

October 14, 2010

Mr. Steven Rus  
Senior Vice President and Director-Nuclear  
Black & Veatch  
11401 Lamar Ave.  
Overland Park, KS 66211

SUBJECT: NRC INSPECTION REPORT NO. 99901391/2010-201 AND NOTICE OF VIOLATION

Dear Mr. Rus:

This refers to the inspection conducted on August 31 to September 3, 2010, at the Black & Veatch (B&V) facility in Overland Park, KS. The purpose of the inspection was to assess your compliance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," and selected portions of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." This NRC inspection report does not constitute NRC endorsement of your overall quality assurance or 10 CFR Part 21 programs. The enclosed report presents the results of this inspection.

Based on the results of this inspection, the NRC has determined that one Severity Level IV violation of NRC requirements occurred. The violation is cited in the enclosed Notice of Violation (Notice), and the circumstances surrounding it are described in detail in the subject inspection report. The violation is being cited in the Notice because NRC inspectors identified that B&V failed to meet the requirements set forth in 10 CFR Part 21 for procedures to ensure evaluation of deviations within 60 days of discovery.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC review of your response to the Notice will also determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide

S. Rus

- 2 -

the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

Sincerely,

*/RA/*

Richard A. Rasmussen, Chief  
Quality and Vendor Branch 2  
Division of Construction Inspection  
& Operational Programs  
Office of New Reactors

Docket No.: 99901391

Enclosures: 1. Notice of Violation  
2. Inspection Report 99901391/2010-201

S. Rus

- 2 -

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Sincerely,

*/RA/*

Richard A. Rasmussen, Chief  
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<b>NAME</b>	EHuang	GLipscomb	VHall	DPasquale	TFrye	RRasmussen
<b>DATE</b>	10/ /2010	10/ /2010	10/ /2010	10/ /2010	10/ /10	10/ /2010

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## NOTICE OF VIOLATION

Black & Veatch  
11401 Lamar Avenue  
Overland Park, KS 66211

Docket No.: 99901391  
Inspection Report No.: 99901391/2010-201

During an NRC inspection conducted at Black & Veatch (B&V) facility in Overland Park, KS, from August 31 to September 3, 2010, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Title 10 of the *Code of Federal Regulations* (10 CFR) 21.21(a)(1) requires, in part, that "Each individual, corporation, partnership, dedicating entity, or other entity subject to the regulations in this part shall adopt appropriate procedures to evaluate deviations and failures to comply to identify defects and failures to comply associated with substantial safety hazards as soon as practicable, and, except as provided in paragraph (a)(2) of this section, in all cases within 60 days of discovery, in order to identify a reportable defect or failure to comply that could create a substantial safety hazard, were it to remain uncorrected."

10 CFR 21.3, "Definitions," states that discovery "means the completion of the documentation first identifying the existence of a deviation or failure to comply potentially associated with a substantial safety hazard within the evaluation procedures discussed in 10 CFR 21.21(a)."

Contrary to the above, as of September 3, 2010, B&V's implementing procedure for 10 CFR Part 21, "Reporting of Defects and Noncompliance," Nuclear Procedure 16.2, "Reporting of Defects and Noncompliances under 10 CFR Part 21 and Part 50.55(e)," Revision 3, dated August 20, 2010, was not an appropriate procedure to ensure evaluations of deviations and failures to comply associated with substantial safety hazards are completed within 60 days of discovery. Specifically, B&V's procedure incorrectly defined "discovery" as the date of its condition review group evaluation.

This issue has been identified as Violation 99901391/2010-201-01.

This is a Severity Level IV violation (Section 6.5).

Pursuant to the provisions of 10 CFR 2.201, "Notice of Violation," B&V is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Chief, Quality Assurance and Vendor Branch 2, Division of Construction Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this Notice of Violation. This reply should be clearly marked as a "Reply to a Notice of Violation" and should include: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. Where good cause is shown, consideration will be given to extending the response time.

ENCLOSURE 1

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Dated this 14 day of October 2010.

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NEW REACTORS  
DIVISION OF CONSTRUCTION INSPECTION AND OPERATIONAL PROGRAMS  
VENDOR INSPECTION REPORT

Docket No.: 99901391

Report No.: 99901391/2010-201

Vendor: Black & Veatch  
11401 Lamar Ave.  
Overland Park, KS 66211

Vendor Contact: Ronald Sacco  
Director of Nuclear Quality Assurance  
(913) 458-8702  
SaccoRA@bv.com

Nuclear Industry: Black & Veatch (B&V) supports U.S. operating nuclear plant projects by providing engineering studies, design modifications, procurement services, construction management, and installation services. B&V is currently engaged in the design and construction management for various advanced reactor technologies.

Inspection Dates: August 31–September 3, 2010

Inspection Team Leader: Daniel Pasquale, CQVB/DCIP/NRO

Inspectors: Victor Hall, CQVB/DCIP/NRO  
George Lipscomb, CQVB/DCIP/NRO  
Eugene Huang (in training), CQVB/DCIP/NRO

Approved by: Richard A. Rasmussen, Chief  
Quality Assurance and Vendor Branch 2 (CQVB)  
Division of Construction Inspection and Operational Programs (DCIP)  
Office of New Reactors (NRO)

## EXECUTIVE SUMMARY

Black & Veatch  
99901391/2010-201

The purpose of this inspection was to review selected portions of B&V's quality assurance (QA) program and its program under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance" (Part 21 program). The inspectors focused on B&V's activities in the areas of design control, records, corrective action identification and resolution, and software QA relating to engineering services supplied as basic components to facilities currently or prospectively licensed by the U.S. Nuclear Regulatory Commission (NRC), as specified in Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." The NRC also evaluated the facility's program for reporting defects in accordance with the requirements of 10 CFR Part 21. The inspection took place at B&V's headquarters in Overland Park, KS.

