

**ATTACHMENT A**  
**EMCBC QUALITY ASSURANCE IMPLEMENTATION PLAN (QIP) MATRIX**

**EMCBC QUALITY ASSURANCE IMPLEMENTATION PLAN (QIP) MATRIX**

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<b>Management / Criterion 1—Program</b>					
<p>1. Establish an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing the work.</p> <p>2. Establish management processes, including planning, scheduling, and providing resources for the work.</p> <p><b>Management Expectations</b></p> <ul style="list-style-type: none"> <li>Using the graded approach and consistent with ISMS principles, the Senior DOE Official ensures resources are planned, scheduled, and allocated to accomplish work.</li> <li>The Functions, Responsibilities and Authorities (FRA) document is used to ensure requirements are identified and associated responsibilities are assigned.</li> <li>Lines of communication, feedback mechanisms, and interfaces with stakeholders, regulators, HQ, and support organizations are established and documented.</li> <li>Personnel at each level (including subcontractors, as applicable) are familiar with and facilitate achievement of the management processes defined in organization specific QIPs that describe the applicable requirements included in the EM QAP relative to planning, control, and performance of assigned work.</li> <li>Management establishes and implements QA processes and procedures for EM or EM site mission-related activities in a controlled manner.</li> <li>QAPs and associated QIPs are developed and maintained considering the guidance provided in DOE G 414.1-2B, <i>Quality Assurance Program Guide</i>.</li> </ul>	A	<b>Requirement 1 – Organization</b>	1, 2	Organization Planning Scheduling Resource Allocation Requirements and Standards Application	EMCBC Organization Chart EMCBC Functions, Responsibilities, and Authorities (FRA) Document EMCBC Strategic Plan EMCBC Service Plan EMCBC Management System (CBCMS) EMCBC Quality Assurance Implementation Plan (QIP)
		100 Basic	1, 2		
	A	200 Structure and Responsibility 201 General 202 Delegation of Work	1, 2		
		300 Interface Control	1, 2		
		<b>Requirement 2 – Quality Assurance Program</b>	1, 2		
		100 Basic	1, 2		
	A	200 Indoctrination and Training 201 Indoctrination 202 Training	N/A		
	A	300 Qualification Requirements 301 Nondestructive Examination (NDE) 302 Inspection and Test 303 Lead Auditor	N/A		
	A	303.1 Communication Skills 303.2 Training 303.3 Audit Participation 303.4 Examination 303.5 Maintenance of Proficiency 303.6 Requalification			
	A	304 Auditors 305 Technical Specialists			
		400 Records of Qualification	N/A		
		500 Records	N/A		
	A	(Appendix 1A-1)	1, 2		
	A	(Appendix 2A-2)	1, 2		
	A	(Subpart 4.5)	1, 2		

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<b>Management / Criterion 2—Personnel Training and Qualification</b>					
<p>1. Train and qualify personnel to be capable of performing their assigned work.</p> <p>2. Provide continuing training to personnel to maintain their job proficiency.</p> <p><b>Management Expectations</b></p> <ul style="list-style-type: none"> <li>Qualifications for specific job categories are based on requirements established by the organization's personnel management, DOE directives, other requirement documents, or management. Management reviews the positions within their organization to determine: <ul style="list-style-type: none"> <li>If critical and unique job junctions or tasks require highly technical, specialized skills;</li> <li>Whether competency is demonstrated before performance (e.g., Office of Personnel Management minimum qualification requirements) or within a specified timeframe after entering the position (e.g., Technical Qualification Program qualification within 18 months of entering the position for federal employees); and</li> <li>Whether a specialized certification may be required;</li> <li>Whether a practical, physical, and/or written examination process should be established for qualification requirements that provide evidence of employee proficiency.</li> </ul> </li> <li>Specialized design, engineering, construction, and operational training include formal and informal training, education, and developmental and other learning assignments.</li> <li>Employee-specific training needs are documented and updated as required to ensure the maintenance of competence required by the position.</li> <li>Technical qualification records are maintained separately from other training records.</li> </ul>	A	<b>Requirement 2 – Quality Assurance Program</b>	1, 2	<p>Training Technical and Professional Qualification</p>	<p>EMCBC Human Resources Management System (MS)</p> <p>Employee Development and Training Subject Area Description (SAD)</p> <ul style="list-style-type: none"> <li>EMCBC Continuing Academic Reimbursement Policy</li> <li>Nomination and Selection for EMCBC Career and Leadership Development Program</li> <li>Technical Qualification Program</li> <li>Career and Leadership Development Program</li> </ul> <p>EMCBC Quality Assurance and Oversight MS Training and Qualification SAD</p> <ul style="list-style-type: none"> <li>Qualification of Assessment Personnel</li> </ul>
	A	100 Basic	1, 2		
	A	200 Indoctrination and Training 201 Indoctrination 202 Training	1, 2		
	A	300 Qualification Requirements 301 Nondestructive Examination (NDE) 302 Inspection and Test 303 Lead Auditor 303.1 Communication Skills 303.2 Training 303.3 Audit Participation 303.4 Examination 303.5 Maintenance of Proficiency 303.6 Requalification 304 Auditors 305 Technical Specialists	1, 2		
	A	400 Records of Qualification	1, 2		
	A	500 Records	1, 2		
	A	(Appendix 2A-1)	N/A		
	A	(Appendix 2A-3)	1, 2		
	A				
	A				
A					

