



Boston Government Services, LLC

ATLAS SOFTWARE QUALITY ASSURANCE PLAN

BGS-SQAP-03

Revision 4

BGS Proprietary Information Notice

This document and the information it contains is property of Boston Government Services, LLC. (BGS). It shall not be reproduced, or its content otherwise made available to non-BGS parties without the express written consent of Boston Government Services, LLC.

Prepared By: *Sherri Sanderson* *08/12/2016*
Sherri Sanderson
Software Implementation Project Manager
Date

Approved By: *D. Newton* *08/12/2016*
Dean Newton
Vice President of Operations
Date

Effective Date: 08/12/2016

Electronic documents once printed, are uncontrolled and may become outdated. Contact the Document Control Administrator (DCA) for the correct version and the current revision.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 2 of 49	

Revision History

Rev. #	Date	By	Type¹	Changes
0	1/29/2016	S. Sanderson	N	Initial Release
1	3/10/2016	S. Sanderson	M	Addresses the following CARs: 15-02, 15-03, and 15-31. Removed Corrective Action Section; references to forms SQAF-01.1, -01.4, and -01; updated references to new procedures identifiers; and content moved to a new Software Management procedure, SQ-02. Corrected minor errors identified in Rev 0.
2	3/18/2016	S. Sanderson	M	Updated Revision history date for Rev. 1 to match the header date of 3/10/16. Changed the Responsible Role in Table 4, D.2 to V & V Engineer. Modified 5.7.7 to reflect the Table 4, D.2 Responsible Role update and Test Lodge clarification. Removed references to system documentation.
3	3/24/2016	S. Sanderson	M	During the Portable Document Format (pdf) conversion of Rev. 2, the graphics were lost. The pdf version of Rev. 3 shows the graphics in Figure 1 and Attachment 3. Minor editorial changes were made in the document.
3 mc-1	3/25/2016	S. Sanderson	mc	Corrected date information in the header.
4	8/12/2016	S. Sanderson	M	Modified 5.6.1 to address the ATLAS-specific baseline labeling system (BGS-SCR-ATLA-0035). Minor editorial changes were made in the document.

¹ M = major change, mc = minor change, N = new

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 3 of 49	

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY 4

2. PLAN DESCRIPTION 4

3. REFERENCES..... 11

4. TRAINING QUALIFICATIONS 12

5. WORK PROCESSES..... 12

6. RECORDS 34

7. ATTACHMENTS 34

ATTACHMENT 1 – Definitions 36

ATTACHMENT 2 – Acronyms 39

ATTACHMENT 3 – ATLAS Project Organization Chart 42

ATTACHMENT 4 – Referenced Forms 43

ATTACHMENT 5 – Baseline Labeling System 44

LIST OF FIGURES

Figure 1 – Hardware Interfaces for the ATLAS Program 11

Figure 2 – Help Desk Flow Chart 14

LIST OF TABLES

Table 5 – Software Planning Phase Activities and Work Products 22

Table 6 – Software Requirements Definition Phase Activities and Work Products 24

Table 7 – Software Design Phase Activities and Work Products 26

Table 8 – Implementation Phase Activities and Work Products 28

Table 9 – Software System Testing Phase Activities and Work Products 30

Table 10 – Installation and Acceptance Testing Phase Activities and Work Products 32

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 4 of 49	

1. EXECUTIVE SUMMARY

This Software Quality Assurance Plan (SQAP) provides responsibilities for the integration of quality activities into all aspects of Boston Government Services, LLC (BGS) project activities performed for the Automated Transportation Logistics and Analysis System (ATLAS).

This SQAP implements the applicable procedures and processes that provide the controls and management practices needed to ensure that contractual Quality requirements, including Department of Energy (DOE) Order 414.1D, *Quality Assurance*; EM-QA-001, Rev. 1, *Environmental Management (EM) Quality Assurance Program*; and ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications, (2008 with Addenda through 2009)*, are met. This plan is designed to use the education and experience of personnel, training, procedures, assessments, and surveillance functions as management tools to ensure all functional and project activities promote the success of BGS. Based upon the functionality of ATLAS and DOE agreement, ATLAS does not meet the definition of nuclear safety software as defined by DOE Order 414.1D, *Quality Assurance*, per the ATLAS Software Classification Determination section in this SQAP. ATLAS does not perform scientific or engineering modeling as described by EM-QA-001 Attachment H.

2. PLAN DESCRIPTION

2.1. Background Information

2.1.1. ATLAS is an integrated web-based logistics management system allowing users to manage inbound and outbound freight shipments by highway and air. ATLAS provides an integrated framework for data sharing between carriers and shippers. ATLAS software application is a modular system that integrates the activities performed by DOE and its contractors in packaging and transportation of materials including radioactive and other hazardous materials. Its modules standardize and simplify common shipment information such as bills of lading, freight bills, rate structures, and hazardous materials documentation.

2.1.2. The ATLAS project consists of the following work scope segments:

- a) Maintaining the ATLAS software application
- b) Maintaining the cloud-based web server and database server for access to the ATLAS software application
- c) Providing day-to-day program support through a user Help Desk
- d) Providing technical support and consultation for the ATLAS data
- e) Providing user training.

2.1.3. The ATLAS software application capabilities include:

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 5 of 49	

- a) Carrier Profile: Provides detailed carrier information for high-usage and/or tendered carriers to assist shippers with carrier selection for shipments.
- b) Route & Rate: Calculates shipment cost estimates for tendered Air, Parcel, Less than Truckload (LTL), Truckload (TL), and Household Goods (HHG) carriers.
- c) Shipping Documents: Automates the creation of shipping documents for general, hazardous, and radioactive material.
- d) Freight Bills: Provides the ability to process freight bills for distribution to sites' accounts payable for payment.

2.2. Purpose and Scope

2.2.1. This SQAP is designed to meet the applicable requirements of:

- a) BGS-QAP-01, *Corporate Quality Assurance Plan (QAP)*
- b) DOE Order 414.1D, *Quality Assurance*
- c) ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications*, (2008 with Addenda through 2009)
- d) EM-QA-001, Rev. 1, *Office of Environmental Management (EM) Quality Assurance Program*

2.2.2. Additionally, this SQAP is governed by the BGS procedures listed in the References section and applies to all activities associated with the maintenance, operations, and continuous improvements for the ATLAS project, including the ATLAS software application, the ATLAS web server application, database administration, Help Desk functions, and user training.

2.3. ATLAS Software Classification Determination

2.3.1. ATLAS is an integrated web-based logistics management system that allows users to manage inbound and outbound shipments by highway and air. ATLAS is a tool used by shippers to prepare shipping documentation. It is the responsibility of the certified shipper to conduct the final review of their work to ensure the content is compliant with the DOE, Department of Transportation, Environmental Protection Agency, and National Regulatory Commission guidelines.

2.3.2. The ATLAS project is comprised of several work scope segments, as described in the Background Information section. The Software Implementation Project Manager (SIPM) will initiate grade level determination for each of ATLAS work scope segments per BGS-QA-03, *Graded Approach*. Until the ATLAS work

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 6 of 49	

scope segments grade level determination is completed, all ATLAS work scope will be governed by this SQAP.

2.3.3. ATLAS is developed software as defined by BGS-SQ-02, *Software Management*.

2.3.4. ATLAS does not perform any of the following:

- a) Safety functions
- b) Classify, design, or analyze nuclear facilities
- c) Hazard control functions in support of nuclear facilities
- d) Radiological safety management programs
- e) Technical safety requirements
- f) Control functions necessary to provide protection from nuclear facility or radiological hazards

2.3.5. ATLAS does not meet the definition of DOE safety software per DOE Order 414.1D.

2.4. Organization Structure and Responsibilities

2.4.1. BGS defines the responsibilities for establishment and implementation of the SQA program through this SQAP and its flow-down procedures. BGS' ATLAS Project organizational structure (Attachment 3), functional responsibilities, levels of authority, and lines of communications for activities affecting quality are documented in this SQAP. When necessary, the responsible person may delegate as long as the designee has the appropriate knowledge, required training, and required independence. The ATLAS Project Team is structured to focus on customer needs while maintaining rigor in quality-related activities.

2.4.2. President

- a) Participates in the document review process per BGS-AD-01, *Document Preparation and Control*.
- b) Performs responsibilities of the Quality Assurance Manager or the Vice President of Operations in his/her absence.

2.4.3. Vice President of Operations

- a) Identifies a SIPM as the point-of-contact for management of the ATLAS project covered by this plan.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 7 of 49	

- b) When the SIPM is the author, reviews and approves ATLAS Software Life Cycle (SLC) documents per BGS-AD-01, *Document Preparation and Control*.
- c) Participates in the document review process per BGS-AD-01, *Document Preparation and Control*.
- d) Performs responsibilities of the SIPM in his/her absence.
- e) Consults with SIPM to make decision to roll-back to a previous version of ATLAS.

2.4.4. Quality Assurance Manager

- a) Ensures quality assurance requirements, as defined in BGS-QAP-01, *Corporate Quality Assurance Plan*, are incorporated into this document.
- b) Provides independent oversight of process implementation.
- c) Participates in the document review process per BGS-AD-01, *Document Preparation and Control*.
- d) Consults with the SIPM on Tier 2 Help Desk issues to determine if the issue is associated with a BGS process or an issue impacting the software baseline.