The NRC inspection was based on the following:

- Appendix B to 10 CFR Part 50
- 10 CFR Part 21

No NRC inspections of this facility have occurred in the 5 years before this inspection. The results of this inspection are summarized below.

### 10 CFR Part 21 Program

The inspectors identified one violation of 10 CFR Part 21. Violation 99901391/2010-201-01 was cited for B&V's failure to adequately prescribe the process to perform an evaluation within 60 days as specified in 10 CFR Part 21. With the exception of this violation, the inspectors concluded that B&V's Part 21 program was consistent with the regulatory requirements.

### Corrective Action

The inspectors concluded that B&V's program requirements for design control were consistent with the regulatory requirements of Criterion XVI, "Corrective Action," and Criterion XV, "Nonconforming Materials, Parts, or Components," of Appendix B to 10 CFR Part 50. Based on the limited sample of design documentation reviewed, the inspectors also determined that B&V's QA program and associated corrective action and implementing procedures for nonconforming materials, parts, or components were being implemented effectively for the areas reviewed. The inspectors did not identify any issues in this area.

### Design Control

The inspectors concluded that B&V's program requirements for design control were consistent with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. Based on the limited sample of design documentation reviewed, the inspectors also determined that B&V's QA program and associated design control implementing procedures were being implemented effectively for the areas reviewed. The inspectors did not identify any issues in this area.

### Document Control

The inspectors concluded that B&V's program requirements for document control were consistent with the regulatory requirements of Criterion VI, "Document Control," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the inspectors determined that B&V's QA program and associated document control implementing procedures were being implemented effectively. The inspectors did not identify any issues in this area.

### Software

The inspectors concluded that B&V's QA policies and implementing procedures that govern the control of software used for activities affecting quality were consistent with the regulatory requirements of Criterion II, "Quality Assurance Program," Criterion III, and Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. Based on the limited sample of software reviewed, the inspectors determined that B&V's QA program and associated implementing procedures were being implemented effectively. The inspectors did not identify any issues in this area.

### Records

The inspectors concluded that B&V's program requirements for quality records were consistent with the regulatory requirements of Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50. Based on the limited sample of quality records reviewed, the inspectors determined that B&V's QA program and associated implementing procedures were being implemented effectively. The inspectors did not identify any issues in this area.

### Internal and External Audits

The inspectors concluded that B&V's program requirements for document control were consistent with the regulatory requirements of Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. Based on the sample of documents reviewed, the inspectors determined that B&V's QA program and associated implementing procedures for internal and external audits were being implemented effectively. The inspectors did not identify any issues in this area.



## REPORT DETAILS

### 1. 10 CFR Part 21 Program

#### a. Inspection Scope

The inspectors reviewed the B&V NQAM and procedures that govern the 10 CFR Part 21 (Part 21) program to determine compliance with 10 CFR Part 21. Specifically, the inspectors focused on portions of B&V's NQAM and implementing procedure NP 16.2, "Reporting Defects and Noncompliances under 10 CFR Part 21 and Part 50.55(e)," Revision 3, dated August 20, 2010.

In addition, the inspectors reviewed a sample of condition reports (CRs) to ensure that B&V implemented its Part 21 process correctly. Because B&V did not have any records of performing a Part 21 evaluation or notification, the inspectors verified that the CRs have been properly screened.

#### b. Observations and Findings

The inspectors noted that NP 16.2 governs B&V's Part 21 program. The inspectors noted that B&V held a weekly Condition Review Group meeting to review all newly opened CRs. B&V's QA manager and other QA personnel participate in the weekly meetings to disposition CRs and determine whether CRs have applicability to the Part 21 program. The inspectors attended a Condition Review Group meeting to ensure that B&V was correctly implementing the Part 21 screening process. The inspectors noted that NP 16.2, Section 6.2.1, stated that "The date of the Condition Review Group evaluation is the start of the 60 day time limit." The inspectors noted a gap between the time a CR would be initiated and the time the Condition Review Group would evaluate the report. However, 10 CFR 21.21(a)(1) states that each entity should adopt appropriate procedures to evaluate deviations and failures to comply to identify defects and failures to comply associated with substantial safety hazards as soon as practicable, and, except as provided in paragraph (a)(2) of this section, in all cases within 60 days of discovery." 10 CFR 21.3, "Definitions," states that discovery "means the completion of the documentation first identifying the existence of a deviation or failure to comply potentially associated with a substantial safety hazard within the evaluation procedures discussed in 21.21(a)." As the procedure is written, B&V's Condition Review Group would evaluate the issue for 10 CFR Part 21 applicability and the 60-day period would begin. This contradicts the definition of "discovery" as the day the initial CR is written. The failure to have the correct timeline in NP 16.2 was inconsistent with the regulatory requirements of 10 CFR Part 21 and was identified as Violation 99901391/2010-201-01.