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<b>Management / Criterion 3—Quality Improvement</b>					
<p>1. Establish and implement processes to detect and prevent quality problems.</p> <p>2. Identify, control, and correct items, services, and processes that do not meet established requirements.</p> <p>3. Identify the causes of problems, and include prevention of recurrence as a part of corrective action planning.</p> <p>4. Review item characteristics, process implementation, and other quality-related information to identify items, services, and processes needing improvement.</p> <p><b>Management Expectations</b></p> <ul style="list-style-type: none"> <li>• Management sets performance goals and standards.</li> <li>• Management establishes metrics that monitor project/program performance to identify QA processes needing improvement.</li> <li>• Corrective actions are developed and implemented for problems/findings related to item characteristics, products, process implementation, or services.</li> <li>• Corrective Action Programs utilize and are consistent with: <ul style="list-style-type: none"> <li>- DOE O 226.1B, <i>Implementation of Department of Energy Oversight Policy</i>;</li> <li>- DOE O 227.1, <i>Independent Oversight Program</i>; and</li> <li>- DOE G 414.1-2B, <i>Quality Assurance Program Guide</i>.</li> </ul> </li> <li>• A process to determine the significance of identified problems/findings is developed.</li> <li>• In the case of significant conditions adverse to quality, causes of problems are identified, and prevention of recurrence is included as a part of</li> </ul>	A	<b>Requirement 2 – Quality Assurance Program</b>	1,2,3,4	<p>Assessment</p> <p>Corrective Action</p> <p>Preventive Action</p> <p>Management Review</p> <p>Assessment Planning</p> <p>Annual Effectiveness Review</p> <p>Annual Declaration</p> <p>Annual Performance Objectives, Measures, and Commitments</p>	<p>EMCBC Quality Assurance and Oversight MS</p> <p>Issues Management, Performance Trending and Improvement SAD</p> <ul style="list-style-type: none"> <li>• EMCBC Corrective Action</li> </ul>
		100 Basic	1,2,3,4		
	A	200 Indoctrination and Training 201 Indoctrination 202 Training	N/A		
	A	300 Qualification Requirements 301 Nondestructive Examination (NDE) 302 Inspection and Test 303 Lead Auditor	N/A		
	A	303.1 Communication Skills 303.2 Training 303.3 Audit Participation 303.4 Examination 303.5 Maintenance of Proficiency 303.6 Requalification			
	A	304 Auditors 305 Technical Specialists			
	A	400 Records of Qualification	N/A		
	A	500 Records	N/A		
	A	<b>Requirement 16 – Corrective Action</b>	1,2,3,4		
	A	100 Basic	1,2,3,4		
	A	(Appendix 2A-4)	1,2,3,4		
	A	(Appendix 16A-1)	1,2,3,4		

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<p>corrective action planning.</p> <ul style="list-style-type: none"> <li>• Management identifies the causes of problems and takes corrective actions to address the problems. Formal root cause analysis should be considered based on the complexity of the identified significant issue. Root causes should be identified and documented using an authoritative methodology for root cause identification and be performed by root cause analysis-trained personnel. Reference DOE Order 232.2, <i>Occurrence Reporting and Processing of Operations Information</i>.</li> <li>• An <i>Extent of Condition</i> determination is considered for significant conditions adverse to quality.</li> <li>• In the case of significant conditions adverse to quality, proposed corrective actions are evaluated to ensure they will effectively address the underlying QA performance issues.</li> <li>• Completed corrective actions are independently verified for implementation and the verification documented to indicate closure.</li> </ul>	<p>A</p> <p>A</p> <p>A</p> <p>A</p>				

