were identified by the NRC reviewers during the Environmental Report (ER) site audit conducted at the Tennessee Valley Authority (TVA) Bellefonte Nuclear Plant, Units 3 and 4 (BLN) site during the week of March 31 through April 4, 2008. Because the response to these three requests include the submittal of several large reference documents, TVA opted to submit these documents under this combined information needs response letter.

By the referenced letter, TVA submitted an application for a combined license for two AP1000 advanced passive pressurized-water reactors at the BLN site. Included in the review of a combined license application (COLA) is a week-long environmental site audit during which the NRC staff tours the proposed plant site and environs and reviews the applicable documents that support the information provided in the ER. At the April 4, 2008, exit meeting for the BLN site audit, the NRC staff provided a list of information that was determined to be necessary to complete the review of the ER.

This letter provides the TVA response to two information needs related to Aquatic Ecology (AQ), AQ-04 and AQ-30, and one information need related to Alternatives (Alt), Alt-23. The combined response to AQ-04 and AQ-30 in Enclosure 1 includes the submittal of eight reservoir vital signs monitoring reports from 1991 through 2000 (Attachments A through H to Enclosure 1). The response to Alt-23 in Enclosure 2 includes the submittal of a Final Environmental Impact Statement for a Coal Gasification Project on the Murphy Hill site (Attachment A to Enclosure 2). There are no ER changes as a result of the information needs addressed by this letter.

If there are any questions regarding this application, please contact Phillip Ray at 1101 Market Street, LP 5A, Chattanooga, Tennessee 37402-2801, by telephone at (423) 751-7030, or via email at pmray@tva.gov.

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

Executed on this 6th day of June, 2008.

Jack A. Bailey
Vice President, Nuclear Generation Development

Enclosures
cc: See Page 2

Enclosure 1: Response to NRC ER Information Needs – Aquatic Ecology

Attachments A - H:

A. Tennessee Valley Authority, Water Resources Division, "Reservoir Vital Signs Monitoring – 1991, Summary of Vital Signs and Use Impairment Monitoring on Tennessee Valley Reservoirs," TVA/WR-92/8, July 1992.

B. Tennessee Valley Authority, Water Management, "Reservoir Monitoring – 1992, Summary of Vital Signs and Use Suitability Monitoring on Tennessee Valley Reservoirs," August 1993.

C. Tennessee Valley Authority, Water Management, "Tennessee Valley Reservoir and Stream Quality – 1993, Summary of Vital Signs and Use Suitability Monitoring," Vol. I, May 1994.

D. Tennessee Valley Authority, Water Management, "Tennessee Valley Reservoir and Stream Quality – 1993, Summary of Vital Signs and Use Suitability Monitoring," Vol. II, May 1994.

E. Tennessee Valley Authority, Water Management, "Aquatic Ecological Health Determinations for TVA Reservoirs--1994: An Informal Summary of 1994 Vital Signs Monitoring Results and Ecological Health Determination Methods," April 1995.

F. Tennessee Valley Authority, Water Management, "Aquatic Ecological Health Determinations for TVA Reservoirs--1996: An Informal Summary of 1996 Vital Signs Monitoring Results and Ecological Health Determination Methods," April 1997.

G. Tennessee Valley Authority, Water Management, "Aquatic Ecological Health Determinations for TVA Reservoirs--1998: An Informal Summary of 1998 Vital Signs Monitoring Results and Ecological Health Determination Methods," August 1999.

H. Tennessee Valley Authority, Resource Stewardship, "Aquatic Ecological Health Determinations for TVA Reservoirs--2000: An Informal Summary of 2000 Vital Signs Monitoring Results and Ecological Health Determination Methods," September 2001.

Enclosure 2: Response to NRC ER Information Need – Alternatives

Attachment A:

A. Tennessee Valley Authority, Final Environmental Impact Statement – Coal Gasification Project, July 1981.

cc (Enclosures and Attachments):
M. A. Hood, NRC/HQ

cc (w/o Enclosures and Attachments):
S.P. Frantz, Morgan Lewis
R.C. Grumbir, NuStart
P.S. Hastings, NuStart
R. H. Kitchen, PGN
M.C. Kray, NuStart
A.M. Monroe, SCE&G
C.R. Pierce, SNC
L. Reyes, NRC/RII
M.E .Shields, DOE/HQ
R. F. Smith-Kevern, DOE/HQ
G.A. Zinke, NuStart

RESPONSES TO NRC INFORMATION NEEDS

Hydrology (H)

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

This enclosure provides the status of the NRC information needs related to the NRC review of Hydrology (H) and provides BLN responses to 31 of these "H" Information Needs.

Status of "H" Information Needs

NRC Information Need Number	Status
• H-01	Resolved at BLN site audit.
• H-02	Resolved at BLN site audit.
• H-03	TVA is currently preparing the response to this information need, and expects to provide the requested data files by June 13, 2008.
• H-04	TVA is currently preparing the response to this information need, and expects to provide the requested data files by June 13, 2008.
• H-05	Response provided in this enclosure.
• H-06	Response provided in this enclosure.
• H-07	Response provided in this enclosure.
• H-08	Response provided in this enclosure.
• H-09	TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
• H-10	Resolved at BLN site audit.
• H-11	Response provided in this enclosure.
• H-12	Response provided in this enclosure.
• H-13	Response provided in this enclosure.
• H-14	Resolved at BLN site audit.
• H-15	Resolved at BLN site audit; ER changes provided in this enclosure.
• H-16	Response provided in this enclosure.
• H-16A	TVA is currently preparing the response to this information need, and expects to provide the requested data files by June 13, 2008.
• H-16B	Resolved at BLN site audit.
• H-16C	Response provided in this enclosure.
• H-16D	Resolved at BLN site audit.
• H-16E	Resolved at BLN site audit.
• H-16F	Response provided in this enclosure.
• H-16G	Response provided in this enclosure.
• H-17	Response provided in this enclosure.
• H-18	TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

- H-19 Resolved at BLN site audit.
- H-20 Response provided in this enclosure.
- H-21 TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-22 Resolved at BLN site audit.
- H-23 TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-24 TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-24A Response provided in this enclosure.
- H-24B Resolved at BLN site audit.
- H-25 Resolved at BLN site audit.
- H-26 Response provided in this enclosure.
- H-27 Response provided in this enclosure.
- H-28 Resolved at BLN site audit.
- H-29 Resolved at BLN site audit.
- H-30 This is a duplicate of NRC Information Need H-23.
- H-31 Resolved at BLN site audit.
- H-32 Response provided in this enclosure.
- H-33 Resolved at BLN site audit.
- H-34 Resolved at BLN site audit.
- H-35 This is a duplicate of NRC Information Need H-26.
- H-36 Resolved at BLN site audit.
- H-37 Resolved at BLN site audit.
- H-38 Resolved at BLN site audit.
- H-39 Resolved at BLN site audit.
- H-40 Resolved at BLN site audit.
- H-41 Response provided in this enclosure.
- H-42 TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-43 Response provided in this enclosure.
- H-44 TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-45 TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-45A Resolved at BLN site audit.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

- H-45B Response provided in this enclosure.
- H-46 TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-47 TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-48 TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-49 TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-49A TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-49B TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-49C TVA is currently preparing the response to this information need, and expects to provide its response by June 27, 2008.
- H-50 Response provided in this enclosure.
- H-51 Resolved at BLN site audit.
- H-52 Response provided in this enclosure.
- H-53 Response provided in this enclosure.
- H-54 Response provided in this enclosure.
- H-55 Response provided in this enclosure.
- H-56 Response provided in this enclosure.
- H-57 Response provided in this enclosure.
- H-58 Response provided in this enclosure.
- H-58A Response provided in this enclosure.
- H-59 Response provided in this enclosure.
- H-60 Resolved at BLN site audit.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 2.3.1 Hydrology. Interpretations of the groundwater hydraulic heads in the vicinity of the intake structure and raw water supply line in the 2005 contour maps appear to be highly dependent on Well W29, and not consistent with current data and interpretations (see Section 2.3.1.5.5 and Figures 2.3-22 and 2.3-23). Explain.