In addition, the inspectors reviewed the following sample of purchase orders to ensure that 10 CFR Part 21 was correctly invoked and did not identify any significant issues:

- Contract 163696.12.1000, Numerical Applications Inc. (NAI) Service, Project 163636/DTE Phase II, Task Order 001
- Contract 163696.12.6000, AMEC Geomatrix Inc. (Geomatrix), Project 163696/DTE Phase II, Task Order 001, Revision 3, dated March 4, 2010

- Contract 147483.12.4000, Project 147483 for the Fermi Unit 3 combined operating license (COL) application, Task Order 001, Revision 0, dated June 5, 2007

c. Conclusions

The inspectors identified one violation of 10 CFR Part 21. Violation 99901391/2010-201-01 was cited for B&V's failure to adequately prescribe the process to perform an evaluation within 60 days as specified in 10 CFR Part 21. With the exception of the violation noted above, the inspectors concluded that B&V's Part 21 program was consistent with the regulatory requirements.

2. Corrective Action

a. Inspection Scope

The inspectors reviewed the NP 16.1, "Nuclear Organization Corrective Action Program," Revision 5, which governs the implementation of B&V's corrective action program, to ensure that it provides adequate guidance consistent with the requirements of Appendix B to 10 CFR Part 50. The inspectors also reviewed a sample of CRs to assess B&V's implementation of the corrective action program. Additionally, the inspectors reviewed NP 15.3, "Control of Nonconforming Items," Revision 0; NP 15.1, "Supplier Nonconformance Evaluation," Revision 2; and NP 15.2, "Field Disposition Instruction," Revision 2, which describes the methods to ensure that a product that does not conform to requirements is adequately identified, controlled, segregated if practical, and disposed of or re-verified for acceptance.

b. Observations and Findings

The inspectors noted that B&V's NP 16.1 established the process for identifying, investigating, reporting, tracking, and correcting conditions adverse to quality and significant conditions adverse to quality, communicating lessons learned, and tracking customer-identified issues. This procedure detailed the process of identifying and documenting apparent conditions adverse to quality that fall under the scope of B&V's quality program, investigating and correcting those adverse conditions, and closing CRs upon completion of corrective action.

B&V uses its CR process to identify issues, report measures and actions taken to evaluate and resolve conditions adverse to quality, and track required actions through completion. The CR process includes, but is not limited to, description of the issue, the owner of the CR, investigation and evaluation documentation results, and prescribed actions to be taken. The inspectors attended a Condition Review Group meeting to verify that B&V correctly assessed CRs for Part 21 applicability and assigned the appropriate significance level for the CRs presented.

The inspectors reviewed B&V's nonconformance process and the following sample CRs:

- CR 00770, "Inconsistencies between NPs 15.1/15.3 and NPs 16.2 regarding 10CFR21 Evaluations," dated September 2, 2010
- CR 00509, "DC Cook Deviation Permits," dated October 8, 2008

- CR 00622, "Review of Calculations," dated August 25, 2009
- CR 00696, "ACS SASSI V 2.1.1 Error," dated March 15, 2010
- CR 00184, "Underground Pipe Calculation," dated August 11, 2006
- CR 00510, "Population Density," dated October 14, 2008
- CR 00684, "Tech. Service Issues with ESA," dated February 10, 2010
- CR 00663, "Standard Plant Invoice Processing Issue," dated December 18, 2009
- CR 00683, "Discrepancy in FSAR Table 2.4-224," dated February 4, 2010
- CR 00764, "Failure to Follow NP 3.18," dated September 1, 2010
- CR 00428, "Incorrect Calc. Formula", dated April 9, 2008
- CR 00419, "SASSI, ETAP, and GTSTRUDL Not Purchased to Requirements of NP 4.1," dated March 12, 2008
- CR 00256, "NP Not Used for Calc.," dated January 9, 2007
- CR 00344, "Deviation Permits Not Available," dated September 21, 2007

c. Conclusion

Based on the review of B&V's corrective action and nonconformance processes, implementing procedures, and a sample of CRs, the inspectors determined that B&V's processes met the requirements of Criterion XVI and Criterion XV of Appendix B to 10 CFR Part 50. No findings of significance were identified.

3. Design Control

a. Inspection Scope

The inspectors reviewed B&V's NQAM and implementing procedures that govern the design control process.

The inspectors reviewed a sample of completed design verification reports (DVRs) and associated calculations to determine whether B&V met the applicable requirements of Criterion III of Appendix B to 10 CFR Part 50, contractually imposed by its customers. The inspectors focused on DVRs from the following recently completed safety-related projects:

- AmerenUE/UniStar: ultimate heat sink for Bell Bend
- Detroit Edison: COL application for Fermi Unit 3

- Entergy: COL application for River Bend
- Nebraska Public Power District: mechanical, instrumentation and control, electrical, and civil modifications and studies for Cooper

b. Observations and Findings

The inspectors noted that all of B&V's nuclear activities were conducted under its Appendix B program. NP 3.1, "Design Verification," dated April 17, 2009, defined the design verification process. The procedure applied to the verification of design documents, including design-basis documents, and design changes (such as drawings, technical specifications, and calculations) for structures, systems, and components. According to the procedure, "Design Verification procedures are established and implemented to ensure that an appropriate verification method is used, the appropriate design parameters to be verified are chosen, the acceptance criteria are identified, and the Design Verification is satisfactorily accomplished and documented."

NP 3.5, "Calculations," Revision 1, defined a process for the preparation, verification, approval, and control of safety-related and nonsafety-related calculations performed for engineering design and engineering analysis for nuclear projects in accordance with the nuclear organization's QA program, as defined in the NQAM.