2.4.5. Software Implementation Project Manager (SIPM)

- a) Generates and maintains ATLAS SLC planning documentation.
- b) Reviews and approves ATLAS SLC documents including requirements, design, test plans, and user documentation per BGS-AD-01, *Document Preparation and Control*. Note: In the instances where the SIPM performs the role of an author of a SLC document, the BGS Vice President of Operations performs this responsibility.
- c) Advises user organizations of problems and approved changes with controlled software.
- d) Uniquely identifies configuration items.
- e) Prepares software retirement documentation.
- f) Implements process improvements in response to problems.
- g) Establishes requirements for access controls for controlled software.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 8 of 49	

- h) Ensures that finalized documents are placed into the configuration management system as required by this plan.
- i) Establishes the minimum qualification requirements and assigns personnel as needed to perform associated activities.
- j) Reviews Tier 2 Help Desk tickets to determine if they are BGS process or software baseline issues. Consults with Vice President of Operations to make decision to roll-back to a previous version of ATLAS.
- k) Ensures that the day-to-day activities affecting quality associated with the ATLAS project are performed per BGS plans and procedures.
- l) Responsible for planning, implementation, tracking, reporting, self-assessment, overall performance, communication, and continuous improvement for the project.

2.4.6. Software Engineer

- a) Generates and maintains ATLAS SLC documents including requirements, design, test plans, and user documentation.
- b) Performs and participates in the document review process per BGS-AD-01, *Document Preparation and Control*.
- c) Performs ATLAS application software maintenance activities as required.
- d) Establishes an approved software baseline following completion of each major activity of the software maintenance process.
- e) Provides Help Desk support.
- f) Performs Database Administration.
- g) Consults with the SIPM on Tier 2 Help Desk issues to determine if the issue is associated with a BGS process or an issue impacting the software baseline.
- h) Translates detailed design into computer code.
- i) Tests, debugs, and refines applications to produce the required result.
- j) Enhances web applications to reduce operating time or improve efficiency.
- k) Performs code review of code produced by individuals other than themselves, if required.
- l) Prepares required user documentation.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 9 of 49	

m) Moves code and database updates to development and production servers.

2.4.7. Verification and Validation (V & V) Engineer

- a) Performs testing of the ATLAS software as required, independent of those who designed the software.
- b) Performs and participates in the document review process per BGS-AD-01, *Document Preparation and Control*.

2.4.8. Document Control Administrator (DCA)

- a) Maintains the quality assurance (QA) records.

2.4.9. Transportation Data Specialist

- a) Performs transportation system data management and operations.
- b) Translates detailed design into database queries.
- c) Translates database queries into reporting queries for web application usage.
- d) Tests, debugs, and refines database queries to produce the required result.
- e) Enhances database queries to reduce operating time or improve efficiency.
- f) Prepares required user documentation.
- g) Generates and maintains SLC document content (e.g., requirements, design, test plans, user documentation) specific to database and reporting queries.
- h) Provides Help Desk support.
- i) Performs Database Administration.

2.4.10. Subject Matter Expert (SME)

- a) Interfaces with Transportation Management Council (TMC) and carriers to perform carrier permit and insurance updates.
- b) Runs the General Services Administration (GSA) LTL Monthly Report.

2.4.11. Software Quality Assurance Subject Matter Expert (SQA SME)

- a) Ensures QA requirements, as defined in BGS-QAP-01, *Corporate Quality Assurance Plan*, are incorporated into this document.
- b) Provides independent oversight of process implementation.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 10 of 49	

- c) Participates in the document review process per BGS-AD-01, *Document Preparation and Control*.

2.4.12. ATLAS End-Users

- a) Uses the software in accordance with user documentation.
- b) Advises the ATLAS Support Help Desk of issues, problems, and/or recommendations.

2.5. Hardware Interfaces

2.5.1. The ATLAS project requires separate hardware interfaces (Figure 1), some of which are physically or logically separated. These environments include: (1) BGS files, (2) BGS backups, (3) BGS software development, (4) configuration management, (5) DOE-EM cloud, and (6) end-users.

2.5.2. All software maintenance activities are performed through the interactions between the Software Engineers' development environment and Plastic Software Configuration Management (SCM) Server for code management. Plastic SCM Server is managed onsite at the BGS Oak Ridge Office and accessed by each individual Software Engineer's application development software through Plastic SCM account access and authentication requirements, per BGS-IM-01, *Application Development and Coding Standards*. The DCA connects directly to the BGS File Server for management of records.

2.5.3. End-User's access to the ATLAS application is through the web and is dependent upon proper account access and authentication within the application. The ATLAS application is hosted at the DOE's EM Cloud datacenter at the Hanford site.

2.5.4. For all BGS controlled hardware, file backups are performed per BGS-IM-03, *Backup and Recovery Standards*.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 11 of 49	

Hardware Interfaces for the ATLAS Program

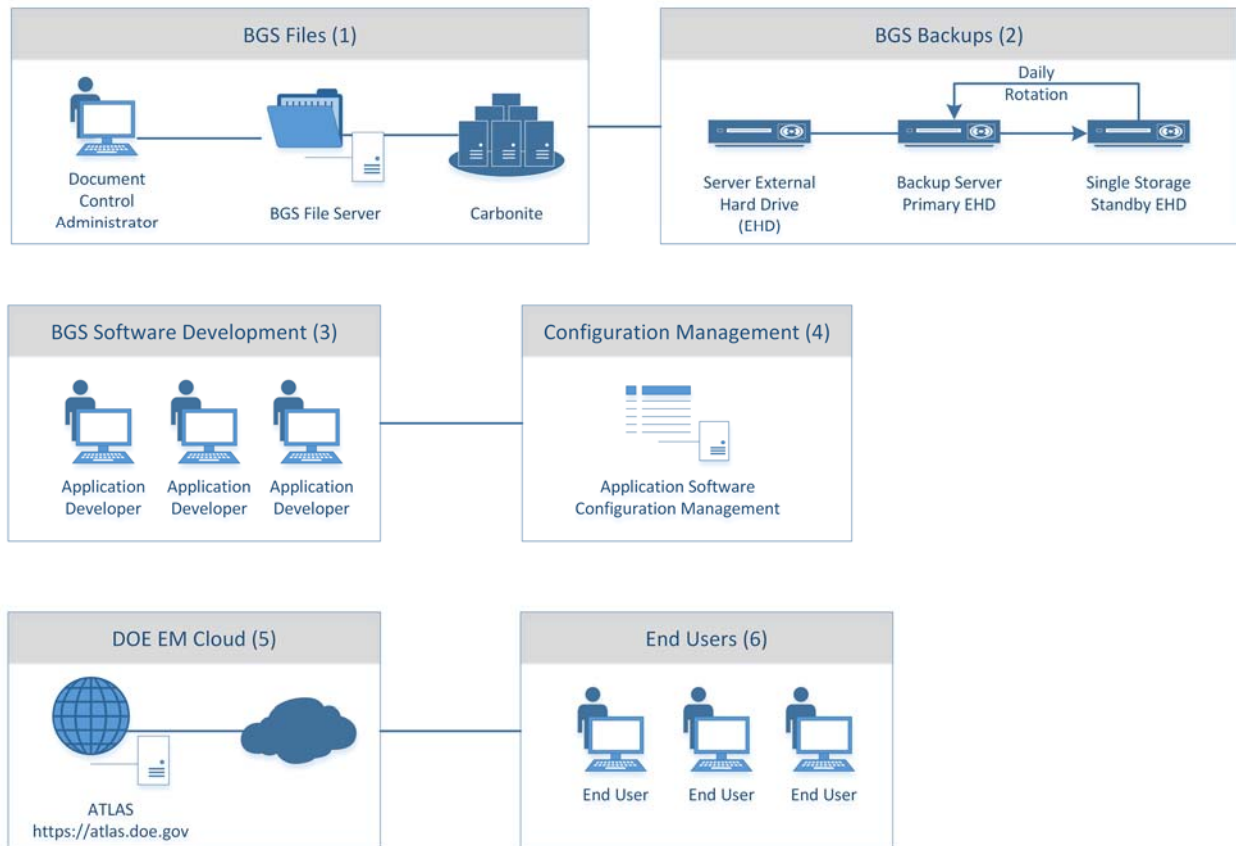


Figure 1 – Hardware Interfaces for the ATLAS Program

*Note: Only Corporate documents utilize the Carbonite backup.

