

QUALITY

Assurance Plan

PLAN

Integrated Procurement System (IPS)

U.S. Election Commission

QUALITY MANAGEMENT PLAN

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1.0 SCHEDULE OF TASKS AND RESPONSIBILITIES

Each member of the IPS development and management team will perform quality management (QM) throughout the systems development, operations and maintenance lifecycles. Based on the scope of the IPS project, these QM activities will focus on project management, systems development, software testing, and systems integration. The QM activities to be performed by the team will also include but will not be limited to conducting/participating in regularly scheduled project status reviews, milestone reviews, systems development lifecycle reviews, and evaluating and reporting on project performance. These QM activities will also involve identifying and implementing corrective measures. The following table is a QM responsibility matrix that takes into consideration, IPS systems development activities, the current team structure and relevant organizational interfaces.

Table 1 Quality Management Responsibility Matrix

QM Stakeholder	IPS Project Activities								
	Initiate/ Plan Project	Define Reqs.	Design System	Acquire SW	Acquire HW	Develop/ Doc./Unit Test System	Integrate and Test System	Install/Deploy /Train	Operate System
USEC									
Project Sponsor	P	P	S					S	P
Project Manager	P	P	P	P	P	P	P	P	P
USEC Test Center							P		
Systems Integrity and QM Division	S	S	S	S	S	P	P		
OPC Users	P	P	S			S			
IV&V Team							P		
Contractor									
Project Leader	P	P	P	P		P	P	P	P
Task Leader	P	P	P	P		P	P	P	P
Sr. Systems Analyst	S	P	P	P		P	P	P	
Sr. Programmer Analyst(s)	S	P	P			P	P	S	
DBA		S	P			S	S	P	S
Data Modeler			P			S	S	S	
Technical Writer	S	S	S			P			
Configuration Manager						P	P	P	

P=Primary

S=Secondary

The following table outlines a schedule of QM activities that will be conducted in coordination with the IPS development lifecycle activities presented in the responsibility matrix presented in Table 1.

Table 2 IPS QM Lifecycle Activities and Deliverables

WBS Task ID	Task Name	QM Activities	Start Date	End Date	Deliverables
1.0	Initiate /Plan Project	Develop QM plan Identify standards and guidelines Evaluate project planning, tracking and oversight processes Evaluate Risk Mgt. Process	03/07/01	04/06/01	QM Plan Quality control measures
2.0	Define Requirements	Evaluate system requirements Evaluate performance requirements Evaluate requirements analysis process Evaluate security and privacy requirements	04/10/01	06/29/01	Requirements Review Analysis and Recommendations
3.0	Design System	Evaluate design process Evaluate data analysis process Conduct IV&V on data integrity Conduct design review meetings	06/29/01	08/31/01	Data Requirements Document (Design process review)
4.0	Acquire Software	Evaluate software tools Evaluate software products review process	06/30/01	08/15/01	Software review process assessment
5.0	Acquire Hardware	Conduct system environment audit Evaluate hardware requirements	06/30/01	07/30/01	System environment report
6.0	Develop, Test and Document System	Evaluate software development library control process Evaluate code and unit testing process Perform configuration audits Conduct code walkthroughs Conduct peer review meetings Evaluate corrective action process	08/15/01	12/07/01	Configuration audit report Software library control process assessment Problem/issues tracking and resolution report

WBS Task ID	Task Name	QM Activities	Start Date	End Date	Deliverables
		Evaluate media cert. Process Evaluate storage and handling process			
7.0	Integrate and Test System	Evaluate integration testing process Evaluate corrective action process Evaluate configuration management process	12/10/01	02/01/02	System integration process assessment Problem and corrective action report
8.0	Install/Deploy/Train	Evaluate acceptance testing process Evaluate release process Evaluate deviations and waivers process	02/01/02	02/28/02	Acceptance testing report Release procedures and deviations and waivers assessment
9.0	Operate System	Conduct production readiness reviews Conduct SDM lifecycle compliance audit Conduct post implementation review	03/01/02	04/01/02	Production readiness assessment SDM technical review report

1.1 Quality Management Activities (Examples)

1.1.1 Identify Standards and Guidelines

QM staff will assist the project in identifying the standards or guidelines to be followed in developing the software product. Findings will be documented and provided to the project manager.