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents	
<b>Management / Criterion 4—Documents and Records</b>						
<p>1. Prepare, review, approve, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.</p> <p>2. Specify, prepare, review, approve, and maintain records.</p> <p><b>Management Expectations</b></p> <ul style="list-style-type: none"> <li>• New or revised requirements are analyzed to determine impact on implementing procedures and/or contracts.</li> <li>• Policies, procedures, and plans are maintained current and deployed in a manner that makes them readily available to the users.</li> <li>• Procedures identify QA records that are created and maintained in the implementation of the procedure.</li> <li>• QA records are maintained in accordance with both NQA-1 and the National Archives and Records Administration (NARA) by incorporating the NQA-1 requirements into the federal records lifecycle.</li> </ul>	A	<b>Requirement 5 – Instructions, Procedures, and Drawings</b>	1	Document Control	<p>EMCBC Requirements Management and Document Control MS</p> <p>Document Control SAD</p> <ul style="list-style-type: none"> <li>• Identifying Controlled Documents</li> <li>• Preparing and Submitting CBC MS Documents</li> <li>• Reviewing CBC MS Documents</li> <li>• Approving CBC MS Documents</li> <li>• Cancelling CBC MS Documents</li> <li>• Annual Review of CBC MS Documents</li> <li>• Control of Technical Instruction Documents</li> <li>• Creation, Review and Distribution of Outgoing Correspondence</li> </ul> <p>EMCBC Records Management MS</p> <ul style="list-style-type: none"> <li>• Identifying, Filing and Maintaining Paper Records</li> <li>• File Plan Maintenance</li> <li>• Vital Record Identification and Protection</li> <li>• Records Disaster Prevention Inspections</li> <li>• Transferring Inactive Paper Records to Records Holding Area / Records Storage Facility</li> </ul> <p>EMCBC Quality Assurance and Oversight MS</p> <p>Quality Records SAD</p> <ul style="list-style-type: none"> <li>• Quality Assurance Records</li> </ul>	
		100 Basic	1			
	A	<b>Requirement 6 – Document Control</b>	1, 2			
		100 Basic	1, 2			
		200 Document Control	1, 2			
	A	300 Document Changes 301 Major Changes 302 Minor Changes	1, 2			
	A	<b>Requirement 17 – Quality Assurance Records</b>	2	Records Management		
		100 Basic	2			
	A	200 Generation of Records	2			
		300 Authentication of Records	2			
		400 Classification	2			
	A	401 Lifetime Records				
		401.1				
		401.2				
		402 Nonpermanent Records				
		500 Receipt Control of Records	2			
	600 Storage	2				
	601 General					
	602 Facility Types					
	602.1					
	602.2					
	603 Temporary Storage					
	700 Retention	2				
	800 Maintenance of Records	2				
	(Appendix 17A-1)	2				
	(Appendix 17A-2)	2				
	(Subpart 4.4)	2				

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<b>Performance / Criterion 5—Work Processes</b>					
<p>1. Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements using approved instructions, procedures, or other appropriate means.</p> <p>2. Identify and control items to ensure proper use.</p> <p>3. Maintain items to prevent damage, loss, or deterioration.</p> <p>4. Calibrate and maintain equipment used for process monitoring or data collection.</p> <p><b>Management Expectations</b></p> <ul style="list-style-type: none"> <li>• Documents clearly establish the roles and responsibilities for employees.</li> <li>• Employees identify and assist in making changes that improve project processes and documents.</li> </ul>	A	<b>Requirement 5 – Instructions, Procedures, and Drawings</b>	1	<p>Oversight Quality Assurance Integrated Safety Management Integrated Safeguards and Security Management Cyber Security Emergency Management Business Services</p> <p>(See Non-Safety Software Quality Requirements below for Federal Information Technology Support Systems &amp; Operations Work Processes)</p>	<p>EMCBC Requirements Management and Document Control MS Document Control SAD</p> <ul style="list-style-type: none"> <li>• Identifying Controlled Documents</li> <li>• Preparing and Submitting CBC MS Documents</li> <li>• Reviewing CBC MS Documents</li> <li>• Approving CBC MS Documents</li> <li>• Cancelling CBC MS Documents</li> <li>• Annual Review of CBC MS Documents</li> <li>• Control of Technical Instruction Documents</li> <li>• Creation, Review and Distribution of Outgoing Correspondence</li> </ul> <p>Requirements Management SAD</p> <ul style="list-style-type: none"> <li>• Identifying and Proposing New or Revised Requirements</li> </ul>
	Basic 100	1			
	N/A				
	N/A				
	N/A				
	A				
	A				