3. REFERENCES²

- 3.1. ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications*, (2008 with Addenda through 2009)
- 3.2. BGS-AD-01, *Document Preparation and Control*
- 3.3. BGS-IM-01, *Application Development and Coding Standards*
- 3.4. BGS-IM-03, *Backup and Recovery Standards*

² Unless otherwise noted the latest revision of the references is applicable.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 12 of 49	

- 3.5. BGS-QA-16, *Corrective Action*
- 3.6. BGS-QAP-01, *Corporate Quality Assurance Plan*
- 3.7. BGS-RM-01, *Quality Assurance Records*
- 3.8. BGS-SQ-01, *Software Change Request*
- 3.9. BGS-SQ-02, *Software Management*
- 3.10. BGS-TR-01, *Qualification and Training*
- 3.11. BGS-WA-22-SQAP-03, *ATLAS Operational Testing*
- 3.12. DOE Order 414.1D, *Quality Assurance*
- 3.13. EM-QA-001, Rev. 1, *Environmental Management (EM) Quality Assurance Program*

4. TRAINING QUALIFICATIONS

Training and qualifications are performed in accordance with BGS QA procedure BGS-TR-01, *Qualification and Training*. Project technical staff are selected based on education and experience as it relates to the defined qualification requirements. Initial and continuing training programs are established for technical staff performing activities affecting quality to ensure an understanding of applicable BGS QA, contract, and regulatory requirements as they relate to their assigned duties. Training is structured to be commensurate with their specific and general duty requirements, the scope, complexity, importance of activity, and the education, experience, and proficiency of the person. Training for ATLAS project technical personnel is determined by the SIPM and delivered per BGS-TR-01, *Qualification and Training*.

5. WORK PROCESSES

5.1. Software Life Cycle (SLC) Methodology

5.1.1. BGS uses the Waterfall model as its Software Life Cycle Model (SLCM). Details of each of the life cycle phases including specific work activities and work products/deliverables are described in SLC Phases section. This SLCM specifies application development phases containing inputs and outputs, entrance and exit criteria and activities. These phases in conjunction with necessary control gates define the software processes and SLC phases implemented for this project.

5.2. Help Desk Support

5.2.1. This section describes the Help Desk process and problem reporting, corrective action, and associated notifications utilized by BGS on ATLAS as shown in the Help Desk Flowchart (Figure 2). It also defines the interface between the Help Desk process and BGS' Software Change Request (SCR) process (BGS-SQ-

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 13 of 49	

01, *Software Change Request*) and Corrective Action process (BGS-QA-16, *Corrective Action*).

- a) BGS is the point-of-contact for the ATLAS Help Desk. The Help Desk receives, troubleshoots, and responds to end-user problems or requests, logs and tracks the problems or requests, and determines the best technical personnel to address the problems or requests. The BGS Help Desk ensures a consistent response to problem resolution, service requests, status reporting, and notification of changes to the user community.
- b) As shown in Figure 2, incoming internal and external requests are assigned a ticket. The processing of tickets involves a two-tiered approach. Most of the issues and requests can be resolved by Tier 1 support personnel. The Help Desk attendant that receives the request conducts an initial evaluation to determine if the request can be resolved by Tier 1 support personnel. The Help Desk ticketing system identifies ticket “types” allowing for separation of user issues. These separate normal activities (Tier 1) are not considered process or baseline issues (i.e., new user requests, password resets, and general support questions).
- c) All Tier 1 tickets are tracked to completion by a member of the ATLAS team and the requester is provided a response for closed Tier 1 tickets.
- d) The Help Desk attendant also consults with the SIPM to determine if the request needs to be escalated to a Tier 2 issue.
- e) The issue is reviewed to evaluate the extent of the condition and the number of users affected. If the extent of the issue is wide spread and impacts multiple users, then the ticket is escalated to the Tier 2 level.
- f) All Tier 2 issues are also reviewed by the SIPM to determine if the issue is a BGS process (procedures, etc.) related issue or an issue impacting the software baseline. The SIPM may consult with the QA Manager and Software Engineer as part of this review. The issue can be either a process and/or software baseline issue. If it is a “process” issue only, a corrective action report is prepared and processed in accordance with BGS-QA-16, *Corrective Action*, and as appropriate corrective actions are identified and tracked to closure. If the issue impacts the software baseline, an SCR is generated using BGS-SQ-01, *Software Change Request*.
- g) Help Desk responsibilities are typically performed by the Software Engineer or Transportation Data Specialist, but can be performed by other ATLAS team members as necessary. Responsibilities, designated by the SIPM are tied to work aids. Current work aids are available on the BGS Employee Portal at www.bgs-llc.com.

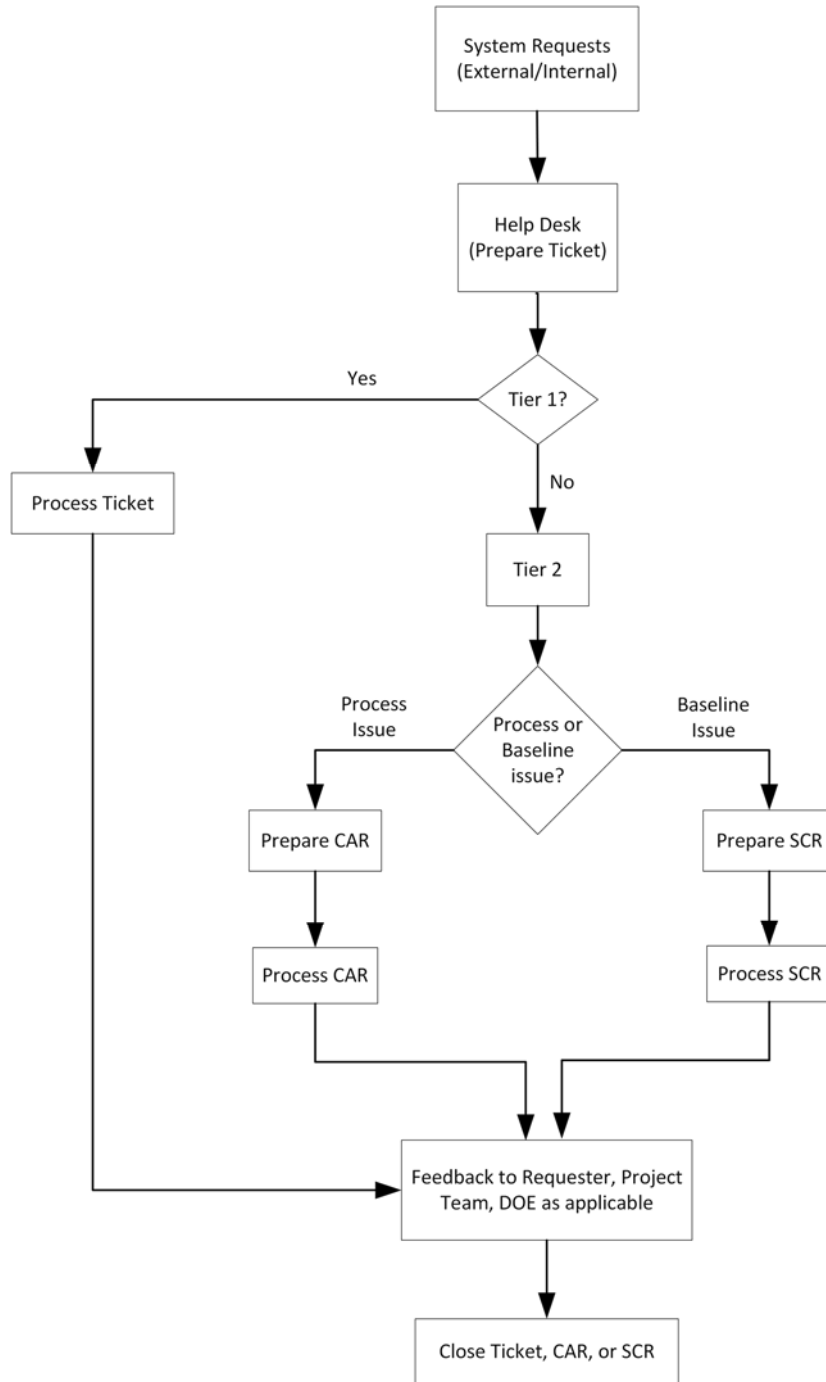


Figure 2 – Help Desk Flow Chart

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 15 of 49	

5.3. Database Administration

5.3.1. The Database Administration function includes data value changes as well as data-driven code changes to the ATLAS application. These data-driven code changes are necessary to support the data changes required for ATLAS operations. Data value changes that only affect the data and are initiated through the Help Desk process do not require an SCR since these are identified, controlled, and tracked through the Help Desk ticket process. Data-driven code changes are expedited through the SCR process as an Emergency/Urgent SCR and follow the processes described in the SLC Phases section.

- a) Database Administration responsibilities are performed by the Software Engineer and Transportation Data Specialist. Responsibilities designated by the SIPM are tied to work aids. Current work aids are available on the Employee Portal at www.bgs-llc.com.

5.4. Software Change Requests

5.4.1. The User community, customer, ATLAS working group, Joint Application Development (JAD), or BGS personnel may identify problems or enhancements to software. For example:

- a) Problems or issues related to the software or the supporting documentation may be identified during operations that present a situation of uncertainty, perplexity or difficulty.
- b) Problems that produce an error.
- c) Enhancements may need to be implemented for items where improvements to the software and/or related documentation are deemed necessary to address new requirements or to improve user interface (e.g., identify common user mistakes and how to resolve them).