BLN INFORMATION NEED: H-05

BLN RESPONSE:

Based on a review of the 2005 geotechnical, geological, and seismological (GG&S) report and the existing TVA water level data from well installation in 1996, it was determined that there was no water in well W29. An exception was noted for the March 2005 reading, in which this well was reported to contain approximately 70 feet of water. Well W29 is 75 feet deep and dry (or no data listed) on all instances except this one. The March 2005 reading from Well W29 was identified to the NRC reviewers during the site audit, and it was agreed that TVA would address this as an anomalous reading.

ASSOCIATED BLN COL APPLICATION REVISIONS:

Revise COLA Part 3, ER Chapter 2, Subsection 2.3.1.5.5, last paragraph, as follows:

> The potentiometric surface maps were compared to historical potentiometric surface maps and were found to show good correlation in groundwater flow and movement, with the exception of one reading for monitoring well W29. Following the installation of this well in 1996, it produced dry readings during all gauging events, except one event in March 2005. The reported groundwater level in W29 from March 2005 is considered an anomalous reading; therefore, this reading is not considered valid and was not used for comparison. Historical groundwater gradient maps from 2005 are presented in Figure 2.3-23 (Sheets 1 - 4).

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 2.3.1.5.4, page 2.3-24. Groundwater Occurrence and Usage. There is considerable discussion of the enlarged joints and fractures, e.g., "…most water producing fractures, both in the epikarst and bedrock aquifers are solutionally enlarged joints and bedding plane fractures." How does this description of the system compare to the conceptual model of the system adopted for analysis and the mathematical representation of travel times reported later in the application. Provide a more comprehensive discussion on how this site is well represented by an equivalent porous media conceptual model?

BLN INFORMATION NEED: H-06

BLN RESPONSE:

The explanation and justification for using an equivalent porous media conceptual model is provided in the second paragraph of ER Section 2.3.1.5.6, as follows:

> "Based on information from present and previous field investigations, the karst system in the area of the BLN facility is poorly developed in that groundwater flow within the aquifer is dominated by poorly integrated pores, joints, and tubes, most with soil or clay fill. Karst aquifers exhibiting these types of groundwater conditions are termed "diffuse-type" karst aquifer systems. Due to the similarities of flow and response to aquifer input and drainage, movement of water through a diffuse karst aquifer is similar to conditions found within a granular (sand, silt, gravel) aquifer system. Movement of water in a granular aquifer can be characterized by use of Darcy's Law; therefore, application of Darcy's Law calculations is appropriate for a diffuse karst aquifer system as found at the BLN (Reference 39)."

The discussion in ER Section 2.3.1.5.4 is enhanced to provide more details.

ASSOCIATED BLN COL APPLICATION REVISIONS:

Revise COLA Part 3, ER Chapter 2, Subsection 2.3.1.5.4, paragraphs 6, 7 and 8, as follows:

> Water seepage into the bedrock dissolves the limestone as it comes in contact with it along preferential flow pathways (joints, fractures, and bedding planes). Most of the solutional ability of the downward percolating water is exhausted in the first 30 ft., resulting in ~~As a result, larger solution channels and~~ solutionally enlarged joints and fractures at the surface of the epikarst zone, which close at depth. ~~and become a leaky, perched aquifer (epikarst aquifer)~~Evidence suggests that most water-producing fractures, both in the epikarst and bedrock aquifers, are solutionally enlarged joints and bedding plane fractures; however, the karst system in the area of the BLN facility is poorly developed and dominated by poorly integrated pores, joints, and tubes, most with soil or clay fill. Within the deeper bedrock

aquifer, a few permeable fractures/solution conduits occur within a relatively impermeable matrix. This results in a moderately permeable epikarst aquifer overlying a deeper, less permeable, bedrock aquifer. ~~Within the bedrock aquifer, a few permeable fractures/solution conduits occur within a relatively impermeable matrix. Evidence suggests that most waterproducing fractures, both in the epikarst and bedrock aquifers are solutionally enlarged joints and bedding plane fractures.~~ Thin shale beds encountered in the bedrock aquifer generally serve as lithologic controls to the movement of groundwater in this regime.

Rainwater percolation downward through the site soils fills the epikarst aquifer~~.~~;~~However~~ however, the rate of water recharge into the epikarst aquifer is much greater than the drainage rate provided by the epikarst and bedrock fractures, joints, and solution channels.~~, resulting in semi-perched conditions.~~ Groundwater slowly drains horizontally through the epikarst aquifer fissures and joints, generally toward Town Creek. The groundwater in the soil and epikarst on the northeastern portion of the site travels down slope to the intake structure channel and into Guntersville Reservoir.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information needs:

H-07: Section 2.3.1.5.6, page 2.3-29. Groundwater Velocity. To what extent has the excavation and placement of backfill for the construction of proposed Bellefonte Units 3 and 4 structures and pipelines been taken into account in the development of groundwater flow directions and groundwater travel times?

H-08: Section 2.3.1 5.7 Hydrology. Hydraulic properties of the backfill materials in the raw water line trench from the original construction are not distinguished from natural materials. However, this man-made feature may present a shortened pathway from Unit 4 to Guntersville Reservoir. Has this been considered? If discounted, why?

BLN INFORMATION NEEDS: H-07 and H-08

BLN RESPONSE:

With the exception of the Unit 1 and 2 essential raw cooling water system (ERCW) pipeline, backfill is not present in the groundwater flow paths from Units 3 and 4 (Units 1 and 2 and associated structures are up- to cross-gradient). Fill material in the parking lot is expected to be removed during construction and was not considered in the analysis of groundwater flow direction and travel times.

A cross-sectional view of the ERCW pipeline is shown in Figure H-8-1 with the current ERCW pipeline trench location shown on Figure H-8-2. This elevation is compared to the groundwater levels noted between Monitoring Well (MW)-1205c near the proposed Unit 4 and MW-1211c on the north side of the ERCW trench. The ERCW trench slopes in accordance with the topography. The ERCW pipeline trench is filled with Grade "A" fill, compacted to 95 percent, with a 1032 gravel top layer (Figure H-8-1, Detail F7).

As shown on the attached Figure H-8-1, groundwater levels reported from MW-1205c are significantly below the Unit 4 end of the ERCW pipeline trench. The probable groundwater potentiometric surface between MW-1205c and MW-1211c is depicted on Figure H-8-1 and shows the average groundwater potentiometric surface would not be above the ERCW pipeline trench bottom until approximately 680 feet from MW-1205c towards the intake structure, as shown on Figure H-8-2. Therefore, any release between MW-1205c and this point would vertically migrate through the soils and bedrock to the groundwater surface.

Groundwater velocities are calculated between MW-1205c and MW-1211c to determine the time that would be required for a release in the vicinity of Unit 4 to reach the point where the potential groundwater surface would intersect the filled portion of the ERCW trench. Calculation results are presented in Table H-8-1.

Using the monthly groundwater elevations in MW-1205c and MW-1211c between July 11, 2006, and May 8, 2007, calculations show that the overall trend of groundwater movement from

MW-1205c would be away from the intake structure, and groundwater from the area of Unit 4 would not migrate towards the intake structure far enough to enter the ERCW trench.

Therefore, the ERCW pipeline fill material is not considered to represent a preferential, shortened pathway for contaminants from Unit 4 to Guntersville Reservoir. [Figures H-8-1 and H-8-2 and Table H-8-1 are provided as Attachments A-1, A-2, and A-3, respectively.]