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<b>Performance / Criterion 6—Design</b>					
1. Design items and processes using sound engineering/scientific principles and appropriate standards.	N/A			(See Non-Safety Software Quality Requirements below for Federal Information Technology Support Systems & Operations Design)	
2. Incorporate applicable requirements and design bases in design work and design changes.	N/A				
3. Identify and control design interfaces.	N/A				
4. Verify or validate the adequacy of design products using individuals or groups other than those who performed the work.	N/A				
5. Verify or validate work before approval and implementation of the design.	N/A				
<b>Management Expectations</b>					
<ul style="list-style-type: none"> <li>• Designs are based on appropriate national standards and industry recognized engineering practices.</li> </ul>	N/A				
<ul style="list-style-type: none"> <li>• Applicable design bases are incorporated.</li> </ul>	N/A				
<ul style="list-style-type: none"> <li>• Design interfaces are identified and controlled.</li> </ul>	N/A				
<ul style="list-style-type: none"> <li>• Design reviews are implemented using individuals or groups other than those who performed the work.</li> </ul>	N/A				
<ul style="list-style-type: none"> <li>• Design work is verified before approval and implementation.</li> </ul>	N/A				

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<b>Performance / Criterion 7—Procurement</b>					
<p>1. Procure items and services that meet established requirements and perform as specified.</p> <p>2. Evaluate and select prospective suppliers on the basis of specified criteria.</p> <p>3. Establish and implement processes to ensure that approved suppliers continue to provide acceptable items and services.</p> <p><b>Management Expectations</b></p> <ul style="list-style-type: none"> <li>This expectation is regardless of whom under the contractor performs the activities, i.e., prime contractor personnel, subcontractors, vendors, or consultants. As such, an effective integrated procurement process (including development of clear statement of work planned for subcontracting by the prime contractor and associated QA requirements, subcontractor evaluation and selection process, and subcontractor work performance monitoring) is a critical responsibility of the prime contractor.</li> <li>Standard QA Contract language is included in prime contracts and applicable QA requirements are included in subcontracts.</li> <li>An integrated acquisition strategy is developed and maintained to ensure work is accomplished in compliance with applicable laws, acquisition regulations, state/Federal regulations, and DOE Orders and directives, and is responsive to the project or facility specifications and needs.</li> <li>Commercial Grade Dedications utilize the information provided in the EM guidance document <i>Guidance for Commercial Dedication</i> dated September 2011 or latest version (<a href="http://www.em.doe.gov/Pages/QACorporateBoard.aspx">http://www.em.doe.gov/Pages/QACorporateBoard.aspx</a>).</li> </ul>	A	<b>Requirement 4 – Procurement Document Control</b>	1	Acquisition Planning Vendor Surveys Bid Evaluations Contractor Oversight Contract Administration Source Evaluation	EMCBC Contracting and Financial Assistance MS
	A	100 Basic	1		
	A	200 Content of Procurement Documents 201 Scope of Work 202 Technical Requirements 203 Quality Assurance Program Requirements 204 Right of Access 205 Documentation Requirements 206 Nonconformances 207 Spare and Replacement Parts	1		
	A	300 Procurement Document Review	1		
	A	400 Procurement Document Changes	1		
	A	<b>Requirement 7 – Control of Purchased Items and Services</b>	2, 3		
	A	100 Basic	2, 3		
	A	200 Supplier Evaluation and Selection	2, 3		
	A	300 Bid Evaluation	2, 3		
	A	400 Control of Supplier-Generated Documents	2, 3		
	A	500 Acceptance of Item or Service 501 General 502 Methods of Acceptance 503 Certificate of Conformance 504 Source Verification 505 Receiving Inspection 506 Postinstallation Testing 507 Acceptance of Services Only	2, 3		
	A	600 Control of Supplier Nonconformances	2, 3		

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
		700 Commercial Grade Items and Services	2, 3		
		701 General			
		702 Utilization			
		703 Critical Characteristics			
		704 Dedication			
		704.1 Commercial Grade Survey			
		704.2 Source Verification			
		704.3 Acceptable Supplier/Item Services Performance Records			
		705 Supplier Deficiency Correction			
		800 Records	2, 3		
		<b>Part II – Subpart 2.14</b>	A		
		100 General	A		
		200 Definition Applications	A		
		300 Utilization	A		
		400 Technical Evaluation	A		
		500 Critical Characteristics	A		
		600 Methods of Accepting Commercial Grade Items	A		
		601 Special Test(s), Inspection(s), and/or Analyses			
		602 Commercial Grade Survey of the Supplier			
		603 Source Verification			
		604 Acceptable Supplier/Item/Services Performance Record			
		700 Commercial Grade Services	A		
		800 Documentation	A		
		(Appendix 4A-1)	1		
		(Appendix 7A-1)	2, 3		