- ?? Identify Standards and Guidelines
- ?? Review Standards
- ?? Resolve Guidelines
- ?? Approve Standards and Guidelines
- ?? Implement Standards and Guidelines

1.1.2 Evaluate Project Planning, Tracking, and Oversight Processes

Project planning, tracking, and oversight involves project management in developing and documenting plans as defined in the SDM and appropriate to the scope of the project. For project documents to be developed, QM staff will assist in identifying the appropriate guidelines and standards, and will assist in tailoring guidelines and standards, to meet the project's needs.

QM staff will determine whether the project conducts the relevant activities stated in the Program and Project plans. To verify that these activities are performed as planned, QM will audit the processes that

define the activity, and will use the SDM or planning document as the measure of whether those activities are being accomplished.

1.1.3 Evaluate Risk Management Process

Risk management provides an approach for identifying and mitigating loss, compromise, or damage to implemented systems and/ or systems under development. A risk assessment should be completed to determine the type and probability of a particular type of risk, and risk management and contingency plans should be in place to provide guidance as to how to mitigate risks. Risks should be periodically re-evaluated. QM staff will

- ?? Verify that a risk assessment has been performed and that it reflects the actuality of risk for the particular project and the project's environment.
- ?? Verify that a risk management plan is in place and is being kept current.
- ?? Ensure that system documentation accurately reflects the tested configuration.

1.1.4 Evaluate Requirements Analysis Process

The purpose of requirements analysis is to formulate, document, and manage the requirements baseline; respond to requests for clarification, correction or change; analyze impacts; revise the requirements specification; and manage the requirements analysis and change process. Requirements analysis establishes a common understanding of the requirements between sponsor, user, and software project team. QM staff:

- ?? Verify that the correct participants are involved in the requirements definition and allocation process to ensure that all user needs are identified.
- ?? Verify that requirements are reviewed to determine if they are feasible to implement, clearly stated, and consistent.
- ?? Verify that changes to allocated requirements, work products and activities are identified, reviewed, and tracked to closure.
- ?? Verify that project personnel involved in the requirements definition and allocation process are trained in the necessary procedures and standards applicable to their area of responsibility to do the job correctly.
- ?? Verify that the commitments resulting from allocated requirements are negotiated and agreed upon by the affected groups.
- ?? Verify that commitments are documented, communicated, reviewed, and accepted.
- ?? Verify that allocated requirements identified as having potential problems are reviewed with the group responsible for analyzing system requirements and documents, and that necessary changes are made.
- ?? Verify that the prescribed processes for defining, documenting, and allocating requirements are followed and documented.
- ?? Confirm that a CM process is in place to control and manage the baselines.
- ?? Verify that requirements are documented, managed, controlled, and traced (preferably via a matrix).
- ?? Verify that agreed upon requirements are addressed in the project plan and in the requirements documents.
- ?? Verify that the software requirements definition and analysis process, and associated requirements reviews are conducted in accordance with the standards and procedures established by the project and as described in the SDM.

- ?? Verify that action items resulting from reviews of the software requirements analysis are resolved in accordance with these standards and procedures.

1.1.5 Evaluate Design Process

Design activity determines the overall structure of the system and software to be built. Based on requirements, the software is partitioned into modules, and the function(s) of each module and relationships among these modules are defined. A goal of design is to define how the software will satisfy the allocated requirements. QM staff:

- ?? Verify that lifecycle documents and a traceability matrix are prepared and kept current and consistent.
- ?? Verify that relevant lifecycle documents are updated and that updates are based on approved requirements change.
- ?? Verify that design walkthroughs (peer reviews) evaluate compliance of the design against the requirements, identify defects in the design, and evaluate and report design alternatives.
- ?? Participate in a sampled set of design walkthroughs and verify that all walkthroughs are conducted.
- ?? Identify defects, verify resolution of previously identified defects, and verify change control integrity.
- ?? Selectively review and audit the content of system design documents.
- ?? Identify lack of compliance with standards and determine corrective actions.
- ?? Determine whether requirements and accompanying design and tools conform to standards, and whether waivers are needed prior to continuing software development.
- ?? Review demonstration prototypes for compliance with requirements and standards.
- ?? Verify that the demonstration conforms to standards and procedures.
- ?? Review the status of design milestones.
- ?? Verify that the software design process and associated design reviews are conducted in accordance with standards and procedures established by the project and as described in the SDM.
- ?? Verify that action items resulting from reviews of the design are resolved in accordance with these standards and procedures.
- ?? Evaluate the method used for tracking and documenting the development of a software unit to determine the method's utility as a management tool for assessing software unit development progress. Example criteria to be applied for the evaluation are the inclusion of schedule information, results of audits, and an indication of internal review and approval by its constituent parts.
- ?? Verify that a method, such as a Software Development File (SDF) or Unit Development Folder (UDF), is used for tracking and documenting development of a software unit.

1.1.6 Evaluate Software Tools

QM staff will conduct evaluations of tools, both existing and planned, used for software development and support. Tools are evaluated for applicability by assessing whether tool capabilities are needed for the software development or support and for adequacy by assessing whether they perform the functions for which the tools are intended. Planned tools are evaluated for feasibility by assessing whether they can be developed with the techniques and computer resources available or whether they will need to be acquired.

1.1.7 Evaluate Software Products Review Process

This QM task assures that quality review processes are in place for all development products, which may include representations of information other than traditional hard-copy documents, and that these products have undergone software product evaluation, testing, and corrective action as required.

QM staff will check that software products are reviewed, verify that results are reported, and that issues or problems reported are resolved in accordance with the SDM and the project's procedures.

1.1.8 Evaluate Media Certification Process

QM staff will verify that CM certifies media containing source code and media containing object code delivered to the procuring agency correspond to one another. QM staff verify that the software version represented by this media matches that on which software performance testing was performed, or correctly represents an authorized update of the code, as applicable.

QM reports, together with the corrective action records, software test reports, and software product evaluation records can constitute required evidence for certification.

1.1.9 Evaluate Storage and Handling Process

QM staff will verify that there is an established plan, methodology, or set of procedures for storage and handling of the media. They evaluate storage of the software product and documentation to verify that storage areas for paper products or media are free from adverse environmental effects such as high humidity, magnetic forces, and dust.

1.1.10 Evaluate Software Development Library Control Process

The Software Development Library (SDL) functions as the main control point for software CM. An SDL contains all units of code developed for evolving project CIs, as well as carefully identified listings, patches, errata, CI and system magnetic tapes and disk packs, and job control streams for operating or building software systems, as well as other technical and management material and documentation deemed necessary in the CMP. The SDL also contains previous versions of the operational software system.

QM staff will:

- ?? Verify the establishment of the SDL and procedures to govern its operation.
- ?? Verify that documentation and computer program materials are approved and placed under library control.
- ?? Verify establishment of formal release procedures for CM approved documentation and software versions.
- ?? Verify that library controls prevent unauthorized changes to the controlled software and verify the incorporation of all approved changes.

1.1.11 Evaluate Code and Unit Testing Process

Software implementation or coding is the point in the software development cycle when the design is finally implemented. The process includes unit testing of the software code. QM staff will:

- ?? Verify that the coding process, associated code reviews, and software unit testing are conducted in conformance with the standards and procedures established by the project and as described in the SDM.
- ?? Verify that action items resulting from reviews of the code are resolved in accordance with these standards and procedures.
- ?? Verify that the mechanism used for tracking and documenting the development of a software unit is implemented and is kept current.