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

The following are provided as Attachments A-1, A-2, and A-3 to this enclosure:

A-1. Figure H-8-1: Elevation Evaluation of Groundwater/Trench Fill Interface

A-2. Figure H-8-2: Distance to Groundwater/Trench Fill Interface

A-3. Table H-8-1: Groundwater Travel Distance from MW-1205c to MW-1211c

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 2.3.2.4 Future Water Use. In Section 2.3.2.4 the applicant states that the potential construction and operation of Units 3 and 4 was not considered in the future forecast. Describe the process used to create a forecast with emphasis on how the current proposed action was omitted, and describe all other proposed or completed facilities not included. Include comment on the resumed operation at Browns Ferry in 2007, and the planned operation of Watts Bar Unit 2 in 2012.

BLN INFORMATION NEED: H-11

BLN RESPONSE:

The potential construction and operation of BLN (Units 3 and 4) was not considered in the 2004 USGS-TVA water usage forecast for the year 2030, because the construction of Units 3 and 4 was not under serious consideration when the study was conducted. A revised water usage forecast (expected to be published in fall 2008) does account for Units 3 and 4.

Subsection 4.2.1.3 provides an estimate of construction water use for Units 3 and 4: construction activities are expected to require water amounts of approximately 240 to 420 gallons per minute (345,600 to 604,800 gallons per day) for concrete batch plant operation, dust suppression, and sanitary needs. For operation of BLN, a conservative projected maximum water use of 33,972 gpm (17,855 million gallons per year) is derived from flow data presented in Figure 3.3-1.

Subsection 2.3.2.4 is revised to include projections for Units 3 and 4 during construction and operation as noted below. With regards to projected water use, the addition of Watts Bar Nuclear Plant (WBN) Unit 2 in 2012, would increase raw water intake usage at the WBN intake pumping station inflow by an estimated 33 percent.

The USGS-TVA 2030 forecast process included the following assumptions:

- TVA's Browns Ferry Nuclear Plant (BFN) Unit 1 is returned to service using once-through cooling.
- All other new power generation uses cooling towers rather than once-through cooling.
- Growth in new generation could potentially exceed the growth in electrical demand within the TVA Power Service Area, resulting in the region becoming a net exporter of power.
- Uncertainty exists as to whether or not new generation within the TVA Power Service Area will utilize water from the Tennessee River watershed. To account for this uncertainty, the forecast is conservatively based on meeting all growth in electrical demand (within the TVA Power Service Area) with power generation that uses water from the Tennessee River watershed.

- Additional scrubbers at Bull Run, Kingston, and Colbert Fossil Plants, which are expected to consume a total of approximately 5,500 gallons per minute (7.92 million gallons per day) are operational by 2010.

ASSOCIATED BLN COL APPLICATION REVISIONS:

Revise COLA Part 3, ER Chapter 2, Subsection 2.3.2.4, second paragraph, by adding text as follows:

The forecast included projections of total water withdrawals for future thermoelectric, public supply, industrial, and irrigation uses (Reference 2). The potential construction and operation of Units 3 and 4 was not considered in the forecast study~~.~~, because the construction of Units 3 and 4 was not under serious consideration when the study was conducted. However, Subsection 4.2.1.3 provides an estimate of construction water use for Units 3 and 4: construction activities are expected to require water amounts of approximately 240 to 420 gallons per minute (345,600 to 604,800 gallons per day) for concrete batch plant operation, dust suppression, and sanitary needs. For operation of BLN, a conservative projected maximum water use of 33,972 gallons per minute (17,855 million gallons per year) is derived from flow data presented in Figure 3.3-1. The USGS-TVA 2030 water use forecast assumes TVA's Browns Ferry Nuclear Plant Unit 1 would be returned to service using once-through cooling (Reference 9). With regards to projected water use, the addition of Watts Bar Nuclear Plant Unit 2 in 2012 would increase raw water intake usage at the Watts Bar intake pumping station inflow by an estimated 33 percent.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 2.3.2.4 Future Water Use. Provide the required estimate of water use by others projected through duration of COL, including a likely extension period.

BLN INFORMATION NEED: H-12

BLN RESPONSE:

TVA typically does not project water use for an extended period as long as that requested by this information need (license, plus extension period). TVA is in the process of preparing an updated estimate of future water use in the Tennessee River watershed that is expected to be available in fall 2008 and will include water use projections for BLN. The report will provide water use projections for thermoelectric power generation, industry, public supply, and irrigation. The estimate for thermoelectric power generation will be based on TVA's current power supply plan, which forecasts future capacity and generation in the Tennessee Valley.

TVA's estimate of future water use is based on the TVA's power supply, which depends on several forecasts. The first is a forecast of electrical demand, which in the past has been based on an economic forecast of future conditions in the Tennessee Valley. However, forecasts beyond 20 years or so generally are a trending analysis of what was forecast up to that point.

In addition to the demand forecast, TVA makes a determination concerning the appropriate technology for future generation, based on future operating costs of existing and new types of power plants, future fuel costs, constraints such as air quality and other environmental regulations and, most recently, the consideration of a carbon cap. TVA also considers demand side management to reduce the need for new power plants. A few years ago, fuel and operating costs and environmental constraints resulted in combined cycle combustion turbines being more favorable for future power generation than nuclear plants. However, that picture has now changed, and future plant considerations seem to favor more nuclear plants.

One of the most important considerations for siting a plant is the transmission line capacity. Because of the difficulty in locating, permitting, and building transmission lines, the lead time on transmission lines can be even longer than that for power plants themselves. Therefore, the forecast of the future transmission line situation could influence where a power plant is built and even possibly what kind of plant it would be. Given the uncertainty of future economic conditions, fuel costs, and regulations, TVA's current power supply plan reflects only a 20-year planning horizon.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 2.3.2 Water Use. [this topic is also relevant to Water-Use Impacts in both the construction (4.2.2) and operation (5.2.2) sections] The applicant states in Section 2.3.2.2 that "Quantitative estimates for instream water use within the Tennessee River Basin watershed have not been completed to date." The term instream use includes hydroelectric power generation, navigation, and maintenance of minimum streamflow for wildlife habitat. Provide the best available quantitative information on these three instream uses on the Tennessee River and Guntersville Reservoir.

BLN INFORMATION NEED: H-13

BLN RESPONSE:

By correspondence dated May 2, 2008, TVA provided responses to comments made by the NRC reviewers during the sufficiency review of the BLN COLA, including the Applicant's Environmental Report. In response to comment ER35, TVA addressed the NRC reviewer's questions regarding instream water use within the vicinity of the BLN site. Because NRC Information Need H-13 requests the same information as that provided in response to ER35, TVA refers the reviewers to the response provided in TVA's May 2, 2008 letter.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 2.3.3.3.2 Local Groundwater Quality. While the 2nd paragraph of this section discusses prior and current studies of groundwater quality, the tables (Tables 2.3-35 and 2.3-36) do not include groundwater quality data. Explain.

BLN INFORMATION NEED: H-15

BLN RESPONSE:

During the BLN site audit, NRC reviewers noted the potential error in reference to groundwater data in Tables 2.3-35 and 2.3-36. TVA has confirmed the reference to Tables 2.3-35 and 2.3-36 in the second paragraph of Subsection 2.3.3.3.2 to be incorrect. The BLN ER is revised to reference Table 2.3-43 instead of Tables 2.3-35 and 2.3-36 as noted below.

ASSOCIATED BLN COL APPLICATION REVISIONS:

Revise COLA Part 3, ER Chapter 2, Subsection 2.3.3.3.2 (second paragraph, last line), as follows:

> The results from the recent groundwater investigation were generally consistent with historical sampling results, which are summarized in Table~~s 2.3-35 and 2.3-36~~ 2.3-43.

ATTACHMENTS:
None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Table 2.3-42. Composite Results of Radioactivity in Background Groundwater Sampling Results from Wells WT1- WT6 for the Period 1977 – 1983. For an application submitted in 2007 including pre-application data sets collected in 2006, these data are dated. Could updated field data, not available for the Rev 0 application, now be presented as a more viable background dataset?