The inspectors determined that B&V's design control process and procedures delineated design activities in a planned, controlled, and orderly manner. The inspectors verified that the design control procedures provided controls for design inputs, outputs, design analyses, records, and organizational interfaces.

The inspectors determined that the provisions in the design process permit the selection and review for suitability of materials, parts, equipment, and processes that are essential to the safety-related function of the product.

The inspectors noted that the procedures and Nuclear Form NF-3.1-1F, "Design Verification Review," identified the interfaces between design organizations, including criteria designs, specifications, changes, technical direction, and approvals.

The inspectors sampled the following DVRs and associated calculations to verify that design activities were accomplished in accordance with the procedures:

- DVR-00003, "Re-Qualification of Beam and Platform B Design," for project 142707.0004 for a Cooper fuel rack modification, dated May 10, 2006
- DVR-00013, "ESWEMS Cooling Water Volume," for project 161642 for the Bell Bend ultimate heat sink conceptual design, dated June 20, 2008
- DVR-00032, "Mean Effective Stresses for Dynamic Testing," for project 147483 for the Fermi Unit 3 COL application, dated December 17, 2007
- DVR-00051, "Bearing Capacity Analysis," for project 147483 for the Fermi Unit 3 COL application, dated March 28, 2008

- DVR-00059, "Unit 3 Control Room Dose from Unit 2 Accident," for project 147483 for the Fermi Unit 3 COL application, dated June 21, 2008
- DVR-00063, "Radiological Analysis Inputs for GASPAR and LADTAP," for project 147483 for the Fermi Unit 3 COL application, dated May 14, 2008
- DVR-00067, "ESWEMS Retention Pond Sizing," for project 161642 for the Bell Bend ultimate heat sink conceptual design, dated May 13, 2010
- DVR-00137, "Estimate Shear Wave Velocity of Backfill Surrounding Seismic Category I Structures," for project 147483/163696 for the Fermi Unit 3 COL application, dated February 8, 2010
- DVR-00177, "Radiological Analysis Inputs for GASPAR and LADTAP," for project 147483 for the Fermi Unit 3 COL application, dated August 5, 2010
- DVR-00178, "Comparison of Airborne Release Concentrations with 10 CFR 20 Limit," for project 147483 for the Fermi Unit 3 COL application, dated August 9, 2010
- DVR-00190, "Evaluation of Potential Accidents," for project 145885 for River Bend, dated January 5, 2009

From the sample above, the inspectors verified that applicable design inputs were correctly translated into specifications. The inspectors verified that the design translation was supported by engineering data, such as calculations, including verification that design inputs were satisfied.

c. Conclusion

The inspectors concluded that B&V's program requirements for design control were consistent with the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50. Based on the limited sample of design documentation reviewed, the inspectors also determined that B&V's QA program and associated design control implementing procedures were being implemented effectively for the areas reviewed. The inspectors did not identify any issues in this area.

4. Document Control

a. Inspection Scope

The inspectors reviewed B&V's NQAM and implementing procedures that govern document control. Specifically, the inspectors focused on NP 6.1, "Document Control," dated December 30, 2009. The inspectors reviewed B&V's information technology solution for the storage and classification of controlled documents and reviewed the implementation of B&V procedures for a sample of documents.

b. Observations and Findings

B&V's procedures define the process for document control, which includes the development, review, approval, issuance, use, and revision of documents. The procedures also define document management, which includes the assignment of record numbers and file numbers and the identification, collection, distribution, indexing, maintenance, and storage of the electronic file, Adobe portable document format (PDF) record file, and original hard copy (paper).

The inspectors noted that B&V's procedures apply to original hard copy, electronic files, e-mails, and PDF record documents created or received by the nuclear organization. This includes nuclear organization department and project correspondence and controlled documents such as manuals, procedures, calculations, design specifications, purchase orders, and related documents.

The inspectors noted that B&V uses Documentum Desktop for Microsoft Windows, Version 5.2.5 SP2, issued July 2004, to store, access, and distribute controlled documents. The inspectors found that Documentum allows B&V staff to access documents quickly and to index B&V's files, such as DVRs and calculations, in a logical manner.

The inspectors verified that B&V had implemented a program to control the issuance of documents. The inspectors also verified that the document control system identified the documents to be controlled; identified the individuals responsible for the review, approval, issuance, and distribution of documents, and controlled changes or revisions to such documents. Finally, the inspectors verified that qualified personnel reviewed the quality-related documents sampled for adequacy.

c. Conclusion

The inspectors concluded that B&V's program requirements for document control were consistent with the regulatory requirements of Criterion VI of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the inspectors determined that B&V's QA program and associated document control implementing procedures were being implemented effectively. The inspectors did not identify any issues in this area.

5. Software

a. Inspection Scope

The inspectors reviewed B&V's QA policies and implementing procedures that govern the control of software used for activities affecting quality to verify compliance with the requirements of Criterion II, "Quality Assurance Program," Criterion III, and Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. Specifically, the inspection team reviewed the policies and procedures governing the implementation of B&V's software QA program related to the acquisition, installation, operation, maintenance, and retirement of computer programs. The inspectors also reviewed a sample of B&V's design analysis software records to verify compliance with B&V requirements. The policies and procedures reviewed within the scope of the inspection in this area included the following:

- NQAM, “Black & Veatch Nuclear Organization Quality Assurance Manual,” Revision 3, dated March 21, 2008
- NP 3.18, “Software Quality Assurance Program for Design Analysis Applications,” effective April 30, 2009
- NP 11.2, “Computer Program Software Testing,” approved August 27, 2010

b. Observations and Findings

b.1 Software Quality Assurance Program

The inspectors learned that NP 3.18 defined program requirements and NP 11.2 defined testing requirements for computer programs at B&V. The inspectors noted that NP 3.18 and NP 11.2 incorporate the requirements for multiple versions of NQA-1 and the software dedication requirements of Section 302 of NQA-1a-2009, Subpart 2.7, “Quality Assurance Requirements for Computer Software for Nuclear Facility Applications.” B&V indicated that all software had been procured prior to the incorporation of the NQA-1a-2009 software QA requirements that did not mandate software dedication.