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<b>Performance / Criterion 8—Inspection and Acceptance Testing</b>					
1. Inspect and test specified items, services, and processes using established acceptance and performance criteria.	N/A			(See Non-Safety Software Quality Requirements below for Federal Information Technology Support Systems & Operations Inspection and Acceptance Testing)	
2. Calibrate and maintain equipment used for inspections and tests.	N/A				
<b>Management Expectations</b>					
• Inspection/test planning	N/A				
• Inspection/test methods	N/A				
• Inclusion of inspection and test acceptance criteria in work and inspection, test implementing documents	N/A				
• Calibration and control of inspection, measuring and test equipment	N/A				
• Documentation and records	N/A				

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<b>Assessment / Criterion 9—Management Assessment</b>					
<p>1. Ensure that managers assess their management processes and identify and correct problems that hinder the organization from achieving its objectives.</p> <p><b>Management Expectations</b></p> <ul style="list-style-type: none"> <li>• Management assessments are one of the means for identifying areas needing correction and/or improvement.</li> <li>• Management assessments are performed by personnel knowledgeable in the subject area and trained in assessment techniques.</li> <li>• Managers within organizations (EM HQ, Field/Project Office, and contractor) assess their organization’s performance with regards to such things as safety, quality, mission completion, and performance against technical and financial goals and objectives. Management consolidates the ISMS and QA validation and declaration activities where possible.</li> <li>• Results of management assessments are documented, and deficiencies identified and tracked with corrective actions taken.</li> <li>• Management assessments use guidance provided in DOE G 414.1-1B <i>Management Assessment and Independent Assessment Guide</i>.</li> </ul>	A	<p><b>Requirement 2 – Quality Assurance Program</b></p> <p>100 Basic</p> <p>200 Indoctrination and Training 201 Indoctrination 202 Training</p>	1	Management Assessment	<p>EMCBC Quality Assurance and Oversight MS Quality Oversight and Assessment SAD</p> <ul style="list-style-type: none"> <li>• Management Assessment and Oversight</li> </ul>
	A	<p>300 Qualification Requirements 301 Nondestructive Examination (NDE) 302 Inspection and Test 303 Lead Auditor</p>	N/A		
	A	<p>303.1 Communication Skills 303.2 Training 303.3 Audit Participation 303.4 Examination</p>			
	A	<p>303.5 Maintenance of Proficiency 303.6 Requalification 304 Auditors 305 Technical Specialists</p>			
	A	400 Records of Qualification	N/A		
	A	500 Records	N/A		
	A	<b>Requirement 18 – Audits</b>	1	(Management Assessments are planned, coordinated, and conducted using Audit Requirements to the extent practical based on conditions, risks, and scope in relation to Independent Assessment Planning)	
	A	100 Basic	1		
	A	200 Scheduling	1		
	A	300 Preparation 301 Audit Plan 302 Personnel 303 Selection of Audit Team	1		
	A	400 Performance	1		
	A	500 Reporting	1		
	A	600 Response	1		
	A	700 Follow-up Action	1		
	A	800 Records	1		
	A	(Appendix 2A-1) / (Appendix 2A-3)	N/A		
	A	(Appendix 2A-4)	1		
	A	(Appendix 18A-1)	1		

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<b>Assessment / Criterion 10—Independent Assessment</b>						
<p>1. Plan and conduct independent assessments to measure item and service quality, to measure the adequacy of work performance, and to promote improvement.</p> <p>2. Establish sufficient authority and freedom from line management for independent assessment teams.</p> <p>3. Ensure that persons conducting independent assessments are technically qualified and knowledgeable in the areas to be assessed.</p> <p><b>Management Expectations</b></p> <ul style="list-style-type: none"> <li>Organizations develop and implement a comprehensive plan and schedule to independently assess and conduct audits of reporting organizations against technical, programmatic, administrative, and quality program requirements.</li> <li>As part of the independent assessment process, the federal and contractor offices ensure their QA programs are assessed to verify compliance and effectiveness of the quality requirements implementation at a frequency such that all elements of the QA program are addressed at least triennially.</li> <li>Independent assessments are performed by personnel knowledgeable in the subject area and trained in assessment techniques.</li> <li>Results of independent assessments/audits are documented; deficiencies tracked; corrective action plans reviewed; and corrective actions verified with the verification documented to indicate closure.</li> <li>Independent assessments use guidance provided in DOE G 414.1-1B, <i>Management Assessment and Independent Assessment Guide</i>.</li> <li>The SRP Modules may be used in the development of Lines of Inquiry for</li> </ul>	A	<b>Requirement 1 – Organization</b>	2	Independent Assessment	EMCBC Quality Assurance and Oversight MS Quality Oversight and Assessment SAD • Independent Assessment	
			100 Basic			N/A
			200 Structure and Responsibility 201 General 202 Delegation of Work			2
		A	300 Interface Control			N/A
			<b>Requirement 2 – Quality Assurance Program</b>			1
			100 Basic			1
			200 Indoctrination and Training 201 Indoctrination 202 Training			N/A
		A	300 Qualification Requirements 301 Nondestructive Examination (NDE) 302 Inspection and Test 303 Lead Auditor 303.1 Communication Skills 303.2 Training 303.3 Audit Participation 303.4 Examination 303.5 Maintenance of Proficiency 303.6 Requalification			3
		A	304 Auditors 305 Technical Specialists			
			400 Records of Qualification			3
		A	500 Records			3
			<b>Requirement 16 – Corrective Action</b>			1
			100 Basic			1
			<b>Requirement 18 – Audits</b>			1
			100 Basic			1, 2
			200 Scheduling			1
	A	300 Preparation 301 Audit Plan 302 Personnel 303 Selection of Audit Team	2, 3			
	A	400 Performance	1			