BLN INFORMATION NEED: H-16

BLN RESPONSE:

Because there are no radiological effluents during the preapplication, site preparation, or construction phase, radiological monitoring to assess the impact of radiological effluent releases was not necessary. Consequently, no preapplication radiological monitoring was performed. As stated in ER Subsection 6.2.1, the preoperational monitoring program, which includes a provision for a full year of groundwater sampling, is to be implemented 2 years before scheduled fuel load.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Provide a copy of the NPDES permit; any existing USACE permits, a 401 certification if one exists

BLN INFORMATION NEED: H-16C

BLN RESPONSE:

During the BLN site audit, TVA provided a copy of the current NPDES Permit (Permit No. AL0024635), dated November 22, 2004. In the April 2, 2008, break-out session on the subject of Permitting, TVA clarified that there are no existing U.S. Army Corps of Engineers (USACE) permits for the BLN site. TVA has subsequently confirmed that no 401 certification exists for BLN.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 2.3.1.3 The list and description of reservoirs within 100 miles of the site should be reviewed to, at a minimum, include Chickamauga Dam and Raccoon Mountain

BLN INFORMATION NEED: H-16F

BLN RESPONSE:

Section 2.3.1.3 identifies the lakes and impoundments that can significantly affect or be affected by BLN operations. The BLN site would not significantly affect or be affected by lakes or impoundments beyond those immediately upstream or downstream of Guntersville Reservoir. This includes Nickajack Reservoir, which extends between approximately 33 and 79 river miles upstream of the BLN site and Wheeler Reservoir, which extends between approximately 43 and 117 river miles downstream of the BLN site. The ER erroneously identified this list of lakes and reservoirs as extending to 100 river miles. This error (100 river mi.) is corrected to identify these lakes and impoundments as those that are within 50 river mi. of BLN. Based on this correction, Chickamauga Dam and Reservoir and Raccoon Mountain Pumped Storage Station are not included in the list of reservoirs; however, these two reservoirs are discussed in Subsection 2.3.1.3.6.

ASSOCIATED BLN COL APPLICATION REVISIONS:

Revise COLA Part 3, ER Chapter 2, Subsection 2.3.1.3, first sentence of first paragraph, as follows:

> Three, large manmade impoundments are located within ~~100~~ 50 river mi. of the BLN site.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 2.3.1.3.6 Chichamauga Dam is listed in this subsection; however, the construction of a lock at this dam is not described. Provide such a description. Include statements regarding the potential change in Tennessee River flows resulting from construction and operation of the lock.

BLN INFORMATION NEED: H-16G

BLN RESPONSE:

In March 1996, TVA issued a Final Environmental Impact Statement (FEIS) to analyze the impacts associated with construction and operation of a lock to replace the existing, deteriorating lock at the Chickamauga Dam. The FEIS found that construction impacts would be localized and few additional operational impacts are expected. Construction of the new lock was determined to have a positive economic benefit, whereas closure of the existing lock would seriously affect migratory fish species and pose economic concerns for upstream industry. In 2003, Congress authorized a 110-ft. by 600-ft. replacement lock to be built riverward of the existing, deteriorating lock, and downstream of the Chickamauga Dam. Construction was initiated in summer of 2007. During 2007, the road relocation and bridge construction were completed, the cofferdam construction was begun, and the lock design continued. Lock construction is scheduled to begin in 2009, with a projected completion date of 2013.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. Revise COLA Part 3, ER Chapter 2, Subsection 2.3.1.3.6, by inserting a new paragraph between existing 5th and 6th paragraphs, as follows:

> Chickamauga Dam is located approximately 80 mi. upstream from the BLN site (Figure 2.3-15) and forms the Chickamauga Reservoir as illustrated in Figure 2.3-17. The Chickamauga Reservoir has a drainage area of approximately 20,790 sq. mi. and a length of nearly 59 river mi. (Reference 30). Construction on Chickamauga Dam began in 1936 and was completed in 1940. Chickamauga provides 784 mi. of shoreline and approximately 36,240 ac. of water surface. Chickamauga Dam is 129 ft. high and stretches 5800 ft. across the Tennessee River (Reference 31). Chickamauga has a normal storage capacity of 392,000 ac.-ft. and maximum storage capacity of 737,300 ac.-ft. (Reference 22). The current Chickamauga lock is 60 ft. x 360 ft., and lifts and lowers river craft approximately 50 ft. between Nickajack and Chickamauga reservoirs. The electrical generating capacity of Chickamauga Dam is 160,000 kW (Reference 31).
>
> In March 1996, TVA issued a Final Environmental Impact Statement (FEIS) (Reference 41) to analyze the impacts associated with construction and operation of a lock to replace

the existing, deteriorating lock at the Chickamauga Dam. The FEIS found that construction impacts would be localized and few additional operational impacts are expected. Construction of the new lock was determined to have a positive economic benefit, whereas closure of the existing lock would seriously affect migratory fish species and pose economic concerns for upstream industry.

In 2003, Congress authorized construction and operation of the 110-ft. x 600-ft. replacement lock to be built riverward of the existing, deteriorating lock, and downstream of the Chickamauga Dam. Construction was initiated in summer of 2007. During 2007, the road relocation and bridge construction were completed, the cofferdam construction was begun, and the lock design continued. Lock construction is scheduled to begin in 2009, with a projected completion date in 2013. (Reference 42).

TVA has two active nuclear power plants located on the west bank of the Chickamauga Reservoir: the Sequoyah Nuclear Plant and the Watts Bar Nuclear Plant (Figure 2.3-17).

2. Revise COLA Part 3, ER Chapter 2, Subsection 2.3.4, by adding Reference 41, as follows:

41. Tennessee Valley Authority, Chickamauga Dam – Navigation Lock Project Final Environmental Impact Statement, March 1996.

42. U.S. Army Corps of Engineers, Chickamauga Lock Replacement Project, Website, http://www.lrn.usace.army.mil/pao/chickamaugalock/, accessed April 28, 2008.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 2.6 Geology. Provide a concise statement regarding the presence or absence of karst geologic structures and hydrogeologic features underlying the Bellefonte site.

BLN INFORMATION NEED: H-17

BLN RESPONSE:

As stated in ER Section 2.6, NUREG-1555 does not require a geologic description and allows referencing the FSAR. A short geologic description and references to FSAR Section 2.5 are presented in ER Section 2.6. FSAR Subsection 2.5.4.1 provides details related to karst geologic structures and groundwater features for the BLN site. FSAR Subsection 2.5.1.2.6 provides an engineering evaluation of karst geologic features and states, "Karst-related ground failure or subsidence due to underground dissolution of limestone is judged to be a geologic hazard to the BLN site, however, the hazard to the Units 3 and 4 power blocks is anticipated to be minor and thus can be mitigated during excavation and construction activities."

In addition, a conclusion regarding karst features is provided in FSAR Subsection 2.5.4.1.3.4, which states, "Extensive review of existing data, historical construction photographs, and subsurface exploration data at the Unit 3 and 4 power block construction zone document minor karst features that are not expected to affect the stability of foundations at the Units 3 and 4 safety-related structures. Most rock containing cavities occurs within 10 to 20 ft. of the top-of-rock and is removed during excavation. Based on experience at the Bellefonte Units 1 and 2 excavation, rock conditions are excellent and minor cavities are remediated."

Bases on the detail provided in FSAR Section 2.5 as referenced in ER Section 2.6, and guidance provided in NUREG-1555, TVA does not consider the provision of additional information related to karst geological and hydrogeological features in ER Section 2.6 to be warranted.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 3.4.1 Description and Operational Modes (of the Cooling System) Section 3.4.1.2 provides the timing of operational modes, and Table 3.4-1 and 3.4-2 provide the estimated heat transfer and raw water demand for the modes. However, on inspection, the startup water demand and startup heat transfer (dissipated to atmosphere and released in liquid) appear out of sync for CWS. Also confirm other values in these two tables, and if correct as issued then Table 3.4-2 should include a footnote accounting for the water neither consumed nor discharged.