5.4.2. The identification, evaluation, prioritization, tracking, and processing of SCRs is governed by BGS-SQ-01, *Software Change Request*.

- a) Operational database administrative changes controlled by a Help Desk Tier 1 ticket are exempt from the SCR process based upon the following criteria:
 - Data changes that do not require the ATLAS application to be modified.
 - The Help Desk ticket process provides verification that the data changed.
- b) Tier 2 database administrative changes require the generation of an SCR.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 16 of 49	

5.5. Software Verification, Validation, and Reviews

5.5.1. Software Verification

- a) Software verification asks the question, “*Are we building the software update correctly?*” Software verification evaluates the technical adequacy and correctness of the software throughout the SLC. In the waterfall SLCM, software verification is performed at the end of each SLC phase to ensure that the products of a given life cycle phase satisfy the conditions imposed at the start of that phase.
- b) The objectives of the software verification process include using established criteria to conduct verification of software and interfaces from the lowest level up to the total system to ensure that the software requirements are satisfied. Verification activities include the traceability of each requirement to the design and to software test procedures.
- c) Software verification methods include the following:
 - Analysis – the use of analytical techniques to predict the compliance of a design to its requirements based on calculated data or data derived from lower level software module or subsystem testing. It is generally used when hardware or peripherals or full systems are not available or not cost effective.
 - Inspection – the visual examination of software module and subsystem code or limited data output. It is generally used to verify design features or projected system output.
 - Review – the evaluation of software documentation by peers to ensure that the document is complete, accurate, and has been written to the required level of detail commensurate with the complexity of the software and expertise of the users of the document.
 - Demonstration – the use of system, subsystem, and module operation to show that a requirement can be achieved by the system. It is generally used for a basic confirmation of performance capability or output and is differentiated from testing by the lack of detailed gathering.
 - Testing – the use of software module, subsystem, or system operation to ensure the software produces the correct results, meets performance and security requirements, and other specified criteria. Tests are performed during and at the completion of development. Tests may be performed at the module level, during integration of software modules or components, and at the system level.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 17 of 49	

- d) Software verification activities are planned, documented, and performed for software defect correction and enhancements. The extent of verification and methods chosen are a function of the complexity of the software, the degree of standardization, the similarity with previous proven software, and the BGS classification of the software, per the ATLAS Software Classification Determination section in this SQAP. Specific software verification activities are identified in each SLC activity in the SLC Phases section.

5.5.2. Software Validation

- a) Software validation asks the question, “Did we build the right software update?” Otherwise stated, “Did we build the software update the customer wanted?” Software validation implements methods to determine if the software requirements were met. Software validation is performed at the completion of software implementation. Software system testing and customer acceptance are considered software validation methods. Software validation is typically performed from a software system level, not at a module or integration level. Software system level testing demonstrates that the software adequately and correctly performs all its intended functions and meets all performance and security requirements. Software validation ensures that the software properly handles abnormal conditions and events as well as credible failures (e.g., power failures, system process not responding). Software validation ensures that the software will not degrade the computer system when it is being executed.
- b) Software validation activities are planned, documented and performed for software defect corrections, software enhancements, and system configuration changes that are determined to impact the software. The primary method for software validation is testing. Software validation is performed prior to approving the software for use. A subset of the software system tests may be performed during software maintenance activities. While installation and in-use testing may only exercise a subset of the software requirements, these are considered software validation activities. A competent individual or group that is independent of the software implementation performs validation activities. Specific software validation activities are identified in the Software System Testing Phase and Installation and Acceptance Phase sections.

5.5.3. Reviews

- a) Review of software ensures compliance with the approved design requirements. Control points and associated reviews for the software elements are identified. These reviews are performed by the SIPM. If the SIPM performed implementation activities, the Vice President of Operations

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 18 of 49	

performs the review. At a minimum the following reviews are performed by BGS:

- **Software System Test Readiness Review:** This review includes the review of requirements related to the activities of preparing the computer program for system testing. It is performed at the end of the Implementation Phase.
 - **Software Completion Review:** The second review provides assurance of satisfactory completion of the software maintenance cycle including system testing. It is performed at the end of the Installation and Acceptance Testing Phase.
- b) Reviews will identify the participants and their specific review responsibilities. Documentation of review comments and their disposition are retained in accordance with BGS-RM-01, *Quality Assurance Records*, as part of the review package. Reviews of controlled documents are performed in accordance with BGS-AD-01, *Document Preparation and Control*.
- c) Tests performed in support of a review may be used to complement verification testing (i.e., developer testing). Such tests are subject to the same criteria as the verification tests, but do not substitute for performing the comprehensive, end of development, validation test (i.e., software system and accepting testing). The tests and test results are included in the verification testing documentation.

5.6. Software Configuration Management

5.6.1. Configuration Identification consists of the software configuration baselines that are established at the end of each maintenance life cycle phase. Software configurations can be identified through the baseline labeling system. The baseline defines the most recent approved software configuration. The software configuration is the set of configuration items that are to be controlled at specific points within the SLC. The ATLAS configuration items are:

- a) ATLAS Application source code and compiled .dll files
- b) EDI Import Tool
- c) EDI FTP Get Tool
- d) Household Goods (HHG) Spreadsheet
- e) Fuel Surcharge (FSC) Spreadsheet

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 19 of 49	

- f) ATLAS SLC documentation, which includes the software planning, requirements design, test plan(s) (includes test suite(s) and test cases), and user documentation.
- g) Microsoft Visual Studio
- h) Microsoft SQL Server

5.6.2. Baseline Labeling System

- a) The ATLAS Application, EDI Import Tool, and EDI FTP Get Tool source code and compiled DLL files baseline labeling system is described in Attachment 5.
- b) The HHG Rating Tool and FSC Spreadsheet baseline labeling system is described in Attachment 5.
- c) The baseline labeling system for ATLAS SLC document QA records is defined in BGS-AD-01, *Document Preparation and Control*.
- d) The baseline labeling system for Microsoft Visual Studio and Microsoft SQL Server (acquired support software) consists of the version numbers supplied by the vendor.

5.6.3. Configuration Change Control and Configuration Status Control

- a) The software configuration change control process includes, but is not limited to configuration initiation, evaluation, and disposition of software change requests; control and approval of changes prior to implementation; and requirements for retesting and acceptance of test results. Configuration items are maintained under configuration management until the software is retired or maintenance activities are assumed by another organization. Updates are documented and tracked using the CCPL and CCSL.
- b) Changes to software and other configuration items are documented, evaluated, and approved per BGS-SQ-01, *Software Change Request*. Only authorized changes are made to the configuration baseline. Changes are evaluated for impact to determine the required level of verification, validation, reviews, and testing activities. Changes will identify any required revision to the SLC documentation, including maintaining traceability to software requirements.
- c) ATLAS uses Test Lodge software for requirements traceability. Software requirements are input into Test Lodge. Test Cases within Test Lodge map to specific requirements. This mapping produces a requirements traceability matrix of test cases to requirements.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 20 of 49	

- d) A separate traceability matrix document is maintained, that maps requirements to design to test cases.
- e) BGS uses the Plastic SCM software configuration management tool for version control. Plastic SCM provides source code management, version management, conflict identification and resolution, reporting, release management, modification traceability, and distributed development capabilities. Plastic SCM is installed on the SCM server and will not allow a Software Engineer to modify code that is being modified by another Software Engineer. Software Engineers shall at a minimum, check-in into the SCM server all modified code by the close of each business day. Reference BGS-IM-01, *Application Development and Coding Standards*, for Plastic SCM code management guidelines.
- f) The configuration status of computer program and support software configuration items are controlled through the CCPL and CCSL and the implementation of BGS-SQ-01, *Software Change Request*. System software installed on the ATLAS production server is configuration controlled by DOE EM Cloud's Hanford IT organization. Testing of these changes are managed by BGS-WA-22-SQAP-03, *ATLAS Operational Testing*. Support software that does not affect performance of the application computer program is not required to be placed under configuration control. Software documentation is generated and stored per BGS-RM-01, *Quality Assurance Records*.

5.7. Software Life Cycle (SLC) Phases

5.7.1. The ATLAS SLCM incorporates the following life cycle phases. While the waterfall life cycle model is used, from time-to-time performing these life cycle phases in a different order may be appropriate for a given project or project phase. Any deviation from the waterfall life cycle model will be identified in the Project Plan. The activities and documents associated with each are identified in the following sections:

- a) Software Planning
- b) Software Requirements Definition
- c) Software Design
- d) Implementation
- e) Software System Testing
- f) Installation & Acceptance
- g) Operations

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 21 of 49	

h) Maintenance

i) Retirement

5.7.2. The following sections and tables identify the SLC activities and associated documents that will be generated. Some documents, once issued are submitted and stored as QA records, per BGS-RM-01, *Quality Assurance Records*. Revisions to and draft documents are not considered QA records until formally issued. Each table identifies when a document becomes a QA record. Authors of QA records are responsible to ensure records are maintained, legible, readily identifiable, and retrievable while in their possession, and other responsibilities to authenticate and transmit QA records as detailed in BGS-RM-01, *Quality Assurance Records*.

