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Issue				ISSUE SUMMARY			
Issue	Date	Prepared by	Department Approvals	Purpose of Issue/ Sections Changed			
A	7/23/2008	K. E. Partain	See Approval Sheet	Initial Issue Project 30302 WO: A30302.0060 Supersedes QAPD-30283			



Title: QUALITY ASSURANCE PROGRAM DOCUMENT – NEXT GENERATION NUCLEAR PLANT (NGNP) ENGINEERING SERVICES PROJECT

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QUALITY ASSURANCE PROGRAM DOCUMENT

NEXT GENERATION NUCLEAR PLANT (NGNP) ENGINEERING SERVICES PROJECT

BATTELLE ENERGY ALLIANCE, LLC BLANKET MASTER CONTRACT NO. 75309 (IDAHO NATIONAL LABORATORY)

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1. GENERAL

1.1 Purpose

This Quality Assurance Program Document (QAPD) describes the Quality Assurance (QA) Program implemented by General Atomics (GA) for the Next Generation Nuclear Plant (NGNP) Engineering Services Project for the Idaho National Laboratory (INL). The QAPD invokes the GA Quality Assurance Manual (QAM) for use on this project, establishes the authority for quality assurance activities, and identifies project-specific quality assurance requirements. This QAPD supersedes QAPD-30283 Rev. B.

The mission of the NGNP project is to develop and demonstrate a first-of-a-kind, very-high-temperature, gas-cooled nuclear system with the capability to generate electrical power and produce hydrogen at a competitive price using a high-temperature, helium-cooled, graphite-moderated, thermal neutron spectrum reactor.

1.2 Scope of Work

- 1.2.1 GA is providing engineering services for the Next Generation Nuclear Plant (NGNP) Project under a Blanket Master Contract (BMC), Contract No. 75309, with the Battelle Energy Alliance (BEA), operator of the Idaho National Laboratory (INL). This is a task order contract under which tasks are added to GA's work scope via procurement change notices (PCNs). These tasks are defined by a Statement of Work (SOW) that is provided by BEA with the PCN. The PCNs are eventually definitized via incorporation into Releases under the BMC. As of the initial issue date of this QAPD, GA is performing work authorized by five PCNs, which will be incorporated into two Releases. Four of the PCNs will be incorporated into Release 1 and one PCN will be incorporated in Release 2. As requested by BEA, GA has prepared the following Work Plans that describe GA's approach for performing the work scope defined in two of the PCNs.
 - "Work Plan for FY-02 Phase B Conceptual Design Studies for the NGNP with Hydrogen Production," dated May 5, 2008
 - "Work Plan for HTGR Component Test Facility (CTF) Initial Conceptual Design Study,: dated June 13, 2008

These Work Plans were reviewed and approved by BEA prior to issuance of the PCNs.

The work being performed by GA as of the initial date of this QAPD is considered to be part of conceptual design by BEA. However, this work is limited to conceptual design studies for the NGNP and for a Component Test Facility (which is expected to be built at the INL to support NGNP technology development) that are being performed as precursors to NGNP conceptual design.



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It is anticipated that more PCNs authorizing GA to perform additional work scope will be issued by BEA from time to time and that these PCNs will be incorporated into new Releases under the BMC. The QA requirements for each task issued under the BMC are specified in the PCN and it is expected that all of the tasks incorporated into a Release will have the same QA requirements. BEA has invoked ASME NQA-1 for Release 2, but not for Release 1.

1.2.2 The work described in Section 1.2.1 will be performed by an international team led by GA. The other members of the team that will participate in this work, under subcontracts from GA, include URS Washington Division (formerly Washington Group International), Rolls Royce, Fuji Electric Systems (Fuji), Toshiba Corporation, and the Korea Atomic Energy Research Institute (KAERI). The Japan Atomic Energy Agency (JAEA) will also participate as a subcontractor to Fuji. The NGNP Project Organization for performance of this task is the same as for the FY08-1 conceptual design studies and is shown in Figure 1.

1.3 Application

The requirements of this QAPD are mandatory for all organizations within GA where work is conducted for the NGNP project. For work subcontracted by GA, applicable QA requirements will be specified in the procurement documents.