BLN INFORMATION NEED: H-20

BLN RESPONSE:

While circulating water system (CWS) flow is initially zero, startup heat transfer value is conservatively based on 40 percent of full load main steam flow to the main condenser as a representation of heat dissipated. [See Note (c) of Table 3.4-1].

The value for "Heat released in liquid discharges by CWS" for the Power Operation mode of operation in Table 3.4-1 contains a typographical error. The value of 41.4×10^7 Btu/hr should be 41.4×10^6 Btu/hr. The ER Table 3.4-1 is revised to correct this typographical error, as shown below.

The consumptive usage values for screen wash, filter backwash, and water treatment are not included in Table 3.4-2 due to their minimal impact on the raw water system (RWS) withdrawal. However, these usage values are depicted in the water balance summary (ER Figure 3.3-1). ER Chapter 3 is revised to provide clarification for Table 3.4-2, as shown below.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. Revise COLA Part 3, ER Chapter 3, Table 3.4-1 as follows (only affected line and column shown):

   Revise the value of "Heat Released in Liquid Discharges by CWS (Btu/hr[(a)(b)]) for the Power Operations mode of operation as follows:

   41.4 x ~~10^7~~ 10^6

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

2. Revise COLA Part 3, ER Chapter 3, Table 3.4-2 to add note (a) as follows (only added text shown):

   a) Consumptive usage values for screen wash, filter backwash, and water treatment are not included in this table due to their minimal impact on RWS withdrawal. These usage values are depicted on the water balance summary (Figure 3.3-1).

   This note applies to the column heading for "RWS Withdrawn (gpm)," which is annotated with a superscripted citation to this note (a).

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> 3.3.2.1 Please check and confirm that the list of chemicals provided, (i.e., Table 3.6-1), includes chemicals required for both operation and maintenance. Also check to ensure that seasonal variations in chemical treatment are addressed.

BLN INFORMATION NEED: H-24A

BLN RESPONSE:

By correspondence dated May 2, 2008, TVA provided responses to comments made by the NRC reviewers during the sufficiency review of the BLN COLA, including the Applicant's Environmental Report. In response to comment ER60, TVA addressed the NRC reviewer's questions on chemicals to be used, chemical concentrations, and seasonal variation of chemical concentrations. Because NRC Information Need H-24A requests much of the same information as that provided in response to ER60, TVA refers the reviewers to the response provided in TVA's May 2, 2008 letter.

With regard to information on chemicals used for maintenance, ER Table 3.6-1 referenced in the May 2, 2008, letter does not consider chemicals used in maintenance of the various water systems (e.g., equipment cleaning, flushing of tanks, degreasing, etc.), as these chemicals would be specified by the equipment manufacturers or vendors. Because such equipment has not yet been specified or procured, this information is not available.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:
None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 4.2.1 Hydrological Alternations. The hydrology impacts section may rely on statements by the applicant that Best Management Practices (BMPs) will be followed, and on detailed descriptions of BMPs that appear in the ER. Provide detailed lists and descriptions of BMPs to be applied at Bellefonte, or provide a copy of the Stormwater Pollution Protection Plan (SWPPP) that contains this information.

BLN INFORMATION NEED: H-26

BLN RESPONSE:

A Stormwater Pollution Prevention Plan (SWPPP) has not been developed yet for BLN (Units 3 and 4). However, the BLN Spill Prevention Control and Countermeasure Plan (SPCCP) was completed in December 2007. Appendix K in the SPCCP document, which contains process water, wastewater, and stormwater BMP plan information, is provided as Attachment B.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

The following document is provided as Attachment B to this enclosure:

B. BLN SPCCP – Appendix K (Process Water, Wastewater, and Stormwater BMP Information)

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information needs:

H-27: Section 4.2.1.3, page 4.2-4. Water Resource Use and Consumption. Will the existing raw water supply system, following its renovation, be used to provide water during construction? If a different system is to be employed, describe its location, components, etc.

H-32: Section 4.2.1.8, page 4.2-6. Effect of Alterations on Water Users. The applicant states "Water for temporary fire protection, concrete batching, and other construction uses is expected to be obtained from an off-site source or Guntersville Reservoir." Describe the likely off-site sources. {may be related to response to H-27}

BLN INFORMATION NEEDS: H-27 and H-32

BLN RESPONSE:

Following maintenance dredging of the intake canal and renovation of the intake structure, TVA plans to use the existing raw water system (RWS) to provide water during construction. The RWS provides water for temporary fire protection, concrete batching, and other construction uses. ER Subsection 4.2.1.8 is revised to reflect TVA's decision to use the RWS as the construction water source.

ASSOCIATED BLN COL APPLICATION REVISIONS:

Revise COLA Part 3, ER Chapter 4, Subsection 4.2.1.8, third paragraph as follows:

> Potable water is supplied by the Scottsboro Municipal Water System (Table 2.3-31). Water for temporary fire protection, concrete batching, and other construction uses is expected to be obtained from ~~an off-site source or~~ Guntersville Reservoir. Groundwater is not expected to be used during construction. Environmental impacts to groundwater would be SMALL and are handled by state programs for environmental releases.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY and AQUATIC ECOLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information needs:

H-41: Section 5.2.2 Water-Use Impacts. [also relevant to Section 5.2.1.6 Operational Activities, Section 5.5.1 Nonradioactive Waste Systems Impacts, and Section 6.3 Hydrological Monitoring] Provide information on the planned frequency and magnitude of dredging activities in the vicinity of the facility intake and discharge structures, and the proposed practices and measures to be employed to control or limit operational impacts. Identify the on-site area to be used for dredge spoil deposition. Assuming a figure is used to identify the on-site disposal area, also show the 500-yr flood elevation.

AQ-23: Page 4.2-8. Has the intake ever been dredged? How often do you anticipate it will need to be dredged?

BLN INFORMATION NEEDS: H-41 and AQ-23

BLN RESPONSE:

The original dredging of the intake channel and construction of the pumping station at the BLN site was completed in 1977. The intake channel was last dredged in January 1987. Divers inspected the channel in the 1990s and reported that the channel would need desilting prior to completing the plant and running the pumps at the intake. As stated in Subsection 6.3.4, a bathymetric survey of the intake channel is expected following the first year of operation to measure sediment build up and determine future dredging intervals. Currently, maintenance desilting in the area of the BLN intake structures is expected to be conducted approximately every 12 to 15 years, based on the maintenance desilting conducted at the nearby Widows Creek Fossil Plant. The extent of desilting of the intake canal is expected to include the 200-ft.-wide base of the intake canal, with particular concentration on the 25-ft.-wide channel cut in the center of the intake canal. Maintenance dredging of the discharge line is not anticipated during operation, because the mixing action of the diffuser and the river flow at this location (approximately 300 feet out in Guntersville Reservoir) are expected to minimize sedimentation rates. No desilting activities are anticipated for the discharge structure and associated piping other than an inspection to evaluate the discharge structure and piping physical condition. Impacts of these maintenance activities, as stated in the ER, are expected to be minimal.

The response to Information Need AQ-24 (provided in TVA Letter ER06, Enclosure 2) provides a description of the practices and measures to be employed to control or limit operational impacts.

A drawing that illustrates the on-site area to be used for dredge spoil deposition, as well as the 500-year flood elevation and archaeological area of potential effect (APE), are provided as Attachment C.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

The following illustration is provided as Attachment C to this enclosure.