5.7.3. Software Planning Phase

a) This is the first phase in the life cycle of a software project. In this phase, the scope of the next release of the ATLAS application is identified. The scope is based upon the planned SCRs as approved by the Software Change Control Board.

b) Planning is deciding, in advance, what to do, how to do it, when to do it, and who is going to do it. The requirements identified in project related material are the primary input to the Project Plan. The level of detail will vary depending on the project size and scope. For software releases that only include Emergency/Urgent SCRs, the Project Plan can be generated, approved and placed into the BGS Records Management System (RMS) in parallel with performing the subsequent life cycle phases. The Project Plan is developed by the SIPM. A document review is conducted per BGS-AD-01, *Document Preparation and Control*, with the reviewer identified by the SIPM. Once the review is completed, the Vice President of Operations reviews the Project Plan and if appropriate, approves the Project Plan. The Project Plan includes:

- Identification of preliminary SCRs to be incorporated in the software release
- Staffing
- Schedule
- Technical and managerial approaches that will be used beyond those identified in this SQAP, and
- Identification of potential risks associated with the project.

FUNCTIONAL AREA: Quality Assurance		BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan		REV. NO. 4	DATE: 8/12/2016
		Page 22 of 49	

Table 1 – Software Planning Phase Activities and Work Products

Work Activity		Work Product	Responsible Role	Form/Report Number	QA Record (Y/N)
A.1	Develop Project Plan	Draft Project Plan	SIPM	NA	N
A.2	Review Draft Project Plan	Combined Review Comment Set	Reviewers per BGS-AD-01 <i>Document Preparation and Control</i>	Documentation per BGS-AD-01, <i>Document Preparation and Control</i>	Y
A.3	Review and Approve Draft Project Plan	Approved Project Plan	Vice President of Operations	NA	Y
A.4	Baseline Project Plan per BGS-AD-01, <i>Document Preparation and Control</i>	Approved Baselined Project Plan	SIPM	NA	Y

5.7.4. Software Requirements Definition Phase

- a) The primary goal of this phase is to develop a basis of mutual understanding between the customer and the implementation team about the requirements for the ATLAS application and the requested enhancement. The Software Requirements Specification (SRS) provides the basis for the software design. This phase involves analysis of the requestor/user's business processes and needs, and translation of those processes and needs into an SRS.
- b) The Software Requirements Definition Phase identifies functional, performance, security, interface and safety requirements, installation considerations, design inputs, and any design constraints. Security considerations should be included which support user access control to ensure only authorized users can access the enhancement, as applicable. The software requirements are complete, correct, consistent, clear, verifiable, and feasible.
- c) Since the ATLAS application is in the Maintenance Phase, the primary input to changes to the SRS are enhancement SCRs. Defect SCRs do not impact software requirements. However, when a Defect SCR is being implemented, the SRS is reviewed to ensure the requirement is included. In most instances

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 23 of 49	

the Database Administration functions will not require the SRS to be updated. In the few instances that may require a change to the SRS, if the associated SCR is considered Emergency/Urgent, the Software Requirements Definition Phase activities can be performed in parallel with performing the subsequent life cycle phases.

- d) The Software Engineer prepares needed changes to the SRS that reside in Test Lodge, attaches to the completed form BGS-SQAF-01.5, *Software Requirements Specification*, and submits the updated document for review in accordance with BGS-AD-01, *Document Preparation and Control*. Once the document review has been completed, the Software Engineer performs any necessary updates to the SRS and performs document control activities per BGS-AD-01, *Document Preparation and Control*. The SIPM approves the SRS and ensures that the software documentation is provided to the DCA for processing and that all finalized documents are placed into the RMS. Any associated SCRs are updated per BGS-SQ-01, *Software Change Request*. For Emergency/Urgent SCRs, including Database Administration function changes, this review can be conducted after the software application has been made available to the users.
- e) The Software Engineer generates the separate Requirement Training Matrix (RTM).

Table 2 – Software Requirements Definition Phase Activities and Work Products

Work Activity		Work Product	Responsible Role	Form/Report Number	QA Record (Y/N)
B.1	If SCR impacts SRS, update SRS and RTM in Test Lodge	Draft SRS	Software Engineer	BGS-SQAF-01.5, <i>Software Requirements Specification</i>	N
B.2	Generate the RTM	RTM	Software Engineer	NA	N
B.3	If revised, perform a review of the draft SRS	Combined Review Comment Set	Reviewers per BGS-AD-01, <i>Document Preparation and Control</i>	Documentation per BGS-AD-01, <i>Document Preparation and Control</i>	Y
B.4	Incorporate review comments	Revised SRS	Software Engineer	BGS-SQAF-01.5, <i>Software Requirements Specification</i>	N
B.5	Approve and baseline SRS by submitting to DCA	Approved and Baselined SRS	SIPM	BGS-SQAF-01.5, <i>Software Requirements Specification</i>	Y

5.7.5. Software Design Phase

- a) The goal of the Software Design Phase is to translate the requirements, the “what to do” of the SRS into the “how to do it” of the design specifications. During this process, the overall structure of the software product is defined. This phase creates a set of technical, computer-oriented system design specifications and data structures from the SRS. The design is documented to the level of detail necessary to plan and execute the Implementation and Installation and Acceptance Phases. The design describes the logical system flow, data organization, system inputs and outputs, processing rules, and operational characteristics of the software product from the user’s point of view.
- b) Prototyping of screen layout may be used in communicating the design specifications to the system owner and users.
- c) General module specifications are produced to define what each module is to do, but not how the module is to be coded. Each module and data structure

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 25 of 49	

is considered individually during detailed design with emphasis placed on the description of internal and procedural details. The primary work product of this phase is a Software Design Document (SDD) that provides a blueprint for the coding of individual modules.

- d) In cases where the software application interfaces with external systems, it is required that the external system does not cause any abnormal conditions to impact the functionality or the native data within the application.
- e) Since the ATLAS application is in the Maintenance Phase, the primary input to changes to the SDD are SCRs. Enhancement SCRs and defect correction SCRs may require changes to the SDD. The Software Engineer evaluates the SCR to determine if the SRS or SDD is impacted by implementing the SCR. If the SRS is impacted, perform activities as outlined in Section 4.4, *Software Requirements Definition Phase*. If the SDD is impacted, the Software Engineer updates the SCR and prepares needed changes to the SDD and submits the revised document for independent review per BGS-AD-01, *Document Preparation and Control*. Once the document review has been completed, the Software Engineer performs any necessary updates to the SDD and document control activities per BGS-AD-01, *Document Preparation and Control*. The SIPM approves the SDD and ensures that the software documentation is provided to the DCA for processing. Any associated SCRs are updated per BGS-SQ-01, *Software Change Request*. For Emergency/Urgent SCRs, including Database Administration function changes, this review can be conducted after the software application has been made available to the users.
- f) The Software Engineer ensures that traceability from the software requirements is maintained to the design, by reviewing and updating the RTM that resides outside of Test Lodge.

FUNCTIONAL AREA: Quality Assurance		BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan		REV. NO. 4	DATE: 8/12/2016
		Page 26 of 49	

Table 3 – Software Design Phase Activities and Work Products

Work Activity		Work Product	Responsible Role	Form/Report Number	QA Record (Y/N)
C.1	If SCR impacts SDD, update SDD	Draft SDD	Software Engineer	BGS-SQAF-01.6, <i>Software Design Document</i>	N
C.2	If revised, perform a review of the revised SDD	Combined Review Comment Set	Reviewers per BGS-AD-01, <i>Document Preparation and Control</i>	Documentation per BGS-AD-01, <i>Document Preparation and Control</i>	Y
C.3	Incorporate review comments	Revised SDD	Software Engineer	BGS-SQAF-01.6, <i>Software Design Document</i>	N
C.4	Approve and baseline SDD by submitting to DCA	Approved and Baseline SDD	SIPM	BGS-SQAF-01.6, <i>Software Design Document</i>	Y

5.7.6. Implementation Phase

- a) The Implementation Phase translates the design into computer executable code. The source code, including suitable comments, is generated using the approved program specifications and coding standards per BGS-IM-01, *Application Development and Coding Standards*.
- b) If during the Implementation Phase, the need for changes are identified either because of (a) the identification of a new requirement, (b) the discovery of a defect, (c) preventative maintenance/re-engineering, (d) a required revision to the documentation, or (e) data-driven code change, a new SCR is generated and submitted for processing using BGS-SQ-01, *Software Change Request*. No changes to the source code are made until the SCR is approved for implementation.
- c) Configuration management of the source code and associated development activities are explained in more detail in BGS-IM-01, *Application Development and Coding Standards*. BGS-IM-01, *Application Development and Coding Standards* defines the process supporting how the Software Engineer will access the source code and begin the development activities. All changes to the source code are associated with an approved SCR.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 27 of 49	