2. ORGANIZATION

- 2.1 The current organization for the NGNP project is shown in Figure 1.
- 2.2 The Director, Modular Helium Reactors, reporting to the Senior Vice President, Energy Group, has overall responsibility for the NGNP Project at GA.
- 2.3 The NGNP Project Manager, reporting to the Director, Modular Helium Reactors, is responsible for managing GA and subcontractor activities on this project in accordance with the contract, for interfacing with the customer and subcontractors, and for implementing and managing the QA Program in accordance with this QAPD. He is also responsible for assuring that personnel working on this project are properly trained.
- 2.4 The Task Leads, reporting to the NGNP Project Manager, are responsible for assuring that the work assigned to them is completed on budget, on schedule, and in compliance with the customerapproved Work Plan.
- 2.5 Engineering personnel, reporting to the NGNP Project Manager, are responsible for performing technical work for the NGNP Project in accordance with the BEA-approved Work Plan and this QAPD, under the direction of the Task Leads.



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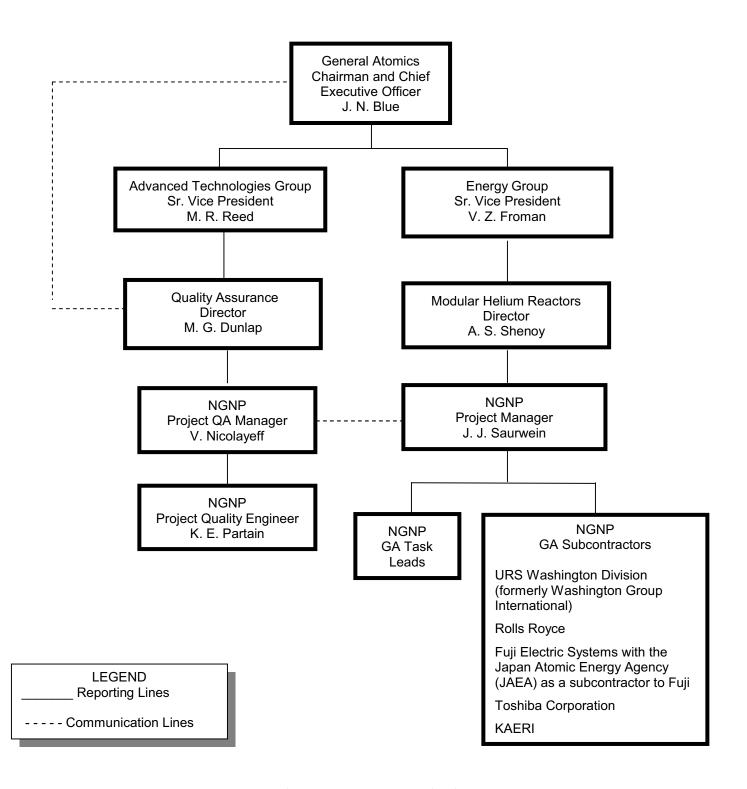


Figure 1 - NGNP Organization



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- 2.6 The NGNP Project QA Manager, reporting to the Director of Quality Assurance, works with the NGNP Project Manager, is responsible for verifying implementation of the QA Program described in this QAPD, and for managing the QA tasks in support of this project.
- 2.7 The NGNP Project Quality Engineer (PQE), reporting to the NGNP Project QA Manager, is responsible for preparing and revising the project QAPD to meet the contract QA requirements, review and approve documents as required by the project, supplier evaluations, inspections, perform surveillances, assessments, and audits as necessary to ensure project compliance with QA requirements.
- 2.8 Support work, such as Configuration Management, Records Management, Finance, Contracts, and Purchasing, is provided through various GA support organizations, as required.
- 2.9 The Project Manager shall ensure that General Atomics QA personnel shall have sufficient authority, access to work areas, and organizational freedom to: (1) identify quality problems; (2) initiate, recommend, or provide solutions to quality problems through designated channels; (3) verify implementation to solutions; and (4) assure that further processing, delivery, installation, or use is controlled until proper disposition of all nonconformance, deficiency, or unsatisfactory conditions have occurred.

3. QUALITY ASSURANCE PROGRAM

3.1 Requirements

- 3.1.1 The Battelle Energy Alliance/Idaho National Laboratory (BEA/INL) Document SOW-6393 Rev. 0 requires GA to implement and maintain a QA Program that complies with the applicable requirements of the national consensus standard NQA-1-2000, "Quality Assurance Requirements for Nuclear Facility Applications," published by the American Society of Mechanical Engineers (ASME).
- 3.1.2 As stated in the contract, this NQA-1-2000 QA Program shall be fully implemented and approved by BEA/INL before the start of the Conceptual Design phase. The requirements of NQA-1-2000 will apply when invoked by BEA for individual work tasks in the SOW or Procurement Change Notice (PCN).