The inspectors also discovered that NP 3.18 applied only to safety-related design analysis or quality record control (database or document control) software. Further, the inspectors discovered that the only type of safety-related software in use at B&V was analytical design third-party software (purchased software) from a mixture of commercial and safety-related suppliers (i.e., no in-house software development).

The inspectors learned that the Nuclear Chief Engineer (NCE), software owner, and Hewlett-Packard (HP) contract personnel had key roles in the acquisition, approval, installation, and testing of third-party software. The NCE approved the use of computer programs for nuclear safety-related design analysis, designated software owners, and approved commercial-grade dedication activities to accept computer programs for nuclear safety-related design analysis that were obtained from a nonsafety-related supplier. The software owner is the computer program subject matter expert designated by the NCE who is responsible for coordinating the acquisition of the computer program, including subsequent versions; preparing the computer program test plan, test procedure (acceptance and in-use), and test log to verify and accept a computer program for nuclear safety-related design analysis; and entering computer program error reports in the HQMS. HP contract personnel maintain quality requirements for B&V servers and personal computers. The software requestor typically completed the in-use tests (IUTs) and the test log.

The inspectors verified that the software QA implementing procedures set forth in NP 3.18 and NP 11.2 met the requirements of NQAM Sections 2, 3, and 11.

b.2 Software Program Implementation

The inspectors reviewed the list of approved software for safety-related design from the Nuclear Software Index database dated September 2, 2010. The inspectors noted the list included 51 entries—35 entries were COTS assigned to a single software owner, 8 were COTS assigned to all other software owners, and 8 were entries acquired from

safety-related suppliers. A B&V project quality manager explained that the 35 entries assigned to a single owner were for a single subcontractor, AMEC Geomatrix (Geomatrix).

Geomatrix performed geotechnical work under the B&V NQAM for both the Detroit Edison Fermi Unit 3 and Entergy River Bend projects and followed its internal software control procedure, AMEC Geomatrix TP2, "Software Validation, Verification, and Control Technical Procedure," Revision 1, effective January 29, 2008. The inspectors learned that B&V personnel reviewed and approved AMEC Geomatrix TP2, each software type, and all calculations from Geomatrix before acceptance. The inspectors reviewed the following documents associated with control of Geomatrix:

- RFR-0062, "AMEC Geomatrix TP2 Request for Review," dated August 17, 2007
- AMEC Geomatrix TP2, "Software Validation, Verification, and Control Technical Procedure," Revision 1, effective January 29, 2008

The inspectors noted that B&V had not placed a specific software error-reporting requirement on Geomatrix, instead they are using a general error/problem notification provision enforced through contractual means. B&V provided an example of a calculation transcription error that was reported to B&V, entered as HQMS Issue Number 00520, dated November 24, 2008, and resolved.

The inspectors also examined three quality software packages from the list of approved software for safety-related design—"ACS SASSI" analytical software used for geological soil interaction calculations for the Mitsubishi Heavy Industries U.S. Advanced Pressurized-Water Reactor (US-APWR), "PLAXIS 3D" deformation calculation software, and Geomatrix "XCDAVA3" probabilistic seismic hazard analysis software relating to work on the Detroit Edison Fermi Unit 3 project:

- Package 1—"ACS SASSI":
  - SCR-1500-01, "ACS SASSI Version 2.3 Software Change Request," dated August 20, 2010
  - SCR-1500-02, "ACS SASSI Version 2.3 Software Change Request," dated September 2, 2010
  - IUT-Plan-1500, "ACS SASSI Version 2.3.0 Test Plan," dated August 23, 2010.
  - IUT-Proc-1500, "ACS SASSI Version 2.3.0 Test Procedure," dated August 23, 2010
  - IUT-Log-1500, "ACS SASSI Version 2.3.0 Test Log," dated August 23, 2010, for personal computer tags NA-206482, NA203442, TO45806, and TO45807
- Package 2—"PLAXIS 3D":
  - SCR-1200-01, "PLAXIS 3D Foundation Version 2 Software Change Request," dated January 7, 2008
  - SRS-1200-01, "PLAXIS 3D Foundation Version 2 Software Requirement Specification," Revision 0, dated May 16, 2008



- RTM-1200-01, “PLAXIS 3D Foundation Version 2 Requirements Traceability Matrix,” dated May 16, 2008
- IUT-Plan-1200-01, “PLAXIS 3D Foundation Version 2 In-Use Test Plan,” dated June 24, 2008
- IUT-Proc-1200-01, “PLAXIS 3D Foundation Version 2 In-Use Test Procedure,” dated July 14, 2008
- Package 3—“XCDCAVA3”:
  - SCR-1370-01, “XCDCAVA3 Revision 1 Software Change Request,” dated November 6, 2008
  - RFR-1768-0042, “Review of SVR for Program XCDCAVA3 Revision 0 Request for Review,” dated October 9, 2008
  - AMEC Geomatrix SVR, “XCDCAVA3 Revision 1 Software Validation Report,” dated October 16, 2008

The inspectors learned that each software package contained slightly differing contents (e.g., software validation reports (SVRs), requests for review (RFRs), test procedures), were stored together electronically in Documentum, and consisted of the quality record and documentation of B&V reviews and approvals.