- d) The Software Engineer develops or revises user documentation. No changes to the user documentation are made until the SCR is approved for implementation.
- e) The V & V Engineer drafts a Software System Test Plan. The test cases in the Software System Test Plan include functional testing, performance testing, security testing, stress testing, and load testing, as applicable. The Software System Test Plan also addresses any retesting or regression testing to ensure no unintended adverse effects were introduced during code modifications and that the software product still meets the software design requirements. This Software System Test Plan will be used during the Software System Testing Phase.
- f) For Database Administration functions that involve ATLAS code modifications, testing is limited to ensuring that the SCR was implemented properly. For other Emergency/Urgent SCR changes, the SIPM identifies the scope of the software system testing.
- g) The Software Engineer performs the necessary code modifications, builds the ATLAS application, performs development testing, and baselines the code. Any associated SCRs are updated per BGS-SQ-01, *Software Change Request*. For Emergency/Urgent SCRs, including Database Administration function changes, this review can be conducted after the software application has been made available to the users.
- h) Prior to the Software System Testing Phase, the SIPM performs an independent review using BGS-SQAF-01.12, *Software System Test Readiness Review*, to ensure traceability of requirements to design and to the software system test plan, and to ensure completion of required activities related to preparing the computer program for system testing.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 28 of 49	

Table 4 – Implementation Phase Activities and Work Products

Work Activity		Work Product	Responsible Role	Form/Report Number	QA Record (Y/N)
D.1	If SCR impacts user documentation, draft/update documentation	Draft/Update User Documentation	Software Engineer	NA	N
D.2	Develop Draft Software System Test Plan	Draft Software System Test Plan (BGS-SATP-##)	V & V Engineer	BGS-SQAF-01.2, <i>Software Acceptance Test Plan</i>	N
D.3	Modify Code	Completed Modules of Code	Software Engineer	NA	N
D.4	Conduct Developer Testing	NA	Software Engineer	NA	N
D.5	Baseline Code	Baselined Code	Software Engineer	NA	N
D.6	Conduct Software System Test Readiness Review	Software System Test Readiness Review Report	SIPM	BGS-SQAF-01.12, <i>Software System Test Readiness Review</i>	Y

5.7.7. Software System Testing Phase

- a) Software system testing activities focus on interfaces between and among components of the software product, such as functional correctness, system stability, overall system operability, system security, and system performance requirements (e.g., reliability, maintainability, and availability).
- b) In this phase, the software product is tested to determine whether it meets functionality, performance, quality, interface and security requirements. Software System Testing is conducted by the V & V Engineer using the approved Software System Test Plan Test Suite stored in Test Lodge to validate that the software product satisfies all requirements. Form BGS-SQAF-01.2, *Software Acceptance Test Plan*, is used as a cover sheet for the printed Test Lodge Software System Test Plan, and is submitted to the DCA.
- c) A Test Run is created from a Test Suite, and executed by the V & V Engineer.
- d) A Software System Test Report is produced by executing a Test Lodge Test Run. Form BGS-SQAF-01.3, *Software Acceptance Test Report*, is used as

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 29 of 49	

a cover sheet for the printed Test Lodge Software System Test Report. The SIPM verifies that software system testing has successfully been completed by signing the Software System Test Report and submitting it to the DCA.

- e) For user documentation, the Software Engineer submits the revised documentation for independent review per BGS-AD-01, *Document Preparation and Control*. Once the document review has been completed, the Software Engineer completes the necessary updates to the documentation and performs document control activities per BGS-AD-01, *Document Preparation and Control*. The SIPM approves the user documentation and ensures it is provided to the DCA for processing and that all finalized documents are placed into the records management system.
- f) For Emergency/Urgent SCRs, including Database Administration function changes, this review can be conducted after the software application has been made available to the users.
- g) Using Test Lodge as a source, update the RTM to ensure that software requirements are mapped to test cases.

FUNCTIONAL AREA: Quality Assurance		BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan		REV. NO. 4	DATE: 8/12/2016
		Page 30 of 49	

Table 5 – Software System Testing Phase Activities and Work Products

Work Activity		Work Product	Responsible Role	Form/Report Number	QA Record (Y/N)
E.1	Review Software System Test Plan and user documentation	Combined Review Comment Set	Reviewers per BGS-AD-01, <i>Document Preparation and Control</i>	Documentation per BGS-AD-01, <i>Document Preparation and Control</i>	Y
E.2	Incorporate review comments for Software System Test Plan and user documentation	Revised Software System Test Plan and user documentation	Software Engineer	BGS-SQAF-01.2, <i>Software Acceptance Test Plan</i>	N
E.3	Approve and Baseline Software System Test Plan and user documentation by submitting to DCA	Approved and Baseline Software System Test Plan (BGS-SATP-##) and user documentation	SIPM	BGS-SQAF-01.2, <i>Software Acceptance Test Plan</i>	Y
E.4	Update the RTM	RTM	V & V Engineer	NA	N
E.5	Conduct Software System Testing	Draft Software System Test Report	V & V Engineer	BGS-SQAF-01.3, <i>Software Acceptance Test Report</i>	N
E.6	Verify Software System Testing Successful	Approved Software System Test Report (BGS-SATR-##)	SIPM	BGS-SQAF-01.3, <i>Software Acceptance Test Report</i>	Y

5.7.8. Installation & Acceptance Phase

- a) Installation and acceptance of the software product is initiated after the software system test has been successfully completed and prior to approval of the software program for use. This phase involves the activities required to install the software, databases, or data that comprise the software product onto the hardware platform at the sites(s) of operation. The objectives of the activities of this phase are to ensure the ATLAS application executes properly

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 31 of 49	

in its production environment and to obtain the requester's acceptance of the software product.

- b) The Software System Test Plan and Software System Test Report are provided to the requester for use in accepting the software. The requester will perform acceptance testing per their processes and provide BGS confirmation that the software is acceptable. If the software is not accepted, BGS will work with the requester to resolve the issues. If necessary, one or more SLC Phases will be repeated.
- c) The V & V Engineer develops an Installation Test Plan that identifies a subset of test from the Software System Test Plan (form BGS-SQAF-01.2, *Software Acceptance Test Plan*). The ATLAS Operational Testing Software System Test Plan (BGS-SATP-08), can be used as part of the Installation Test Plan. Once DOE approves the software for release, the SIPM or Software Engineer performs the installation. The V & V Engineer executes the Installation Test Plan and generates the Installation Test Report (form BGS-SQAF-01.3, *Software Acceptance Test Report*).
- d) The SIPM reviews the RTM for completeness and processes per BGS-RM-01, *Quality Assurance Records*.
- e) The SIPM will conduct a Software Completion Review to ensure that the Installation and Acceptance Phase is completed.
- f) Upon successful completion of the Installation and Acceptance Phase, software will be deployed for production per the Deploy ATLAS Software Updates to Production work aid. This includes archiving the current version of the software prior to installing the new version.

FUNCTIONAL AREA: Quality Assurance		BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan		REV. NO. 4	DATE: 8/12/2016
		Page 32 of 49	

Table 6 – Installation and Acceptance Testing Phase Activities and Work Products

Work Activity		Work Product	Responsible Role	Form/Report Number	QA Record (Y/N)
F.1	Distribute Installation Package and Installation Test Plan to V & V Engineer	Installation Test Plan	SIPM	BGS-SQAF-01.2, <i>Software Acceptance Test Plan</i>	Y
F.2	Perform Installation and Installation Testing	Installation Test Report	V & V Engineer	BGS-SQAF-01.3, <i>Software Acceptance Test Report</i>	Y
F.3	Obtain requester's acceptance	Customer acceptance notification	SIPM	NA	Y
F.4	Verify RTM is complete	RTM	SIPM	NA	Y
F.5	Conduct Software Completion Review	Software Completion Review Report	SIPM	BGS-SQAF-01.14, <i>Software Completion Review</i>	Y

5.7.9. Operations Phase

- a) Once approved for release and installed, ATLAS is distributed to the user community by placement on servers controlled by Hanford Information Technologies. ATLAS is executed on computer servers maintained by DOE. BGS does not control or maintain configuration control of those servers. When notified of a configuration change to a server that hosts ATLAS, the change is controlled per BGS-SQ-01, *Software Change Request*, and the appropriate testing is performed to ensure ATLAS functions properly. Configuration change notifications are distributed to BGS via email. BGS does not perform in-use testing for this environment. BGS does not control or support the individual user computing environment.

5.7.10. Maintenance Phase

- a) During the Maintenance Phase, configuration changes to support software are managed per BGS-SQ-01, *Software Change Request*, and may require testing of a subset of the software system test plan to be performed to ensure the new support software does not impact the functionality, performance or security of ATLAS. Additionally, operational testing should be performed

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 33 of 49	

each time the software product is installed in a different operating environment. Operational testing is performed per the ATLAS Operational Testing work aid.

- b) ATLAS is a web-based cloud application that requires the users to execute the most recent version of the software. The ATLAS software is not downloaded to the user's local computer. Only the current version of ATLAS is available to the users. BGS does not make previous versions of ATLAS available to the users. Therefore, routine use of previous versions of the software is prevented. BGS archives all previous versions of ATLAS within its software configuration management tool providing the capability to roll-back to a previous version should it be required. BGS maintains the ability to roll-back three versions of the ATLAS software.
- c) ATLAS may fail to perform as expected during operations due to a significant defect or other operational environment condition that requires ATLAS to roll-back to a previous version. The SIPM and Vice President of Operations will make the decision to roll-back to a previous version. Rolling-back to a previous version is performed per the Roll Back ATLAS Software to a Previous Version work aid.