1.1.12 Evaluate Integration Testing Process

Software integration and test activities combine individually developed components in the development environment to verify that they work together to complete software and system functionality. Integration requires synchronization to meet designated integration and test milestones. In the integration and test portion of the development lifecycle, the testing focus shifts from individual component accuracy to the proper operation of interfaces between components, the flow of information through the system, and the satisfaction of system requirements. QM staff will:

- ?? Verify that software test activities are identified, test environments have been defined, and guidelines for testing have been designed. The QM staff verify that the software integration process, software integration testing activities, and software performance testing activities are being performed in accordance with the SDM, the software design, the plan for software testing, and established software standards and procedures.
- ?? Verify that any transfer of control of code to personnel performing software is being accomplished in accordance with established software standards and procedures.
- ?? Verify that as many software integration tests as necessary and all the software performance tests are witnessed to confirm that the approved test procedures are being followed, accurate records of test results are being kept, all discrepancies discovered during the tests are being properly reported, test results are being analyzed, and associated test reports are completed.
- ?? Verify that discrepancies discovered during software tests are identified, analyzed, and corrected; software unit tests and software integration tests are re-executed as necessary to validate corrections made to the code; and the software unit's design, code, and test are updated based on results of software integration testing, software performance testing, and the corrective action process.
- ?? Verify that software performance tests produce results, which will permit determination of performance parameters of the software.
- ?? Verify that the responsibility for testing and for reporting on results has been assigned to a specific organizational element.
- ?? Verify that procedures are established for monitoring informal testing.
- ?? Review the Software Test Plan (Unit and Integration) and the Independent Verification, Validation, and Test Plan for compliance with requirements and standards.
- ?? Verify that the software is tested.
- ?? Monitor test activities, witness tests, and certify test results.
- ?? Verify that requirements have been established for certification or calibration of all support software or hardware used during tests.

1.1.13 Evaluate the Corrective Action Process

The corrective action process describes steps for (1) problem identification and correction occurring during software development to verify early detection of actual or potential problems, (2) reporting the problem to the proper authority, (3) analysis of the problem to propose corrective measures, (4) timely and complete corrective action, and (5) recording and following up on the status of each problem. Problems in this context include documentation errors, software errors, and noncompliance with standards and procedures. QM staff will:

- ?? Periodically review the corrective action processes and their results to assess the effectiveness of the correction action process.
- ?? Perform periodic analysis of all reported problems to identify trends that may disclose generic problem areas. These analyses may include study of the causes, magnitude of impact, frequency of occurrence, and preventive measures.

The results of this task may be documented using a process audit form and provided to project management.

1.1.14 Evaluate Configuration Management Process

QM staff will:

- ?? Verify that configuration identification of documents, code, and computer data have established standards for titling and describing change status.
- ?? Verify that baseline management of changes to the developmental baseline (including documents, code, and computer data) are identified, reviewed, implemented, and incorporated in accordance with established procedures.
- ?? Verify that configuration control of changes to baseline documents and software are being managed in accordance with CM requirements as stated in the Configuration Management Plan.
- ?? Verify that configuration status accounting reports are prepared at established times, are prepared in accordance with established procedures, and report the status of items that are significant with respect to management of the configuration of the software product and documentation.
- ?? Verify that the personnel assigned to participate in the configuration audits comply with the CMP.
- ?? Verify that for document control that approved project personnel are using up-to-date documentation and the document distribution process results in receipt of correct documentation.
- ?? Verify that the program support library is the single place of storage for the baseline version of all software. Verify that the identification of all software includes the software name and a unique version identifier. The evaluation may also determine that control of access to software products is being properly exercised and that unauthorized changes to master files cannot occur.

1.1.15 Evaluate Acceptance Testing Process

This activity ensures that the product is ready to be released to end users. It evaluates the "as built" system against functional, data, and performance requirements, and examines the utility of user, operations, and maintenance documentation. QM staff will:

- ?? Evaluate Performance Test Software

- ?? Test System Functions Against Requirements
- ?? Maintain SDL and SDFs
- ?? Maintain Trouble Reporting Process
- ?? Evaluate/ Report Software Integration Test Process
- ?? Resolve Audit Findings

1.1.16 Evaluate Release Process

This activity applies to all deliverables released into the USEC IT environment. QM staff evaluate activities in preparation for end-item delivery to verify that program or project requirements for functional and physical audits of the end-item products are being satisfied. Specific actions include:

- ?? Review Version Release Documentation
- ?? Approve Version Release Documentation
- ?? Evaluate/ Report End-Item Delivery Process
- ?? Resolve Audit Findings

1.1.17 Evaluate Deviations and Waivers Process

QM staff will assist program or project management with requests for deviations and waivers if required, and verify that the deviation or waiver request is processed in accordance with the project's CMP and approved by the approving organization.