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<b>Safety Software Quality Requirements</b>					
<p>(See DOE O 414.1D Attachment 4)</p> <p><b>Management Expectations</b></p> <ul style="list-style-type: none"> <li>Safety Software QA processes use guidance provided in DOE G 414.1-4, <i>Safety Software Guide</i>.</li> <li>Computer safety software used to develop or execute the model meets the applicable criteria of NQA-1a-2009 Part I, Subpart 2.7, Subpart 2.14 and DOE O 414.1D Attachment 4.</li> <li>EM model development and operation considers and utilizes the following consensus standards as appropriate: <ul style="list-style-type: none"> <li>ANSI/ANS-10.2-2009, <i>Portability of Scientific and Engineering Software</i></li> <li>ANSI/ANS 10.4-2008, <i>Verification and Validation of Non-Safety-Related Scientific and Engineering Computer Programs for the Nuclear Industry</i></li> <li>ANSI/ANS-10.5-2011, <i>Accommodating User Needs in Scientific and Engineering Computer Software Development</i></li> <li>ASME V&amp;V 20-2009, <i>Standard for Verification and Validation in Computational Fluid Dynamics and Heat Transfer</i></li> </ul> </li> </ul> <p><u>Software Validation Requirements (Safety and Non-Safety Software)</u></p> <ul style="list-style-type: none"> <li>Software validation activities are planned, documented, and performed for software, software changes, or system configurations that are determined to impact the software.</li> <li>The validation test plans, test cases, and test results are documented, reviewed, and approved prior to use of the software.</li> </ul>	A	<b>Requirement 7 – Control of Purchased Items and Services</b>	A	Safety System Software Procurement	EMCBC Contracting and Financial Assistance MS EMCBC Information Technology MS
	A	100 Basic	A		
	A	200 Supplier Evaluation and Selection	A		
	A	300 Bid Evaluation	A		
	A	400 Control of Supplier-Generated Documents	A		
	A	500 Acceptance of Item or Service 501 General 502 Methods of Acceptance 503 Certificate of Conformance 504 Source Verification 505 Receiving Inspection 506 Postinstallation Testing 507 Acceptance of Services Only	A		
	A	600 Control of Supplier Nonconformances	A		
	A	700 Commercial Grade Items and Services 701 General 702 Utilization 703 Critical Characteristics 704 Dedication 704.1 Commercial Grade Survey 704.2 Source Verification 704.3 Acceptable Supplier/Item Services Performance Records 705 Supplier Deficiency Correction	A		
	A	800 Records	A		
	A	<b>Part II – Subpart 2.14</b>	A		
	A	100 General	A		
	A	200 Definition Applications	A		
	A	300 Utilization	A		
	A	400 Technical Evaluation	A		
	A	500 Critical Characteristics	A		