C. BLN Site Drawing Illustrating 500-Year Floodplain and APE

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 5.2.1.6 page 5.2-3. Operational Activities Causing Other Hydrologic Alterations. Periodic maintenance dredging is described, and elsewhere in the application it is made clear that raw water is required during all modes of plant operation. Is there a conflict in these statements? How would water be provided during dredging or de-silting the intake channel?

BLN INFORMATION NEED: H-43

BLN RESPONSE:

The service water system (SWS) cooling tower basin has a 12-hour raw water hold-up capacity (see DCD Tier 2, page 9.2-3), which allows continued operation of both Units 3 and 4 during the maintenance dredging (desilting) of the intake channel. Prior to initiating maintenance dredging activities, TVA will assess the planned activity to determine whether the location and duration of the dredging activity would be expected to impact plant construction operations. If the maintenance dredging operation is in a location that would have an adverse affect on raw water quality and the duration of the operation is greater than the hold-up capacity of the SWS cooling tower basin, an alternate makeup water supply may be provided.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

5.2.2.8 The text lists and describes six cases; however, nine are described elsewhere. Why were only six described here.

BLN INFORMATION NEED: H-45B

BLN RESPONSE:

A comparison of the information presented in Subsection 5.2.2.8 to that in Subsection 5.3.2.1 confirmed that there are three additional temperature/flow conditions in Subsection 5.3.2.1 that should have been included in Subsection 5.2.2.8. Accordingly, Subsection 5.2.2.8 is revised for to be consistent with Subsection 5.3.2.1.

During the review of ER Subsection 5.2.2.8 in preparation of the response to this information need, TVA identified an inconsistency between the 14,450 gpm blowdown flow value for two cooling towers in this subsection and the 15,828 gpm value presented throughout Chapter 5. Based on the confirmation of the accuracy of the 15,828 gpm value, the value in Subsection 5.2.2.8 is corrected to reflect this 15,828 gpm value.

ASSOCIATED BLN COL APPLICATION REVISIONS:

Revise COLA Part 3, ER Chapter 5, Subsection 5.2.2.8, paragraph 1, as follows:

An analysis of thermal plumes resulting from the BLN effluent discharges was done for ~~conditions of (1) low river temperature at maximum downstream flow, (2) mean river temperature at maximum downstream flow, (3) high river temperature at maximum downstream flow, (4) low river temperature at maximum reverse river flow, (5) mean river temperature at maximum reverse river flow and (6) high river temperature at maximum reverse river flow (Subsection 5.3.1.2).~~ these conditions:

- Low river temperature, 7Q10 downstream flow (Figure 5.3-3)
- Mean river temperature, 7Q10 downstream flow (Figure 5.3-4)
- High river temperature, 7Q10 downstream flow (Figure 5.3-5)
- Low river temperature, reversing river flow (Figure 5.3-6)
- Mean river temperature, reversing river flow (Figure 5.3-7)
- High river temperature, reversing river flow (Figure 5.3-8)
- Low river temperature, maximum reverse river flow (Figure 5.3-9)
- Mean river temperature, maximum reverse river flow (Figure 5.3-10)

• High river temperature, maximum reverse river flow (Figure 5.3-11)

The circulating water systems blowdown flow rate was assumed constant at ~~approximately 14,450~~ 15,828 gpm. However, a conservative rate of 16,000 gpm was used for the CORMIX2 runs. This 16,000 gpm flow rate represents the total of maximum blowdown, plus other miscellaneous effluents, from the new facility. ~~For the maximum river flow, low river flow, and maximum reverse river flow case and the high, median, and low river temperatures, a~~ A plume model was developed for each case to determine the plume characteristics. Summaries of the predicted plume analysis data are provided in Table 5.3-2, and additional information is presented in Subsection 5.3.2.1.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 5.5.1 Nonradioactive Waste System Impacts. With regard to the nonradioactive waste systems, are all laboratory wastes discharged to Town Creek? Are all laboratory wastes categorized as nonradioactive? Provide clarification on the routing and discharge / disposal of laboratory waste for the proposed plants.

BLN INFORMATION NEED: H-50

BLN RESPONSE:

The BLN laboratory drains, including floor drains, are routed to the liquid radioactive waste (WLS) system and may eventually be discharged to Guntersville Reservoir, not Town Creek. Other laboratory drains are routed via the WLS chemical waste tank, to the mixed waste system and processed as mixed waste.

Laboratory drains, including floor drains, are routed to the WLS chemical waste tanks for processing. The WLS chemical waste tank inputs are limited to laboratory and decontamination drains. The waste tank contents are recirculated and sampled to determine appropriate action for disposal, which could include: shipment to a mixed-waste disposal facility or chemical treatment (e.g., neutralization) and routing to the WLS waste hold-up tank for treatment and release with floor drains. In the absence of a licensed off-site disposal site, mixed waste would be stored on-site in a segregated, monitored, restricted area until an off-site repository is available. The contents of the waste hold-up tanks are processed and pumped to one of the WLS monitoring tanks, sampled, and assuming the contents are acceptable for discharge, discharged to the environment through the monitored effluent discharge line. The discharge line includes a radiation monitor at outfall DSN003e (see Figure 2.3-26).

During the review of this information need, TVA identified the need for several ER text changes to consistently address the laboratory drains discharge path through DSN003e, rather than DSN007 and Town Creek, during BLN operation.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. Revise COLA Part 3, ER Chapter 5, Subsection 5.5.1.1.3, second paragraph, as follows:

   Discharges from floor drains are components of wastewater discharged to the WWRB and composed of building sumps and floor drains, and other miscellaneous low-volume wastewaters. Floor drain discharges are also made from outfall DSN007, consisting of Simulator Training Facility sanitary wastewaters~~,~~ and equipment room floor drains.~~, and laboratory wastewaters.~~ Laboratory floor drains will routed to the liquid radioactive waste management system and eventually discharged to Guntersville Reservoir from outfall DSN003E.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

2. Revise COLA Part 3, ER Chapter 6, Subsection 6.3.1, third bullet as follows:

   - Monitoring point DSN007 includes the Simulator Training Facility treated sanitary, equipment room floor drains, and laboratory wastewaters discharged into the site sanitary system. (Units 3 and 4 laboratory waste will not be discharged from DSN007.) Flow rate is measured during operation.

3. Revise COLA Part 3, ER Chapter 6, Table 6.6-1 by adding Note (r), which applies to the definition of DSN007 under the heading "Monitoring DSN and Discharges", as follows:

   DSN007: Simulator Training Facility treated sanitary, equipment room floor drains, and laboratory wastewaters [(r)]

   r) Laboratory waste for Units 3 and 4 will not be discharged through DSN007.

4. Revise COLA Part 3, ER Chapter 5, Subsection 5.5.1.1, second paragraph, as follows:

   The BLN site-specific NPDES permit (Permit Number AL0024635) became effective on December 1, 2004, and expires on November 30, 2009. Table 6.6-1 lists the discharge streams (systems) to be sampled, location of sampling stations (outfall DSNs), constituents to be monitored or sampled, frequency of sampling, type (method) of sample collection (e.g., surface grab or depth composite), and time period for required monitoring (monitoring frequency) under the permit. Discharge locations are shown on Figure 2.3-26. (Note: The routing of laboratory waste for Units 3 and 4 differs from that proposed for Units 1 and 2. Units 3 and 4 laboratory wastewater is treated as liquid radioactive wastewater and is not discharged through DSN007.) Table 3.6-1 lists the anticipated chemicals used and residual concentrations within the waste streams discharged from the facility that are used in establishing the NPDES monitoring requirements

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 6.1 Thermal Monitoring. Among the many figures listed in Section 6.1, which would be best to show state of Alabama representatives as an example of where routine thermal monitoring (a) was planned to occur for Units 1 and 2, and (b) may occur for Units 3 and 4? Aside from Figure 2.3-9 showing the bathymetric survey which yielded temperatures during a 3-day period in 2006, which figures show where thermal monitoring has ever occurred at the Bellefonte site?