2.0 SYSTEM DOCUMENTATION

2.1 Documents by Phase

The following sections provide a comprehensive list of all documents that will be produced during each phase of the development of IPS.

2.1.1 Initiate/Plan Project

Document	Description
Mission Needs Statement	Defines overall need for the Integrated Procurement System project
Technological Profile	Defines technical requirements, system security plan, telecommunications plan and relationship to existing systems
Business Profile	Defines business case, functional requirements and performance objectives, and feasibility study
Management and Planning Profile	Provides the initial Project Plan, Acquisition Plan, and Verification and Validation Documentation
Risk Profile	Defines risk assessment and mitigation plan, and initiative pilot/prototype plans
Financial Profile	Provides Cost-benefit Analysis, defines alternatives, and identifies funding source
Configuration Management Plan	Defines change control process and processes to support software integration and installation
Quality Management Plan	Provides quality assurance and quality control guidelines for all project activities and deliverables
Communication Plan	Identifies stakeholders and processes for communicating with them
Organization and Staffing Plan	Defines organizational structure and staffing required by the project
Risk Management Plan	Defines the quality assurance and quality control processes

2.1.2 Define Requirements

Document	Description
System specifications	Defines the hardware and software requirements for implementing IPS
System support and acquisition plan (initial)	Defines any additional hardware or software support requirements for the implementation and operation of IPS
Functional requirements document (FRD)	Defines the user and business requirements that drive the implementation of IPS

Document	Description
	development and implementation of IPS
Data requirements document	Defines the data base structure and data integration requirements for IPS
Updated IPS project plan	Updates to project plan based on accomplishments or changes to date

2.1.3 Design System

Document	Description
Subsystem Specifications	Describes the detailed design of IPS
Data Requirements Document	Provides an analysis of data and associated system and functional requirements
Database Design Document	Defines database's logical models and data integrity requirements
Database Specifications	Documents the detailed design for the system's databases
Program Specifications	Documents the functions, timing requirements, interfaces, input and output reports and the accuracy and validity requirements
Training Plan (initial)	Defines training methodology, tools, and schedule
Updated IPS project plan	Updates to project plan based on accomplishments or changes to date

2.1.4 Acquire Software

Document	Description
Software review process assessment	Documents outcome of software review and acquisition process

2.1.5 Acquire Hardware

Document	Description
Hardware service agreements	Defines service level agreements
System environment report	Analysis of current operating systems, systems applications and associated infrastructure

2.1.6 Develop, Test and Document System

Document	Description
Updated FRD	Integrates requirements and scope changes
Updated system's specification document	Updates system design based on updates to FRD
Configuration Audit Report	Documents that System Configuration is correctly recorded in design documents
Installation and Conversion Plan (initial)	Defines tasks to be performed to implement system as well as data conversion strategy
Test Plan	Describes unit and integration testing requirements and schedule
Operations Manual	Provides guidelines to support systems operations
Users' Manual	Provides guidance to users on how to use the system
Maintenance Manual	Describes systems maintenance requirements
Validation, Verification, and Testing Plan (final)	Defines IV&V process audit strategy. Includes system testing strategy
Updated IPS Project Plan	Updates to project plan based on accomplishments or changes to date
System integration process assessment	Provides evaluation of integration process along with appropriate corrective actions
Software library control process assessment	Provides evaluation of software library control process along with appropriate corrective actions
Problem/issues tracking and resolution report	Documents problems/issues identified during peer reviews

2.1.7 System Integration and Testing

Document	Description
Test Results and Evaluation Reports	Documents testing process, procedures and outcomes
Installation and Conversion Plan (final)	Defines tasks to be performed to implement system as well as data conversion strategy
Updated IPS Project Plan	Updates to project plan based on accomplishments or changes to date
Problem and corrective action reports	Documents integration and testing troubleshooting activities and outcomes
System integration process assessment	Documents outcome of system integration process audits
Pilot Test Results	Documents results of pilot testing activities