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents	
<p><u>Software Verification Requirements (Safety and Non-Safety Software)</u></p> <ul style="list-style-type: none"> <li>• Software verification activities are planned, documented, and performed for software, software changes, or system configurations that are determined to impact the software.</li> <li>• Software verification is performed at the end of the requirements, design, and testing life cycle phases to ensure that the products of a given life cycle phase are traceable and fulfill the requirements still applicable from the previous phase and/or previous phases.</li> <li>• Software verification evaluates the technical adequacy, ensures correctness of the software, and verifies that software is traceable to the software design requirements. <ul style="list-style-type: none"> <li>- Tests and test results from reviews and verifications are included in the acceptance test documentation.</li> <li>- Tests conducted as reviews or verifications do not substitute for performing comprehensive, end-of-development acceptance tests.</li> </ul> </li> <li>• Software verification includes review of the test results.</li> <li>• Software verification is completed prior to approval of the computer program for use.</li> <li>• Verification reviews identify the reviewer(s) and each reviewer's specific responsibilities during the review.</li> <li>• Documentation of review comments and their disposition is retained as part of the records package.</li> <li>• Software verification and validation activities are performed by individuals not associated with the development of the software. In those instances where this level of independence may not be achieved, an individual associated with</li> </ul>	A	600 Methods of Accepting Commercial Grade Items 601 Special Test(s), Inspection(s), and/or Analyses 602 Commercial Grade Survey of the Supplier 603 Source Verification 604 Acceptable Supplier/Item/Services Performance Record	A			
	A	700 Commercial Grade Services	A			
	A	800 Documentation	A			
	A	(Appendix 4A-1) (Appendix 7A-1)	A	A		
	A					
	A					
	A					

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<p>the development of the software performs these activities with management approval and documented justification.</p> <ul style="list-style-type: none"> <li>As part of the configuration change control, software verifications are performed for the changes, as necessary, to ensure that document traceability is maintained.</li> </ul>	A				

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<b>Non-Safety Software Quality Requirements</b>					
<p>(See DOE O 200.1A)</p> <p><b>Management Expectations</b></p> <p><u>Software Validation Requirements (safety and non-safety software)</u></p> <ul style="list-style-type: none"> <li>• Software validation activities are planned, documented, and performed for software, software changes, or system configurations that are determined to impact the software.</li> <li>• The validation test plans, test cases, and test results are documented, reviewed, and approved prior to use of the software.</li> </ul> <p><u>Software Verification Requirements (safety and non-safety software)</u></p> <ul style="list-style-type: none"> <li>• Software verification activities are planned, documented, and performed for software, software changes, or system configurations that are determined to impact the software.</li> <li>• Software verification is performed at the end of the requirements, design, and testing life cycle phases to ensure that the products of a given life cycle phase are traceable and fulfill the requirements still applicable from the previous phase and/or previous phases.</li> <li>• Software verification evaluates the technical adequacy, ensures correctness of the software, and verifies that software is traceable to the software design requirements. <ul style="list-style-type: none"> <li>- Tests and test results from reviews and verifications are included in the acceptance test documentation.</li> <li>- Tests conducted as reviews or verifications do not substitute for performing comprehensive, end-of-development acceptance tests.</li> </ul> </li> <li>• Software verification includes review of the test results.</li> </ul>	A	<b>Requirement 3 – Design Control</b>	A	Support Systems Software Support Systems Databases Support Systems Networks Support Systems Websites Support Systems Interfaces	EMCBC Information Technology MS Applications and Software Development SAD <ul style="list-style-type: none"> <li>• Software Application Development and Management</li> </ul>
		100 Basic	A		
		200 Design Input	N/A		
		300 Design Process	N/A		
	A	400 Design Analysis 401 Use of Computer Programs 402 Documentation of Design Analyses	A		
	A	500 Design Verification 501 Methods 501.1 Design Reviews 501.2 Alternate Calculations 501.3 Qualification Tests	N/A		
	A	600 Change Control 601 Configuration Management of Operating Facilities 601.1 601.2 601.3 601.4 601.5 601.6 601.7 601.8 601.9	N/A		
		700 Interface Control	A		
	A	800 Software Design Control 801 Software Design Process 801.1 Identification of Software Design Requirements 801.2 Software Design 801.3 Implementation of the Software Design 801.4 Software Design Verification 801.5 Computer Program Testing 802 Software Configuration Management 802.1 Configuration Identification 802.2 Configuration Change Control 802.3 Configuration Status Control	A		
	A				

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<ul style="list-style-type: none"> <li>Software verification is completed prior to approval of the computer program for use.</li> <li>Verification reviews identify the reviewer(s) and each reviewer's specific responsibilities during the review.</li> <li>Documentation of review comments and their disposition is retained as part of the records package.</li> <li>Software verification and validation activities are performed by individuals not associated with the development of the software. In those instances where this level of independence may not be achieved, an individual associated with the development of the software performs these activities with management approval and documented justification.</li> <li>As part of the configuration change control, software verifications are performed for the changes, as necessary, to ensure that document traceability is maintained.</li> </ul>	A	900 Documentation and Records	A		
		<b>Requirement 5 – Instructions, Procedures, and Drawings</b>	A		
	A	100 Basic	A		
		<b>Requirement 7 – Control of Purchased Items and Services</b>	A		
	A	100 Basic	A		
		200 Supplier Evaluation and Selection	A		
	A	300 Bid Evaluation	A		
		400 Control of Supplier-Generated Documents	A		
		500 Acceptance of Item or Service 501 General 502 Methods of Acceptance 503 Certificate of Conformance 504 Source Verification 505 Receiving Inspection 506 Postinstallation Testing 507 Acceptance of Services Only	A		
	A	600 Control of Supplier Nonconformances	A		
		700 Commercial Grade Items and Services 701 General 702 Utilization 703 Critical Characteristics 704 Dedication 704.1 Commercial Grade Survey 704.2 Source Verification 704.3 Acceptable Supplier/Item Services Performance Records 705 Supplier Deficiency Correction	A		
		800 Records	A		
		<b>Requirement 11 – Test Control</b>	A		
		100 Basic	A		
		200 Test Requirements	A		