BLN INFORMATION NEED: H-52

BLN RESPONSE:

Figure 2.3-9 illustrates the thermal monitoring survey conducted at the BLN site in 2006. No figures exist for routine thermal monitoring. However, as part of the current state-issued NPDES permit for Units 1 and 2, temperature monitoring requirements apply to DSN003, the outfall for cooling tower blowdown and other wastewater from electric power generation. Figure 2.3-26 provides the location of outfall DSN003.

Prior to operation of Units 3 and 4, a revised NPDES permit will be obtained from the state. Confirmation of the use of outfall DSN003 for temperature monitoring is expected at that time. Quarterly (seasonal) temperature measurements performed in the vicinity of the BLN from 2006 and 2007 are provided in Table 2.3-39 for locations shown on Figure 2.3-27. Other aspects of temperature effects from plant operation, including CORMIX modeling for thermal plume considerations, are discussed in Subsection 5.3.2.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 6.1.1 Pre-application Monitoring, and Section 6.1.2 Preoperational Monitoring. Provide copies of correspondence regarding consultation with ADEM and their concurrence with the approach used for both the pre-application and pre-operational monitoring program. If only email traffic is available, provide the name of contact at the ADEM and a brief summary of their concurrence statement.

BLN INFORMATION NEED: H-53

BLN RESPONSE:

E-mail correspondence was conducted in August 2006 with Charles Reynolds, an environmental engineer in the Water Quality Branch of the Alabama Department of Environmental Management (ADEM). ADEM provided guidance and insight on the approach to be used and the parameters that must be considered for the preoperational monitoring program. The correspondence included the ADEM's rationale for preapplication mixing zone model evaluations performed in 1997 and guidance for mixing zone criteria. ADEM did not identify a requirement for formal concurrence, although it is understood that ADEM's confirmation at the time of permitting would likely address the use of the latest CORMIX model and conservative water quality protection criteria.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 6.2 Radiological Monitoring. Does the applicant plan to adopt the program initiated within the industry through the Nuclear Energy Institute regarding the monitoring for radioactivity in groundwater?

BLN INFORMATION NEED: H-54

BLN RESPONSE:

The NEI guidance that delineates recommended actions for a groundwater protection program is provided in NEI 07-07, *Industry Ground Water Protection Initiative - Final Guidance Document*. TVA has opted not to adopt this guidance in its entirety at this time; however, as addressed in FSAR Subsection 11.5.7, TVA has adopted NEI 07-09, *Generic FSAR TEMPLATE Guidance for Offsite Dose Calculation Manual (ODCM) Program Description*. NEI 07-09 embodies important aspects of NEI 07-07, including the notification and reporting requirements in the Groundwater Protection Initiative section of the ODCM. In addition, various aspects of the BLN Groundwater Monitoring Program, summarized in FSAR Subsection 12AA.5.4.13, are incorporated into the Radiation Protection Program described in FSAR Chapter 12, Appendix 12AA. These program aspects address specific locations for plant design features to facilitate effective groundwater monitoring and implementation considerations in the event groundwater contaminants are identified.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 6.6.4 Operational Monitoring. Provide a figure showing the locations where waste streams will be sampled prior to and during discharge to all DSNs listed in the NPDES permit. The purpose of the figure is to demonstrate the control achieved on the discharges made, and the assurance that one knows preset limits are being met prior to discharge occurring.

BLN INFORMATION NEED: H-55

BLN RESPONSE:

The waste stream discharge points for the current NPDES permit are shown on Figure 2.3-26. The NPDES permit directs samples to be taken at the nearest accessible location just prior to discharge and after final treatment. The actual sampling point locations will be identified by qualified individuals familiar with the systems and the NPDES permit requirements.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information need:

> Section 9.4.1.2.2 Dry Cooling Towers. Other portions of Section 9.4.1 make a remark to the effect "… since there have not been any significant technology changes in … technology since 1974." If this is not true of dry cooling, then some discussion of the change in the technology should be added. The concluding statement that the dry cooling towers were not viable for Bellefonte Units 1 and 2, and the conclusion is still valid for Units 3 and 4, implies no change. If technology changes have occurred, dry cooling may remain not viable; however, the narrowing of the difference between valid and not valid should be described or quantified.

BLN INFORMATION NEED: H-56

BLN RESPONSE:

Statements from other subsections within ER subsection 9.4.1 are not relevant to Subsection 9.4.1.2.2. There have been some developments in thermodynamic materials that would aid in the overall size of the dry cooling tower, but these changes would not affect the dry cooling tower's output temperature. Dry cooling tower outputs closely follow the dry bulb temperatures of the area and are limited due to entropy of the system.

The cooling tower approach temperature can be varied with the cooling tower size with the best approach temperature being approximately 10ºF. Therefore, at a dry bulb temperature of 98ºF, the best outlet temperature that could be obtained and would be 108ºF. This type of an approach temperature would require a very large cooling tower, on the order of .25 to 1.0 mi^2. Furthermore, these high outlet temperatures would have a significant impact on the plant's electrical generating capacity along with the additional parasitic losses due to the high velocity fans being used in these towers. The Environmental Protection Agency (EPA) expressed these adverse attributes of dry cooling technology in their considerations associated with the final rule on NPDES regulations addressing cooling water intake structures for new facilities. ER Subsection 9.4.1.2.2 is revised to address the EPA's considerations.

ASSOCIATED BLN COL APPLICATION REVISIONS:

Replace COLA Part 3, ER Chapter 9, Subsection 9.4.1.2.2, last paragraph, as follows:

~~Considering the production cost penalty and technical obstacles with respect to the previously mentioned advantages, it was concluded that dry cooling towers were not a viable alternative heat dissipation method for Bellefonte Units 1 and 2. This conclusion is still valid for BLN Units 3 and 4.~~ The adverse considerations associated with the use of dry cooling tower systems at new facilities was addressed in the preamble to EPA's final rule on NPDES regulations addressing cooling water intake structures for new facilities. The EPA determined that dry cooling is not the

best technology available for minimizing adverse environmental impacts, in part, because the technology of dry cooling carries costs that are sufficient to pose a barrier to entry to the marketplace for some projected new facilities, and dry cooling technology has some detrimental effects on electricity production by reducing the energy efficiency of steam turbines. Therefore, dry cooling tower systems should only be considered if water supply is an issue. Because Guntersville Reservoir provides an adequate water source for BLN, it follows that dry cooling tower systems should not be considered for the BLN site.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY and Alternatives

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information needs:

H-57: Section 9.4.1.2.3 Mechanical-Draft Cooling Towers. Is the final remark really supportable, i.e., "…since there have not been any significant technology changes in MDCT systems." Really? The applicant believes there has been no significant change in this technology since 1974? Why would the statement "new non-metallic heat exchanger technologies may be used to minimize cost and fouling with improved corrosion resistance" made on page 9.4-11 not apply?

H-58: Section 9.4.1.2.5 Spray Canals. The applicant states, "About twice as much fogging and seven times as much icing would occur with spray canals when compared to NDCTs." However, on page 9.4-4 the applicant states with regard to NDCTs that "Ground level fogging and icing are generally not a problem with large NDCTs. Surface fogging … rare….unlikely that fogging would occur. … because fogging is rare, icing events are not expected." So, are we in general saying that two and seven times zero is zero? Or should the spray canal numbers be reverse engineered and used to assign frequencies to fogging and icing for the NDCTs?

Alt-28: Discrepancy about issues in Mechanical draft cooling tower and spray canal sections in 9.4.1

BLN INFORMATION NEEDS: H-57, H-58, and Alt-28

BLN RESPONSE:

Natural draft cooling towers (NDCTs) have little occurrence of fogging or icing due to the high elevation of their plume discharge. Therefore, the staff is correct in saying that a quantifiable discussion has no meaning, and the statement in Subsection 9.4.1.2.5 is replaced with one that provides a better understanding of this comparison.