3.2 Implementation

3.2.1 The GA QA Program implemented for the GA scope of work on the NGNP Project is described in this QAPD. The QAPD invokes the GA Quality Assurance Manual (QAM) for use on this project. It establishes authority for QA activities and comprises the QA Plan required by the contract.



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- 3.2.2 The GA corporate nuclear QA Program is described in the QAM. The QAM implements the 18 Criteria of 10 CFR 50 Appendix B and ASME NQA-1-1989, through the NQA-1c-1992 addenda, which are equivalent to NQA-1-1994. The applicable changes between NQA-1-1994 and NQA-1-2000 are addressed in this QAPD. In addition to the 18 Criteria of 10 CFR 50 Appendix B, the six sections of NQA-1-2000 Subpart 2.7, QA Requirements for Computer Software for Nuclear Facility Applications, apply for tasks for which BEA has invoked NQA-1-2000. GA plans to update the QAM for compliance with NQA-1-2008 after NQA-1-2008 is approved by the NRC.
- 3.2.3 Detailed instructions for engineering activities are provided in the Project/Resource Procedures Manual (P/RPM).
- 3.2.4 Detailed instructions for the Quality Assurance organization are described in Quality Division Instructions (QDIs).
- 3.2.5 Procedures, instructions, and other documents used to implement the quality assurance requirements for this project are listed in Table 1, Quality Assurance Program Index (QAPI), as they apply to each of the 18 criteria of NQA-1-2000.
- 3.2.6 The order of precedence of GA quality assurance documents for this project is this QAPD, the QAM, the P/RPM, and the QDIs.

3.3 Personnel Indoctrination and Training

- 3.3.1 The NGNP Project Manager is responsible for determining the indoctrination and training requirements and for assuring that all personnel are trained and qualified to perform their assigned functions and tasks in accordance with the administrative procedure (AP), AP-1040, "Indoctrination and Training of Personnel" of the P/RPM. Indoctrination and training requirements for project personnel shall be listed on Forms GA 2709 and GA 2709-1.
- 3.3.2 Training shall be documented on Form GA 2162, "Record of Training," or equivalent.
- 3.3.3 Engineering training files shall be maintained at the individual level by the project. Such training files shall include both documented training requirements and documented training accomplishments. QA personnel training files shall be maintained by the Quality Systems group. Table 2 lists the record retention responsibilities and modes.

4. DESIGN CONTROL

Design control shall be in accordance with the quality procedure (QP), QAM QP-3, "Design Control," and Section 4, "Engineering Procedures (EPs)" of the P/RPM.



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4.1 <u>Design Calculations</u>

Design calculations shall be issued or released in accordance with Section 4 of the P/RPM. Engineering calculations and analyses shall be fully checked by a qualified individual other than the originator, and shall be signed and dated as checked. Calculations which are performed by computer, or with computer assistance, shall include a description of the hardware and software used, a description of the model employed if applicable, verification documentation for the computer program, and a copy of the computer input and output.

4.2 <u>Software Design Control</u>

Design, validation, and documentation for developing or revising in-house computer software shall comply with P/RPM EP-4070, "Control of Scientific and Engineering Computer Programs," MHR Amendments and NQA-1-2000, Requirement 3, Design Control, Paragraph 800, Software Design Control.

5. PROCUREMENT DOCUMENT CONTROL

The requirements of QAM QP-4, "Procurement Document Control," shall apply. QA shall review and approve all project-initiated Purchase Requisitions (PRs).

6. INSTRUCTIONS, PROCEDURES, AND DRAWINGS

The requirements of QAM QP-5, "Instructions, Procedures, and Drawings," shall apply. Work shall be conducted in accordance with the procedures described in section 3.2 of this QAPD.

7. DOCUMENT CONTROL

The requirements of QAM QP-6 and P/RPM Sections 4 and 5 shall apply.

7. 1 <u>Controlling Procedures</u>

During the CDS and CD phases, design documents shall be information issued in accordance with P/RPM Section EP-4030, "Information Issue of Design Documents." Project Control (PC) documents shall be issued in accordance with P/RPM Section PP-2070, "Project Control Documents."



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7.2 Approvals

All project control documents, design documents, and project deliverables shall be approved by the author, the PQE, the NGNP Project Manager, and the GA Resource Manager, who is the Director, Modular Helium Reactors.