2.1.8 Install, Deploy and Train

Document	Description
IPS Users' Manual	Documents IPS user functions and procedures
IPS Training Plan (final)	Defines the methodology and schedules for administering IPS user training
IPS Training Material	Provides guidance for conducting IPS user training
Acceptance testing report	Documents IPS acceptance testing procedures and results
Release procedures and deviations and waivers assessment	Documents IPS release policies and procedures

2.1.9 Operate System

Document	Description
Production readiness assessment	Documents the results of inspections of designated production sites
Disaster/recovery procedures	Documents system recovery and backup plans and procedures
System performance reports	Documents performance results from systems operations
Post implementation review reports	Evaluates systems' performance over 12 – 18 month timeframe and system's support of business objectives

2.2 Discipline for Documentation Standard Practices

Documents will conform to the standards and guideline outlined in USEC document 2400.15A, the USEC ADP Document Standards guide and Quality Assurance Guidelines (version 1.0). In general the document quality control standards practices applied to documents created during each phase of the IPS development lifecycle will include but not be limited to the following:

- ?? Peer review of all non-SDM and technical documents prior to government reviews
- ?? Inspection and review of all final drafts
- ?? Independent review prior to the submission of final documents

The content of all documents will be reviewed and evaluated to ensure content quality, appropriateness and substance, and document completeness and analytical rigor where relevant. For those documents that are created using non-USEC standard templates and outlines, a waiver must be obtained from the project's quality manager authorizing an exemption. Prior to authorizing an exemption, the project's quality manager will conduct a preliminary review of the document's outline to ensure compliance with the standards and guidelines articulated in 2400.15A. No document will be released as final without the concurrence signatures of the IPS project leader, project manager, project sponsor and division director.

3.0 REVIEWS AND AUDITS

The following sections discuss the QM role in the reviews and audits that will be conducted during the IPS development lifecycle to ensure quality, consistency, comprehension, and completeness of the project documentation and activities.

3.1 Review Process

The IPS team’s review process will comprise the following five steps:

1. The project manager, team lead or designated team member schedules a review meeting and sends out a notification to all participants. This will always include representatives of the QM and IV&V team.
2. The project leader or designated team member of the task, subtask or work product to be reviewed will distribute review materials to participants in advance of the review meeting
3. The review will be conducted in compliance with USEC standards and guidelines. The review will focus on:
 - a. Assessing alignment with project objectives and identifying functional and technical issues and concerns.
 - b. Identifying action items and assigning resources along with follow-up and completion dates.
 - c. Reporting on and addressing noncompliance items and metrics
4. Following each meeting, the process or task owner will document and distribute meeting minutes and actions items to participants.
5. Follow-up reviews will be conducted as scheduled

The above steps are designed to ensure the each review is properly planned, executed and documented. As such, the informal lead reviews described in section 3.3 will apply the above listed steps except in instances where an exception is deemed appropriate.

The review process will be used as a mechanism to assess the merits of a process, its effectiveness, ease of adoption and application and opportunities for improvement. As such the IPS team will perform the following categories of reviews identified in the table below. These reviews will be further defined in sections 3.2 and 3.3.

Type of Review	Responsibility	Participants
Internal Process Reviews/Audits	QM Manager, IV&V Team	Project management and designated team leads
External Process Reviews	IV&V Team	QM Manager, IV&V Team
Milestones/Project Status Reviews	Project Manager, Project Leads	Project Manager, IPS team members
Product Reviews—Internal Peer Reviews	Team Leads	Core team and team members as appropriate

3.2 Formal Reviews and Audits

This subsection addresses the formal and scheduled reviews and audits that the IPS development team will conduct during the project's development and implementation activities.

3.2.1 Lifecycle Reviews

The IPS team will conduct lifecycle or process reviews throughout the project. The team will perform lifecycle reviews at the end of each project phase and milestone defined in Section 2.0. These reviews will include internal process reviews, project status and performance reviews conducted by the project's QM lead. The objective of the internal process review is to assess whether the project team is conducting its activities in accordance with the project plan and in alignment with the IPS project's goals and objectives. . The QM lead will use the internal process review procedures and findings to report review outcomes and recommend corrective actions where appropriate. An external validation and verification team will conduct the external process review by using their own process review procedures. These internal and external reviews will occur during different lifecycle phases and may run in parallel with each other depending on project schedule and completion of a respective project phase. Table 1 outlines the various lifecycle reviews and the associated phases.