As discussed in the EPA preamble to the final NPDES rule, wet cooling towers provide the best method of mitigating condenser heat load at a new power plant. NDCTs and mechanical draft cooling towers (MDCTs) use the same cooling method, whereby hot condenser outlet water flows over a fill (film or splash) to promote evaporation and, in turn, cooling (approximately 950 BTU/lbm). The most significant upgrade in cooling tower technology has been the introduction of the film-type polyvinyl chloride (PVC) sheets used for the cooling tower fill. The choices of the film fill must be made based on plant conditions and makeup water chemistry. Early attempts to reduce potential fouling through the application of PVC fill media met with failure, because the cooling towers routinely became plugged after a short period of service. As a result, the costly task of repacking the cooling towers was frequently performed in an attempt to maintain the "as-new" thermal performance. However, over the last 15 years, fill manufacturers have continued to reduce the fouling potential and increase the thermal efficiency. There is a physical limit in achieving this combination that is dependent on the quality of the circulation

water, water treatment, and environment. Because these technology upgrades would equally apply to NDCTs, there is no significant technology change that would make an MDCT better than an NDCT. In fact, the parasitic losses alone would make the NDCT superior to the MDCT.

Non-metallic heat exchanger technologies do not apply to MDCTs; the technologies would only apply to dry or wet /dry (hybrid) cooling towers (Subsection 9.4.1.2.6), and would only be reflected in the sizing of the cooling tower.

An additional statement is added to the discussion of MDCTs to indicate that new cooling tower technology would improve the operation of an MDCT, and that the same technology would also lead to improved operation of an existing NDCT.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. Revise COLA Part 3, ER Chapter 9, Subsection 9.4.1.2.3, by inserting text into the last paragraph and deleting the last sentence, as follows:

   Technology for MDCTs has improved over the last 15 years with the introduction of the polyvinyl chloride (PVC) film fill. This film fill greatly increases performance for all types of wet cooling towers, including NDCTs and MDCTs. Although technology has improved for the MDCTs, upgrades in technology would equally enhance the performance of the existing NDCTs. Therefore, there is no significant technology change that would make MDCTs superior to NDCTs. The parasitic losses alone would make the existing NDCTs superior to MDCTs. In addition, MDCTs would cause an increase in fogging and icing, which could be serious for the particular topography, and the road and city locations in the Guntersville Reservoir area. TVA concluded that the use of MDCTs ~~were~~ is inferior to NDCTs at ~~Bellefonte Units 1 and 2~~BLN for these reasons. ~~This conclusion is still valid for BLN Units 3 and 4 since there have not been any significant technology changes in MDCT systems.~~

2. Revise COLA Part 3, ER Chapter 9, Subsection 9.4.1.2.5, by replacing the last sentence of the first paragraph, as follows:

   Spray canals were considered for waste heat dissipation at Bellefonte Units 1 and 2. A spray canal system approximately 2.5 mi. long and 200 ft. wide was required. During operation, water is sprayed upward at a low level, 15 to 20 ft., as compared to plume release heights of 60 ft. and up to 500 ft. for MDCTs and NDCTs, respectively. The primary disadvantages of spray canals were atmospheric effects, similar to those of MDCTs, when compared with NDCTs. ~~About twice as much fogging and seven times as much icing would occur with spray canals when compared to NDCTs.~~ NDCTs have virtually no occurrence of icing or fogging due to the elevation of their plume discharge, and are superior to spray canals in minimizing fogging and icing.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY and ALTERNATIVES

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information needs:

H-58A: "9.4.1.2.6 Wet / Dry Towers. Reconsider beginning this section with the statement "Water conservation is not a primary concern…""

Alt-27: "Further explanation needed on cooling systems - why were hybrid towers not considered?"

BLN INFORMATION NEEDS: H-58A and Alt-27

BLN RESPONSE:

The Cooling Tower Institute's Technical Paper Number TP93-01, "Plume Abatement and Water Conservation with the Wet/Dry Cooling Tower," defines hybrid cooling as the European term for a wet/dry cooling tower. The term "hybrid cooling tower" became more common in the United States following Marley Cooling Technologies' purchase of Balcke, a European cooling tower manufacturer, to become SPX Cooling Technologies. Subsequent increased use of the term hybrid cooling tower in SPX advertising brought this term to the forefront. Wet/dry cooling towers (hybrid towers) are addressed in ER Subsection 9.4.1.2.6. The disadvantages of the dry cooling portion of this tower, as discussed in the EPA preamble to the final NPDES Rule, provide further evidence that a wet/dry cooling tower should not be used when the availability of water is not a primary concern.

ASSOCIATED BLN COL APPLICATION REVISIONS:

Revise COLA Part 3, ER Chapter 9, Subsection 9.4.1.2.6, by inserting a paragraph prior to the last paragraph and adding text to the last paragraph, as follows:

Reduced evaporation, makeup water, and blowdown are the benefits of the wet-dry cooling process, thus reducing water-related impacts. However, the disadvantages of dry cooling, as discussed in the EPA preamble to the final NPDES Rule, apply to the dry cooling portion of the heat-dissipation process. The dry cooling process is not as efficient as the wet cooling process, because dry cooling requires the movement of a large amount of air through the heat exchanger to achieve the necessary cooling. This results in a lower net electrical power output for distribution.

Water availability is not a primary issue at the BLN site, and the visual plume would not impact the scenic surroundings of this rural area. TVA concluded that, for the above-cited reasons, the use of wet/dry cooling towers is not viable at BLN.

ATTACHMENTS:

None.

ATTACHMENT C
BLN SITE DRAWING ILLUSTRATING 500-YEAR FLOODPLAIN AND APE

NRC Review of the BLN Environmental Report

NRC Information Needs - BLN ER Site Audit Exit Meeting

NRC Environmental Category: HYDROLOGY and ALTERNATIVES

During the BLN Environmental Report site audit exit meeting on April 4, 2008, the NRC staff identified the following information needs:

H-59: Section 9.4.1.2.6 Wet / Dry Cooling Towers (Hybrid Towers). In this section the applicant acknowledges the closed cycle NDCTs are undersized for Units 3 & 4. Does this imply derating on hot summer days? Define a "hot summer day", its frequency, and the frequency of derating.

Alt-24: In section 9.4.1.2.6 the ER acknowledges the closed cycle NDCTs are undersized for Units 3 & 4. Does this fact imply a needed permit condition to enforce ramp-down on hot summer days? If so, describe permitting conditions.

BLN INFORMATION NEEDS: H-59 and Alt-24

BLN RESPONSE:

No permit is required in regards to ramp-down on hot summer days. Westinghouse evaluated the main condenser for a variety of circulating water flowrates and temperatures. The results of this evaluation concluded that with the existing tower design the generated power would be impacted by 18 MWe during the ASHRAE 1% exceedance conditions, or approximately 87 hours during the summer months. Because this change in generator output will not impact reactor power levels for the plant, TVA is deleting the unnecessary sentence in ER Subsection 9.4.1.2.6 that addresses the need to reduce electrical output during hot summer days.

ASSOCIATED BLN COL APPLICATION REVISIONS:

Revise COLA Part 3, ER Chapter 9, Subsection 9.4.1.2.6, paragraph 7, by deleting the last sentence, as follows:

> Given that water conservation is not a primary concern at this location, plume abatement is also not a significant concern. The current existing closed-cycle NDCT system designed for Bellefonte Units 1 and 2 was slightly undersized for the total cooling requirements during the hottest days for which the addition of a dry cooling component from a hybrid system would further complicate and eliminate a majority of the potential benefits of a hybrid system. ~~Although the new BLN Units 3 and 4 require slightly less cooling capacity than the old Units 1 and 2, the existing closed-cycle cooling towers are still undersized and require reducing electrical output during hot summer days.~~

ATTACHMENTS:

None