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
		300 Test Procedures (Other than for Computer Programs)	N/A		
		400 Computer Program Test Procedures	A		
		500 Test Results	A		
		600 Test Records 601 Test Records 602 Computer Program Test Records	A		
		<b>Part II – Subpart 2.7</b>	A		
		100 General 101 Software Engineering 102 Definitions	A		
		200 General Requirements 201 Documentation 202 Review 203 Software Configuration Management 204 Problem Reporting and Corrective Action	A		
		300 Software Acquisition 301 Procured Software and Software Services 302 Otherwise Acquired Software	A		
		400 Software Engineering Method 401 Software Design Requirements 402 Software Design 402.1 Software Design Verification 403 Implementation 404 Acceptance Testing 405 Operation 406 Maintenance 407 Retirement	A		
		500 Standards, Conventions, and Other Work Practices	A		
		600 Support Software 601 Software Tools 602 System Software	A		
		700 References	A		

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
		<b>Part II – Subpart 2.14</b>	A		
		100 General	A		
		200 Definition Applications	A		
		300 Utilization	A		
		400 Technical Evaluation	A		
		500 Critical Characteristics	A		
		600 Methods of Accepting Commercial Grade Items	A		
		601 Special Test(s), Inspection(s), and/or Analyses			
		602 Commercial Grade Survey of the Supplier			
		603 Source Verification			
		604 Acceptable Supplier/Item/Services Performance Record			
		700 Commercial Grade Services	A		
		800 Documentation	A		
		(Appendix 3A-1)	A		
		(Appendix 7A-1)	A		
		(Appendix 11A-1)	A		
		(Subpart 4.1)	A		

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<b>Model Development, Use, and Validation</b>					
<p>(See EM-QA-001 Attachment H)</p> <p><b>Management Expectations</b></p> <ul style="list-style-type: none"> <li>• Model development and approaches to validation are planned, controlled, and documented. Planning for model validation identifies the validation methods and the validation criteria used. If model validation activities are completed after documentation of the model (i.e., using new confirmation test data gathered in the field or laboratory), these activities are described in the work-planning document.</li> <li>• Documentation of models includes: <ul style="list-style-type: none"> <li>- Definition of the objective (intended use) of the model.</li> <li>- Description of conceptual model and scientific basis, as well as alternatives for the selected conceptual model. Rationale for not selecting alternatives should also be included.</li> <li>- Results of literature searches and other applicable background information.</li> <li>- Identification of inputs and their sources.</li> <li>- Identification of, and rationale for, assumptions that are made to develop or apply the model, including model idealizations, as well as those assumptions that support the input to the model and impact model results.</li> <li>- Discussion of mathematical and numerical methods that are used in the model, including governing equations, formulas, and algorithms, and their scientific and mathematical bases.</li> <li>- Identification of any associated software used, computer calculations performed, and basis to permit traceability of inputs and outputs.</li> <li>- Discussion of initial and/or boundary conditions.</li> </ul> </li> </ul>	<p>N/A</p> <p>N/A</p> <p>N/A</p>				

DOE O 414.1D and EM-QA-001 Criteria	Applies to EMCBC	NQA-1-2008 (Addenda through 2009)	Applies to 414.1D Criterion	Key Processes	Implementing Procedures and Documents
<ul style="list-style-type: none"> <li>- Discussion of model limitations (i.e., data available for model development, valid ranges of model application, spatial and temporal scaling).</li> <li>- Discussion of model uncertainties (e.g., conceptual model, mathematical model, process model, abstraction model, system model, parameters) and how they affect the model.</li> <li>- Identification of the originator, reviewer, and approver.</li> </ul> <ul style="list-style-type: none"> <li>• The intended use of the model and the importance of the model is used to determine the appropriate level of confidence for a model (i.e., models of system components most relied upon are validated with the highest levels of confidence to the extent practical).</li> </ul>	N/A				