For the sample of software packages selected, the inspectors verified that B&V met the software control and testing requirements set forth in NP 3.18 and NP 11.2.

c. Conclusion

The inspectors concluded that B&V’s QA policies and implementing procedures that govern the control of software used for activities affecting quality were consistent with the regulatory requirements of Appendix B to 10 CFR Part 50. Additionally, B&V’s software QA implementing procedures set forth in NP 3.18 and NP 11.2 meet the requirements of NQAM Sections 2, 3, and 11. Further, based on the sample of software reviewed, the inspectors determined that B&V’s NQAM and associated software control and testing procedures were being implemented effectively. The inspectors did not identify any issues in this area.

6. Records

a. Inspection Scope

The inspectors reviewed B&V’s QA policies and implementing procedures that govern the quality record control process to verify compliance with the requirements of Criterion XVII of Appendix B to 10 CFR Part 50. Specifically, the inspection team reviewed the policies and procedures governing the implementation of B&V’s records program related to the handling and storage of nuclear quality records. The inspectors also inspected the computer center, the Software Distribution Center, and temporary records storage location. The inspectors further reviewed a sample of B&V’s quality records to verify compliance with B&V requirements. The policies and procedures reviewed within the scope of the inspection in this area included the following:

- NQAM, “Black & Veatch Nuclear Organization Quality Assurance Manual,” Revision 3, dated March 21, 2008

- NP 17.1, "Handling and Storage of Quality Records," Revision 3, effective December 29, 2009

b. Observations

b.1 Nuclear Records Program

The inspectors discovered that B&V converts all documents to electronic format for storage and classifies all documents as lifetime records, unless other requirements are specified for a particular project. Project-specific quality records are retained until transfer to the client at the end of each project.

The inspectors also learned that B&V maintains three databases for the storage of quality records: Documentum (main document database), Powertrak module J05 (drawings), and Powertrak module J07 (supplier documents). Primary records were located at the onsite computer center, with backup copies on tape (remote storage) or optical storage media. The inspectors learned that B&V contracted with HP to manage its computer systems, including maintaining hardware, coordinating backups, and installing new software. B&V personnel controlled specific record access rights via the Access Control List. The inspectors learned that access rights become read-only once the records are archived.

The inspectors also discovered that NP 17.1, Section 6.4.1, "Lifetime Records," classifies "computer programs or corresponding mathematical model" as a lifetime design record. The inspectors learned that HP personnel in the Software Distribution Center control third-party software, and that the software is generally maintained outside of Documentum and Powertrak. However, the results of the software use (e.g., calculations, tables) are stored in Documentum. The inspectors learned that to comply with software licensing agreements, the Software Distribution Center maintains third-party software backup copies and controls access to software by providing installation services after receiving a software change request (SCR).

The inspectors verified that the quality records implementing procedures set forth in NP 17.1 met the requirements of NQAM Section 17. The inspectors also selected a sample record requirement for programmatic top-down verification and verified that the classification criteria for lifetime and nonlifetime records set forth in NP 17.1, Section 6.4, "Records Classification," met the requirements of NQAM Section 17.2.7, "Classification."

b.2 Temporary Record Storage

The inspectors learned that B&V had previously determined that a 1-hour fire-rated, two-drawer filing cabinet was insufficient to meet its needs, so B&V decided to certify a storage room to meet temporary storage requirements. The inspectors reviewed an internal memorandum, "Temporary Storage of Quality Assurance Records per NQA-1 and NP 17.1—Updated," dated January 13, 2010, which outlined the certification of the storage room. The inspectors noted that the temporary records storage location is currently used for miscellaneous document storage. After further discussion with a B&V project support assistant, the inspectors learned that documents are typically placed in electronic media within 2 days and that the temporary storage room is not currently in use. As a result, the inspectors did not review any quality records in temporary storage.

### b.3 Nuclear Records Retrieval

The inspectors examined the following sample of three quality record packages, each relating to a different record type, to evaluate B&V's ability to retrieve quality records—a NAI procurement specification relating to work on the Detroit Edison Fermi Unit 3 project, the installation and testing records for the "ACS SASSI" analytical software used for geological calculations for the Mitsubishi Heavy Industries US-APWR, and a drawing relating to the ultimate heat sink for the UniStar Bell Bend project:

- Package 1—NAI procurement specification:
  - Task Order 147483.12.4000-001, "NAI Task Order," Revision 0, dated June 5, 2007
  - RFR-0024, "NAI Task Order Request for Review," dated May 14, 2007
  - RAR-0035, "NAI Task Order Review and Approval Record," approved June 6, 2007
  - Service Agreement 147483.12.4000, "NAI Service Agreement," Revision 0, dated June 5, 2007
  - RFR-0004, "NAI Service Agreement Request for Review," dated March 20, 2007
  - RAR-0034, "NAI Service Agreement Review and Approval Record," approved June 6, 2007
- Package 2—"ACS SASSI" testing records:
  - SCR-1500-01, "ACS SASSI Version 2.3 Software Change Request," dated August 20, 2010
  - IUT-Plan-1500, "ACS SASSI Version 2.3.0 Test Plan," Revision 0, dated August 23, 2010
  - IUT-Proc-1500, "ACS SASSI Version 2.3.0 Test Procedure," Revision 0, dated August 23, 2010
  - IUT-Log-1500, "ACS SASSI Version 2.3.0 Test Log" dated August 23, 2010, for personal computer tag NA-206482
- Package 3—ultimate heat sink drawing:
  - Plant Arrangement 161642-1EMS-S1103, "ESWEMS Pond Sections and Details for UniStar-Bell Bend," Revision 1, dated May 27, 2010
  - DVR-0070, "ESWEMS Pond Sections Design Verification Review," dated May 25, 2010
  - RAR-0035, "ESWEMS Pond Sections Review and Approval Record," dated May 27, 2010

The NRC inspectors learned that each record package is stored together electronically and consists of the quality record, plus documentation of B&V reviews and approvals. The inspectors discussed procedures for retrieving records from the backup records (offsite tape storage) but did not request any documents from the backup source.

The inspectors verified that B&V had met the quality record requirements set forth in NP 17.1 for the selected records.

c. Conclusion

The inspectors concluded that B&V's program requirements for quality records were consistent with the regulatory requirements of Criterion XVII of Appendix B to 10 CFR Part 50. Additionally, B&V's quality records implementing procedure set forth in NP 17.1 met the requirements of NQAM Section 17. Further, based on the sample of quality records reviewed, the inspectors determined that B&V's NQAM and associated quality records procedure were being implemented effectively. The inspectors did not identify any issues in this area.

7. Internal Audits

a. Inspection Scope

The inspectors reviewed NQAM Section 18, "Audits," and the implementing procedures that govern the internal audit process to determine compliance with Appendix B to 10 CFR Part 50. Specifically, the inspectors reviewed NP-18.1, "Audit Performance," Revision 2.

b. Observations and Findings

The inspectors observed that the manager of the B&V corporate QA organization (B&V Energy) performs the required internal audits of the Nuclear Projects Division. The inspectors verified that use of this individual maintained appropriate independence between corporate QA and nuclear project production. Additionally, the staff verified that the individual had the appropriate audit team lead inspector qualifications to perform internal inspections of a nuclear project, that the qualifications were current, that the correct procedures were used, and that an inspection plan and checklist with acceptance criteria were used. The inspectors verified that the B&V internal audits in the sample of audits reviewed met the requirements of its NQAM.

The inspectors noted that B&V performs internal audits of each applicable section of its NQAM at least once every 12 months. The inspectors verified, in the sample of audits reviewed, that B&V auditors met the requirements of the NQAM. The inspectors noted that B&V auditors initiated CRs when deficiencies were identified. The inspectors verified that B&V took appropriate action to correct any deficiencies identified in these CRs.

The inspection team reviewed a selection of B&V internal audits that provided an overall assessment of the B&V process. This selection included one audit from each of the preceding 3 years and one performed on site activities supporting an active COL application:

<u>Project No.</u>	<u>Supplier</u>	<u>Date</u>	<u>Alternate ID</u>	<u>Number of Findings</u>
1768	B&V Nuclear Organization Internal Audit	August 26, 2010	10NP01	8 Findings 2 Recommendations <b>C. Ashworth</b>

BVN-2009-0013	B&V Nuclear Organization Internal Audit	March 30– April 3, 2009	9NP01	5 Findings <b>C. Ashworth</b>
BVN-2008-0007	B&V Nuclear Organization Internal Audit	January 1– February 2, 2008	8NP01	12 Findings <b>J. Jones</b>
147855	Review of DTE COL Project Site Activities (Core Drilling and Subsurface Activities)	August 2, 2007	SR 07SR0002	0 Findings <b>C. Ashworth/ G. DeLullo</b>

c. Conclusion

The inspectors concluded that B&V’s internal audit program requirements and implementation were consistent with the regulatory requirements of Criterion XVIII of Appendix B to 10 CFR Part 50. The inspectors did not identify any issues in this area.

8. External Audits

a. Inspection Scope

The inspectors reviewed NQAM Section 18 and the implementing procedures that govern the external audit process to determine compliance with Appendix B to 10 CFR Part 50. Specifically, the inspectors reviewed NP-18.1 and NP-7.1, “Supplier Qualification.”

b. Observations and Findings

The inspectors noted that NQAM Section 18 describes the process and requirements for performing external audits.

The inspectors noted that B&V performs external audits of each supplier listed on its approved suppliers list at least once every 3 years, as specified in NQAM Section 18, to ensure ongoing compliance with Appendix B to 10 CFR Part 50. The inspectors noted that B&V auditors follow a preset audit plan that includes attributes to be verified and corresponding acceptance criteria. The inspectors also noted that the B&V audit team lead issued CRs when deficiencies were identified. The inspectors verified that B&V took appropriate action to correct any deficiencies identified in these CRs. The inspectors verified, in the sample of audits reviewed, that B&V auditors met the requirements of the NQAM.

The inspectors noted that the B&V implementing procedures recognize several methods of performing external audits to assess a supplier’s quality and capability: (1) performing a B&V external supplier audit, (2) approving a third-party supplier audit performed by a fellow member of the Nuclear Industry Assessment Committee (NIAC), or (3) performing a commercial-grade survey of the supplier’s QA program in conjunction with a commercial-grade dedication. The representative sample of external supplier audits selected for this inspection included examples of both B&V and NIAC audits; however, since B&V has not performed any commercial-grade dedications, no commercial-grade surveys were available to inspect.