7.3 <u>Correspondence</u>

Correspondence, including electronic mail transmitting significant technical information (as determined by the NGNP Project Manager), shall be controlled in accordance with P/RPM procedure AP-1030, "Communications and Publication Control." The files will be maintained by the NGNP Project Manager and will be transmitted to Records Management's Engineering Data File (EDF) at the end of the project.

8. CONTROL OF PURCHASED ITEMS AND SERVICES

The requirements of QAM QP-7, "Control of Purchased Items and Services," shall apply. Conceptual Design Studies provided by GA subcontractors will be considered Non-Safety-Related.

During the CDS phase A, GA performed a "desk evaluation" of subcontractors' QA Programs to assess their capabilities to perform NGNP conceptual design activities to the requirements of NQA-1-2000. Suppliers performing work on tasks for which BEA has invoked NQA-1-2000 shall be qualified by GA as appropriate for the work scope that they will perform. On-site evaluations of suppliers will be performed prior to placement of subcontracts for work required by the customer to meet NQA-1-2000 requirements, in accordance with QPI-7-2, "Supplier Surveys," except as otherwise permitted by QP-7.

9. IDENTIFICATION AND CONTROL OF ITEMS

- 9.1 The requirements of QAM QP-8, "Identification and Control of Items," shall apply if needed; however, no handling of physical items (e.g. fuel, hardware, etc.) is anticipated during the CDS and CD phases.
- 9.2 Historical records (e.g. Engineering and QA records) used to generate reports and manuals for this project shall be properly identified to maintain traceability between the records, the reports, and the manual.



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10. CONTROL OF SPECIAL PROCESSES

The requirements of QAM QP-9, "Control of Processes," shall apply if needed; however, no activities involving special processes are anticipated during the CDS and CD phases.

11. INSPECTION

The requirements of QAM QP-10, "Inspection," shall apply if needed; however, no activities involving inspection are anticipated during the CDS and CD phases.

12. TEST CONTROL

The requirements of QAM QP-11, "Test Control," shall apply.

12.1 <u>Computer Software Test Controls</u>

Computer software used to calculate or process data, or control operation of items shall be verified, validated, and controlled, in accordance with P/RPM EP-4070, MHR Amendment..

12.2.1 Platform Translation of Existing Computer Codes

To ensure Validation and Verification (V&V) status of project computer codes, platform translations of existing computer codes shall require both a Validation Test and a Validation Test report documenting the software analysis process and test completion, per P/RPM EP-4070, MHR Amendment.

13. CONTROL OF MEASURING AND TEST EQUIPMENT

The requirements of QAM QP-12, "Control of Measuring and Test Equipment," shall apply.

14. HANDLING, STORAGE, AND SHIPPING

The requirements of QAM QP-13, "Handling, Storage, and Shipping," shall apply if needed; however, no activities involving handling, storage and shipping are anticipated during the CDS and CD phases.



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15. INSPECTION, TEST, AND OPERATING STATUS

The requirements of QAM QP-14, "Inspection, Test, and Operating Status," shall apply if needed; however, no activities involving inspection, test and operations, with the exception of computer software programs, are anticipated during the CDS and CD phases.

16. CONTROL OF NONCONFORMING ITEMS

The requirements of QAM QP-15, "Control of Nonconforming Items," shall apply.

17. CORRECTIVE ACTION

- 17.1 Significant quality problems shall be promptly identified, documented, and corrected in accordance with QAM QP-16, "Corrective Action." Corrective Action Requests (CARs) shall be prepared, processed, and closed-out in accordance with QDI 16-5, "Corrective Action Request Preparation."
- 17.2 Trend reports are not required during the CDS and CD phases.

18. QUALITY ASSURANCE RECORDS

- 18.1 Records listed in Table 2 shall be collected, stored, maintained, and indexed at the GA Quality Assurance Records Center (QARC) or GA Configuration/Records Management, in accordance with QAM QP-17, "Quality Assurance Records," and the P/RPM.
- 18.2 All records listed in Table 2 shall be maintained for at least five years after the completion of the project, or as otherwise required by the customer.
- 18.3 QA and Configuration Management (CM) Records are scanned electronically; microfilming is no longer used, although many of the archived records are still on microfilm.

19. AUDITS AND ASSESSMENTS

19.1 Audits

Formal internal audits of GA will be conducted in accordance with QAM QP-18, "Audits," at least once per year. Supplier audits shall be conducted in accordance with Section 8 of this QAPD.