5.7.11. Retirement Phase

- a) When ATLAS is retired, the SIPM initiates an SCR per BGS-SQ-01, *Software Change Request*. Following approval, the SIPM notifies users of pending retirement, ensures all user account access to the application has been disabled, and properly archives the ATLAS software and software life cycle documentation.

5.8. Support Software

5.8.1. Support software includes software tools and system software. ATLAS uses the following software tools in the development and operating environments. The current versions of each are identified in the CCSL. Additionally, any separate distribution media for a software tool will be stored in the telecom room (locked). Acquisition of support software follows BGS-QA-04, *Procurement*.

5.8.2. Development Environment Support Software

- a) C# compiler and associated libraries
- b) MS SQL Server
- c) MS Visual Studio and associated libraries
- d) Test Lodge

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 34 of 49	

- e) Plastic SCM
- f) Balsamiq Mockup
- g) MS Excel
- h) Server O/S including patches (e.g., Windows)

5.8.3. Operating Environment Support Software

- a) MS .net framework
- b) Server O/S including patches (e.g., Windows 8.1, Windows 7)
- c) MS SQL Server

5.9. Changes to the support software are controlled per BGS-SQ-01, *Software Change Request*, and are evaluated for impact on the controlled software to determine the level of reviews and retesting that will be required. When changes to a software tool are anticipated, the changes are evaluated before installation to identify any potential impact on the performance of ATLAS in the operating environment or results in developing, building and testing ATLAS in the development environment. If determined that the new software tool version is needed, the Software Configuration management process will be initiated and the tool will be installed in a location that does not impact operations or critical development activities and then tested. Testing can be informal, in that the tests can be ad hoc and not predefined. However, documentation of what ATLAS functions were tested and the test results should be documented using the Software Acceptance Test Report (BGS-SQAF-01.3). Only those fields applicable to the informal testing process need to be completed.

5.10. System software updates such as patches and service packs for the Server O/S and MS SQL Server are not controlled by the ATLAS project. When we are notified of a system software change, coordination and testing of changes is managed with the use of the ATLAS Operational Testing work aid.

6. RECORDS

6.1. Tables 1 through 6 identify the types of records (work products), associated forms (Form or Report number) and which, when completed, are QA records. QA records generated will be maintained according to BGS-RM-01, *Quality Assurance Records*.

7. ATTACHMENTS

- 7.1. ATTACHMENT 1 – Definitions
- 7.2. ATTACHMENT 2 – Acronyms

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 35 of 49	

7.3. ATTACHMENT 3 – ATLAS Project Organization Chart

7.4. ATTACHMENT 4 – Referenced Forms

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 36 of 49	

ATTACHMENT 1 – Definitions

Acceptance Testing	<p>(1) Testing conducted to determine whether a system satisfies its acceptance criteria and to enable the customer to determine whether to accept the system. Source: IEEE Standard 829-2008.</p> <p>(2) Formal testing conducted to enable a user, customer, or other authorized entity to determine whether to accept a system or component. Source: IEEE Standard 829-2008.</p> <p>(3) The process of exercising and evaluating a system or system component by manual or automated means to ensure that it satisfies the specified requirements and to identify differences between expected and actual results in the operating environment. Source: ASME NQA-1</p>
Changeset	A group of one or more files checked in to source control.
Computer Program	A combination of computer instructions and data definitions that enables computer hardware to perform computational or control functions. Source: ASME NQA-1
Document	Recorded information describing, specifying, reporting, certifying, requiring, or providing data or results.
Graded Approach	The process of ensuring the level of analyses, documentation, and actions used to comply with a requirement are commensurate with the following: Relative importance to safety, safeguards, and security; Magnitude of any hazard involved; Life cycle phase of a facility or item; Programmatic mission of a facility; Particular characteristics of a facility or item; Relative importance of radiological and non-radiological hazards; and Any other relevant factors. Source: DOE Order 414.1D
Quality	The condition achieved when an item, service, or process meets or exceeds the user's requirements and expectations. Source: DOE Order 414.1D
Quality Assurance	All those actions that provide confidence that quality is achieved. Source: DOE Order 414.1D

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 37 of 49	

Quality Assurance Program The overall program or management system established to assign responsibilities and authorities, define policies and requirements, and provide for the performance and assessment of work.
Source: DOE Order 414.1D

Record A completed document or other media-providing objective evidence of an item, service, or process.

Safety Software Safety Software. Includes the following:

(1) Safety System Software. Software for a nuclear facility that performs a safety function as part of a Structure, System, or Component (SSC) and is cited in either (a) a DOE-approved documented safety analysis; or, (b) an approved hazard analysis per DOE Policy 450.4, Safety Management System Policy, dated 10-15-96 (or latest version) and 48 CFR 970-5223.1.

(2) Safety and Hazard Analysis Software and Design Software. Software that is used to classify, design, or analyze nuclear facilities. This software is not part of an SSC but helps to ensure the proper accident or hazards analysis of nuclear facilities or an SSC that performs a safety function.

(3) Safety Management and Administrative Controls Software. Software that performs a hazard control function in support of nuclear facility or radiological safety management programs or technical safety requirements or other software that performs a control function necessary to provide adequate protection from nuclear facility or radiological hazards. This software supports eliminating, limiting, or mitigating nuclear hazards to workers, the public, or the environment as addressed in 10 C.F.R. Parts 830 and 835, the DEAR Integrated Safety Management System clause, and 48 CFR 970-5223.1.

Source: DOE Order 414.1D

Software Computer programs and associated documentation and data pertaining to the operation of a computer system. Source: ASME NQA-1

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 38 of 49	

Software System Testing The process of exercising or evaluating a software system or component by manual or automated means to ensure that it satisfies the specified requirements and to identify differences between expected and actual results in the operating environment. Also known as software validation. (Derived from ASME NQA-1 acceptance testing).

Support Software This software includes: software tools, system software, operating systems, system utilities, compilers, assemblers, translators, interpreters, query language, word processing programs, spreadsheets, database managers, and graphing programs.

Tier 1 A Help Desk Ticket that does not require modifications to the ATLAS software application.

Tier 2 A Help Desk Ticket that requires modification to the ATLAS software application.

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 39 of 49	

ATTACHMENT 2 – Acronyms

ASME	American Society of Mechanical Engineers
ATLAS	Automated Transportation Logistics and Analysis System
BGS	Boston Government Services, LLC
CCPL	Controlled Computer Product Log
CCSL	Controlled Computer Software Log
CAR	Corrective Action Report
CI	Configuration Identifier
CFR	Code of Federal Regulations
DCA	Document Control Administrator
DOE	Department of Energy
EDI	Electronic Data Interchange
EHD	External Hard Drive
EM	Emergency Management
FTP	File Transfer Protocol
GSA	Government Services Administration
HHG	Household Goods
IT	Information Technology
JAD	Joint Application Development

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 40 of 49	

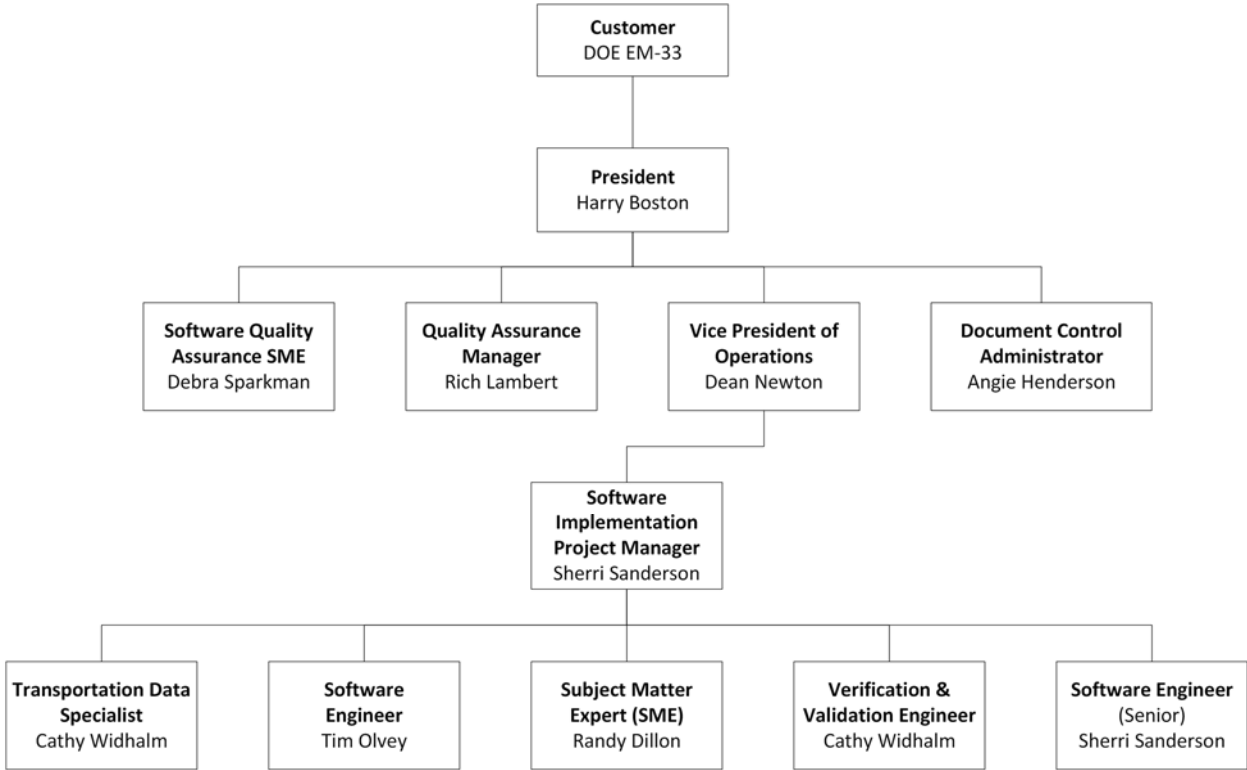
LLC	Limited Liability Company
LTL	Less than Truckload
NQA	Nuclear Quality Assurance
QA	Quality Assurance
QAP	Quality Assurance Plan
RMS	Records Management System
RTM	Requirement Training Matrix
SCM	Software Configuration Management
SCR	Software Change Request
SDD	Software Design Document
SIPM	Software Implementation Project Manager
SLC	Software Life Cycle
SLCM	Software Life Cycle Model
SME	Subject Matter Expert
SQAF	Software Quality Assurance Form
SQAP	Software Quality Assurance Program
SRS	Software Requirements Specification
SSC	Structure, System, or Component
TL	Truckload