The inspectors verified that B&V's recent audits of the following suppliers met the requirements of Criterion VII, "Control of Purchased Material, Equipment, and Services," and Criterion XVIII of Appendix B to 10 CFR Part 50:

<u>Project No.</u>	<u>Record No.</u>	<u>Supplier</u>	<u>Date</u>	<u>Alternate ID</u>	<u>Number of Findings</u>
891768	10SE04	Ghiocel Predictive Technologies Inc., Pittsford, NY - Supplier of ACS SASSI Software	June 14, 2010	NIAC Audit N-08-04, (11-12Feb08)	3 Findings <b>J. McCormick</b>
1768	09NS01	Hewlett Packard Enterprises (F.K.A. EDS)	March 2-6, 2009	10SE01	0 Findings <b>J. McCormick</b>
1768	09NS02	Georgia Tech Research Corp, Atlanta, GA - Supplier of GT STRUDL Software	March 2, 2009	NIAC Audit 14113 (13-15Oct09)	2 Findings 11 Observations 4 Recommendations <b>J. McCormick</b>

c. Conclusion

The inspectors concluded that B&V's audit program requirements and implementation were consistent with the regulatory requirements of Criterion XVIII of Appendix B to 10 CFR Part 50. The inspectors did not identify any issues in this area.

9. Exit Meeting

On September 3, 2010, the NRC inspectors presented the inspection results during an exit meeting with B&V Senior Vice President and Director—Nuclear, Steven Rus; B&V Director of Nuclear Quality Assurance, Ronald Sacco; and other B&V personnel. During this meeting, B&V indicated that, with the exception of prices indicated on purchasing-related documents, none of the information provided to or reviewed by the inspectors contained information determined to be proprietary.

## ATTACHMENT

### 1. PERSONS CONTACTED

S. Rus, Senior Vice President, Director-Nuclear, B&V  
R. Sacco, Director of Nuclear Quality Assurance, B&V  
K. Zernickow, Director of Nuclear Support Services, B&V  
M. Wadley, Director of Business Development, B&V  
S. Stasek, Director of Quality, DTE  
R. Hirsch, Director of Nuclear Construction, B&V  
K. Kamatti, Director of Nuclear Services, B&V  
B. Fraser, Nuclear Projects Director, B&V  
C. Ashworth, Nuclear Quality Assurance, B&V  
A. Layfield, Project Quality Manager, B&V  
J. McCormick, Project Quality Manager, B&V  
S. Thomas, Engineering Manager, B&V  
P. Gove, Engineering Manager, B&V  
P. Majerle, Configuration and Information Manager, B&V  
C. Levins, Project Support Assistant, B&V  
F. Rutherford, Nuclear IMS Liaison, HP  
F. Logback, Server Delivery Manager, HP  
K. Verhoff, System Administrator, HP  
D. Fulson, Software Distribution, HP  
L. Yochim, Quality Assurance, B&V  
T. Bockelman, Project Mechanical Engineer, B&V  
T. Coleman, Project Controls Manager, B&V  
R. Crandall, Project Manager, B&V  
M. Dover, Security Specialist, B&V  
L. Drbal, Nuclear Chief Engineer, B&V  
D. Haverkamp, Procurement Manager, B&V  
E. Kaminski, Procurement Representative, B&V  
C. Klotz, Nuclear Organization Analyst, B&V  
E. Meyer, Geotechnical Engineer, B&V  
B. Thompson, Project Discipline Engineer, B&V  
D. Timple, Environmental Manager, B&V  
N. Woodward, Nuclear Administrative Assistant, B&V

### 2. INSPECTION PROCEDURES USED

Inspection Procedure 36100, "Inspection of 10 CFR Parts 21 and 50.55(e) Programs for Reporting Defects and Noncompliance," dated October 3, 2007

Inspection Procedure 43002, "Routine Inspections of Nuclear Vendors," dated October 3, 2007

### 3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

No NRC inspections of B&V's facility in Overland Park, KS, occurred in the previous 5 years.

<u>Item Number</u>	<u>Status</u>	<u>Type</u>	<u>Description</u>
99901391/2010-201-01	Opened	NOV	Point of Discovery 10 CFR Part 21

4. LIST OF ACRONYMS USED

B&V	Black and Veatch
CFR	<i>Code of Federal Regulations</i>
COL	combined license
COTS	commercial off-the-shelf
CQVB	NRC Quality Assurance and Vendor Branch 2
CR	condition report
DCIP	Division of Construction Inspection and Operational Programs
DVR	design verification report
HP	Hewlett-Packard
HQMS	Harrington Quality Management System
IUT	in-use test
NAI	Numerical Applications Inc.
NCE	Nuclear Chief Engineer
NIAC	Nuclear Industry Assessment Committee
NOV	Notice of Violation
NP	nuclear procedure
NQA	Nuclear Quality Assurance
NQAM	Nuclear Organization Quality Assurance Manual
NRC	U.S. Nuclear Regulatory Commission
NRO	Office of New Reactors
PDF	portable document format
QA	quality assurance
RFR	request for review
RTM	requirements traceability matrix
SCR	software change request
SRS	software requirement specification
SVR	software validation report
US- APWR	U.S. Advanced Pressurized-Water Reactor