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19.2 <u>Assessments and Surveillances</u>

Initial assessments of the capabilities of GA's subcontractors to perform NGNP conceptual design activities in accordance with the requirements of NQA-1-2000 will include a "desk review" of subcontractor QA Program documents by GA's NGNP Project QA Manager and the QA Engineer and appropriate correspondence between GA and subcontractor personnel.

GA QA management shall regularly assess the adequacy and effective implementation of the Quality Assurance Program in accordance with QDI 10-2, "Surveillance Performance and Reporting."



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TABLE 1 QUALITY ASSURANCE PROGRAM INDEX

This Quality Assurance Program Index (QAPI) sets forth the procedures, instructions, and other documents which will be used to implement the Quality Assurance Program for the NGNP.

Definition	on: P/RPM: QAM: QP: QAPD: QDI:	Program/Resource Procedure Quality Assurance Manual Quality Procedure in QAM Quality Assurance Program Quality Division Instructions	Document		
NQA-1 Section	NQA-1 Red	quirement	QAPD Section	GA Document	
1.	Organization		2	QAM-QP-1	
2.	Quality Assurance	Program	3	QAM-QP-2	
3.	Design Control		4	QAM-QP-3 / P/RPM	
4.	Procurement Document	ment Control	5	QAM-QP-4	
5.	Instructions, Proceed	dures, and Drawings	6	QAM-Q-5P	
6.	Document Control		7	QAM-QP-6 / P/RPM	
7.	Control of Purchase	ed Items and Services	8	QAM-QP-7	
8.	Identification and C	Control of Items	9	QAM-QP-8	
9.	Control of Special	Processes*	10	QAM-QP-9	
10.	Inspection*		11	QAM-QP-10	
11.	Test Control		12	QAM-QP-11 / P/RPM	
12.	Control of Measuri	ng and Test Equipment	13	QAM-QP-12	
13.	Handling, Storage,	and Shipping*	14	QAM-QP-13	
14.	Inspection, Test, ar	nd Operating Status	15	QAM-QP-14	
15.	Control of Noncon	forming Items	16	QAM-QP-15	
16.	Corrective Action		17	QAM-QP-16 / QDI-16-5	
17.	Quality Assurance	Records	18	QAM-QP-17 / P/RPM	
18.	Audits		19	QAM-QP-18	
Subpart	2.7 Computer Softw	vare	4, 12	QAM-QP-3, 11 / P/RPM	

^{*}These activities are not anticipated under the current scope of work



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${\it TABLE~2} \\ {\it QUALITY~ASSURANCE~RECORDS~RETENTION~RESPONSIBILITIES}$

	Record Type	Record Form	Storage Responsibility	Transmittal To Storage Responsibility
1.	Quality Assurance Program Document	Electronic scan	QARC	Quality Systems
2.	Quality Assurance Manual	Electronic Scan	QARC	Quality Systems
3.	Project Control and Design Documents as defined in P/RPM	Electronic scan	Records Management	Configuration Management
4.	Project Correspondence	Electronic scan	Records Management	Configuration Management
5.	Personnel Training and Indoctrination Records	Electronic scan	QARC	Quality Systems
6.	Corrective Action Requests	Electronic scan	QARC	Quality Systems



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APPENDIX A - ACRONYMS

AP Administrative Procedure in GA P/RPM ASME American Society of Mechanical Engineers

BEA Battelle Energy Alliance, LLC
BMC Blanket Master Contract
CAR Corrective Action Request

CD Conceptual Design

CDS Conceptual Design Studies
CFR Code of Federal Regulations
CM Configuration Management
CTF Component Test Facility
DOE Department of Energy
EDF Engineering Data File

EPs Engineering Procedures in the GA P/RPM

GA General Atomics

INL Idaho National Laboratory

M&O Management and Operating (Contractor)

NGNP Next Generation Nuclear Plant NRC Nuclear Regulatory Commission NQA Nuclear Quality Assurance

PC Project Control

PCN Procurement Change Notice

PP Project Office Procedures in the GA P/RPM

PQE Project Quality Engineer

P/RPM Project/Resource Procedures Manual

QA Quality Assurance

QAM Quality Assurance Manual

QAPD Quality Assurance Program Document
QAPI Quality Assurance Program Index
QARC Quality Assurance Records Center
QDIs Quality Division Instructions
QP Quality Procedure in the GA QAM

U.S. United States

WGI Washington Group International