Table 1 IPS QM Lifecycle Reviews

IPS Lifecycle Reviews	SDM Lifecycle Phases									
	Non-Lifecycle Reviews	Initiate/Plan Project	Define Reqs.	Design System	Acquire SW	Acquire HW	Develop/Doc./Unit Test Syste	Integrate and Test System	Install/Deploy /Train	Operate System
Management Reviews		†	†	†	†	†	†	†	†	†
Peer Reviews		†	†	†			†	†	†	†
Requirements Review			†							
Specification Review				†	†	†				
Preliminary Design Review				†						
Critical Design Review				†						
Test Readiness Review							†			

IPS Lifecycle Reviews	SDM Lifecycle Phases									
	Non-Lifecycle Reviews	Initiate/Plan Project	Define Reqs.	Design System	Acquire SW	Acquire HW	Develop/Doc./Unit Test Syste	Integrate and Test System	Install/Deploy /Train	Operate System
Formal Qualification Review					†	†	†			
Production Readiness Review								†		
Acceptance Test Review									†	†
IV&V Audits	†	†	†	†	†	†	†	†	†	†
Post-Implementation Review	†									†

Table 2 Review Schedule

Type of Review	Frequency	Application of Results
Product Review – External Peer Reviews	Each deliverable	Measure product quality, address requirements criteria, customer satisfaction
Product Reviews—Internal Peer Review	Each deliverable	Evaluate requirements criteria
Management Reviews	Bi-weekly and at completion of each milestone	Measure planned vs. actual performance, assess project status
IV&V Audits	At Completion of Each Project Phase	Measure process and product quality
Lifecycle Reviews	Each Project Phase	Measure quality of deliverables, process effectiveness

3.2.2 Audits

The IPS projects will participate in a various internal and external audit activities during its lifecycle. In addition to scheduled process and project audit reviews, USEC oversight bodies and organizations such as the Technology Investment Board Executive Committee (TIBEC), Technical Investment Board Executive Committee Working Group (TIBEC WG), and the Office of the Inspector General (OIG), will perform reviews and audits on the project in accordance with legislative mandates: The following table provides an overview of IPS audit activities and schedule.

Audit	Purpose	Frequency
Project Control Review	Assess project health and performance	Quarterly
OIG Audit	Evaluate legislative compliance	As requested by USEC OIG
USEC Technical Review	Assess SDM compliance	As requested by USEC Systems Engineering Oversight and Performance Monitoring Division
IV&V Audits	Assess process effectiveness	At completion of each SDM phase
Functional Configuration Audit	Evaluate compliance with software baseline requirements	Prior to product release
Physical Configuration Audit	Verify consistency between product and documentation	Prior to product release

3.3 Informal Reviews

3.3.1 Team Lead Reviews

These reviews will consist of regular quality control review of deliverables. In order to ensure consistent quality of all work products, IPS team leads will review all deliverables developed by the respective team members. The team lead review is mandatory and is an integral part of the project's QM activities.

3.3.2 Internal Project Peer Reviews

All major deliverables will undergo informal peer review prior to release. Each team lead assigned responsibility for an IPS project task selects the deliverable or document to be peer reviewed. The owner of the deliverable will initiate and complete the peer review process. The team lead will be responsible for ensuring that the peer review is planned, conducted, and action items resolved. The role of the QM lead will be to verify that the peer review took place and adhered to the project's peer review process. This verification will be noted through sign-off and maintenance of project work-papers.

3.3.3 External Peer Reviews

The team leads will recommend deliverables for external peer reviews (i.e., independent of the project team) by appropriate entities or subject matter experts. The IPS project manager will decide which work products will be subjected to external peer review. The team lead will work with the QM lead to schedule and conduct the review as needed. The results of the review will be reported to the IPS project management team.