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 41 of 49	

TMC Transportation Management Council

V & V Verification and Validation

ATTACHMENT 3 – ATLAS Project Organization Chart



FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 43 of 49	

ATTACHMENT 4 – Referenced Forms

The current revision of each form is available on the BGS employee portal

Form Number	Form Name
BGS-SQAF-01.2	Software Acceptance Test Plan
BGS-SQAF-01.3	Software Acceptance Test Report
BGS-SQAF-01.5	Software Requirements Specification
BGS-SQAF-01.6	Software Design Document
BGS-SQAF-01.8	Software Change Request
BGS-SQAF-01.12	Software System Test Readiness Review
BGS-SQAF-01.14	Software Completion Review

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 44 of 49	

ATTACHMENT 5 – Baseline Labeling System

ATLAS Application Software Releases, EDI Import Tool, and EDI FTP Get Tool

The baseline labeling system for these configuration items consists of a 3 segment version number, followed by a 2 segment build number. Examples of drivers that increment the baseline labeling segments are listed below. Build numbers increment when any of the three segments of the version number change. There are some cases, noted in Table A4 where a build number will change while the version number remains the same.

Major Releases may include SCRs for a new module or new functionality added as a new section in a module.

Minor Releases may include SCRs for underlying system framework or control updates, enhancements to an existing screen in a module, refactoring of existing code, or routine updates that involve additions of new screens (yearly, for example).

Bug Fixes include SCRs with a change type of Defect.

Routine Releases may include SCRs for reoccurring code updates, such as the weekly fuel surcharge screen update, adding PDF files to an existing list of files for download, or notification updates to users regarding data updates, via the Change Log screen.

- Version, 1st segment – Increments upon a major release. This number is unique and increments by one (1). When this number changes, the 2nd and 3rd segments of the version number are reset to zero (0). (see Table A1)
- Version, 2nd segment – Increments upon a minor release. This number is unique and increments by one (1). When this number changes, the 3rd segment of the version number is reset to zero (0). (See Table A2)
- Version, 3rd segment – Increments when bugs are fixed. This is indicated by Defect being checked as the Change Type in an SCR. This number is unique and increments by one (1). (See Table A3)
- Build, 1st segment – Plastic SCM Code Development branch changeset number. This changeset contains the code used to compile/build a software release. This number is unique and changes with all updates, including routine updates that do not change the version number. Changeset numbers are automatically generated in Plastic SCM. Changeset numbers referenced in a software release build may not be sequential. (See Table A4)
- Build, 2nd segment – Plastic SCM Software Release branch changeset number. This changeset contains the compiled code posted to the development and production environments. This number is unique and changes with all updates, including routine updates that do not change the version number. Changeset numbers are automatically generated in Plastic SCM. Changeset numbers referenced in a software release build may not be sequential. (See Table A4)

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 45 of 49	

Table A1 – Major Release Increment Drivers

Examples of Major Release Increment Drivers									
A Carrier Load Board feature is added as a new section in the Rate & Route module									
A GSA module is added, accessible via a new module box shown on the default screen users see once they bypass the security notice upon login									
The ability to generate a new type of shipping document is added to the Shipping Documents module.									
A Site Administration feature is added to ATLAS, providing site-specific controls to site administrators									
A new EDI relationship is created with a carrier we currently do not have an EDI relationship with									
This is not a finite list of drivers. Other drivers may also increment these segments.									
Version and Build increment example when a major version is released: Example: Version 3.4.7, Build 101.202									
Current Version and Build									
Version	Major	.	Minor	.	Bug	Build	Code Changeset	.	Release Changeset
	3	.	4	.	7		101	.	202
Target Version and Build									
Version	Major	.	Minor	.	Bug	Build	Code Changeset	.	Release Changeset
	4	.	0	.	0		204	.	205

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 46 of 49	

Table A2 – Minor Release Increment Drivers

Examples of Minor Release Increment Drivers									
The .net framework is upgraded to a new version									
Controls (list, menu, loading indicator, etc.) are upgraded to a new version									
A list in the Freight Bill module is updated to allow editing directly within the list									
New rate analysis screens are added for TL, LTL, HHG, Air and Parcel for 2017									
A DOE site requests EDI from a carrier we currently have an EDI relationship with									
This is not a finite list of drivers. Other drivers may also increment these segments.									
Version and Build increment example when a minor version is released: Example: Version 3.4.7, Build 101.202									
Current Version and Build									
Version	Major	.	Minor	.	Bug	Build	Code Changeset	.	Release Changeset
	3	.	4	.	7		101	.	202
Target Version and Build									
Version	Major	.	Minor	.	Bug	Build	Code Changeset	.	Release Changeset
	3	.	5	.	0		214	.	220

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 47 of 49	

Table A3 – Bug Fix Increment Drivers

Examples of Bug Fix Increment Drivers									
A data saving defect is resolved									
A report footer defect is resolved									
An AP pay file defect is resolved									
A button navigation defect is resolved									
An international address defect is resolved									
This is not a finite list of drivers. Other drivers may also increment these segments.									
Version and Build increment example when a bug fix is released: Example: Version 3.4.7, Build 101.202									
Current Version and Build									
Version	Major	.	Minor	.	Bug	Build	Code Changeset	.	Release Changeset
	3		4		7		101		202
Target Version and Build									
Version	Major	.	Minor	.	Bug	Build	Code Changeset	.	Release Changeset
	3		4		8		229		230

Table A4 – Routine Release Increment Drivers

Examples of Routine Release Increment Drivers									
The weekly fuel surcharge data is updated on the fuel surcharge screen each week									
A new tender document is added to the list of tenders in the TL tender screen									
A notification of data updates, such as a new MCEP list posted, proper shipping names updated, ERG guide data updates are posted on the Change Log									
This is not a finite list of drivers. Other drivers may also increment these segments.									
Version and Build increment example when a routine release occurs: Example: Version 3.4.7, Build 101.202									
Current Version and Build									
Version	Major	.	Minor	.	Bug	Build	Code Changeset	.	Release Changeset
	3	.	4	.	7		101	.	202
Target Version and Build									
Version	Major	.	Minor	.	Bug	Build	Code Changeset	.	Release Changeset
	3	.	4	.	7		239	.	242

ATLAS Application Files

This baseline labeling system for this configuration item consists of the item (file name), and its most recent changeset number. (e.g., Default.aspx, 155). This information is found in the Plastic SCM Items view. Plastic SCM assigns changeset numbers for version control purposes, when changes are checked in.

Household Goods (HHG) Spreadsheet

The baseline labeling system for this configuration item consists of the year in the filename (e.g., 2016 HHG Rating Tool.xlsx). The year in the filename increments each calendar year. If this spreadsheet is updated more than once in the year, the filename will be appended at the end with an underscore (_) and a sequential number. Sequential numbering starts with one (1). (e.g., 2016 HHG Rating Tool_1.xlsx).

FUNCTIONAL AREA: Quality Assurance	BGS-SQAP-03	
PROCEDURE TITLE: ATLAS Software Quality Assurance Plan	REV. NO. 4	DATE: 8/12/2016
	Page 49 of 49	

Fuel Surcharge (FSC) Spreadsheet

The baseline labeling system for this configuration item consists of the year in the filename (e.g., 2016 Current FSC Matrix.xls). The year in the filename increments each calendar year. If this spreadsheet is updated more than once in the year, the filename will be appended at the end with an underscore (_) and a sequential number. Sequential numbering starts with one (1). (e.g., 2016 FSC Surcharge Tool_1.xls).