3.4 Review Reports

The QM lead will collect measurement data generated as an output of the project’s QM activities. Measurement data will be analyzed to identify trends, potential quality issues, process inefficiencies, and potential improvement areas. As a result of the project QM activities, the QM Lead will prepare a monthly status report addressing the following items to the IPS Project Managers and team members:

- ?? QM review findings
- ?? Summary of findings from QM activities
- ?? Results of QM reviews
- ?? Reviews scheduled for the next month

3.5 Review and Audit Metrics

The following table outlines the metrics that will be used to capture and analyze IPS project performance and management information during the system development lifecycle

Expectations	Tools Used to Meet Expectations	Measure	Goal
1. System delivered on-time, within budget	<ul style="list-style-type: none"> ? Detailed weekly time tracking against work packages ? Detailed financial record keeping ? Weekly Project Management Status Meeting ? Monthly status with Senior Management ? Use of standard systems development methodology 	<ul style="list-style-type: none"> ?? % Late ?? % Over Budget ?? Conformance with SDM 	<ul style="list-style-type: none"> ?? < 10% ?? <10%
2. System Meets User Requirements	<ul style="list-style-type: none"> ? Stating and confirming mutual expectations ? Construction Segment Work Statements 	<ul style="list-style-type: none"> ?? Scope Changes ?? No. of User Change Requests 	<ul style="list-style-type: none"> ?? 0 Unsatisfied Requirements ?? <= 40 User changes per release

Expectations	Tools Used to Meet Expectations	Measure	Goal
3. System Should be reliable and high quality	? Technical and functional design reviews ? Exit criteria ? Use standard off-the-shelf products ? On site Quality Assessment Reviews (by various subject experts)	?? No. of Critical defects ?? No. of Major defects ?? No. of Minor defects	?? 0 Critical defects ?? <= 5 Major defects ?? <= 10 Minor defects
4. System Accepted By User Community	?? User Meetings in Requirements Phase ?? User Review of Design Document ?? User Acceptance testing	?? % of users who access the system	?? System used by 90% or more of users
5. System Prototypes should be developed early in the project which help define requirements and demonstrate early success	?? System Prototype	?? Demo Date	?? Completed During Design Phase of project
6. Business Process improved, system reduces user workload	?? User involvement in all phases of the project ?? User Acceptance test	?? % Reduction hours per task	?? 20% or more reduction
7. Proper Systems Development Disciplines Followed (Requirements Definition, design, unit test, systems test, user test etc...)	?? Phase Containment Strategy ?? Phase Exit Criteria	?? % Deliverables accepted	?? 100% acceptance

4.0 TESTING

The IPS project team will comply with all system integration and release testing requirements articulated in the USEC Enterprise Test Center Policy. QM team will work with the test team to prepare for all phases of testing. QM will review the test plans, scenarios, and scripts for compliance with SDM and project objectives and vision. In addition, the QM team will perform all function and unit tests in accordance with SDM guidelines. The QM team will also assist the USEC test center team to trace the test scenarios to the functional requirements. Prior to product release the IPS QM team will work with the USEC test team to assure that the following tests are conducted thoroughly and accurately:

- User acceptance testing of the IPS interfaces
- Unit testing of COTS implementation
- Stress/Performance testing
- String testing of the COTS implementation
- System and integration testing of the COTS implementation
- Regression testing of the COTS implementation
- USEC Test Center release testing
- User acceptance testing of the COTS implementation

5.0 PROBLEM REPORTING AND CORRECTIVE ACTION

The IPS project manager will perform the function of QM manager throughout the project's development lifecycle. In this role the QM manager will review problem, project status and process audit reports and implement corrective actions to address issues that may arise during the IPS development lifecycle.

5.1 Problem/Issue Documentation

Problems and issues associated with the project will be documented via bi-weekly project status reports. Problems and issues that are identified as a result of process audits that are conducted throughout the development lifecycle will be documented via QM audit reports and process review findings. All problem, project status and review reports will be documented and archived in a change control database that will be established and maintained by the team. In addition, it is the responsibility of each IPS project team member to document and track all issues and risks which they identify that relate to each team member's specific work elements. However all issues that are considered to be project level risks must be addressed directly and documented by the project manager. In addition the team will utilize tools and media such as emails and minutes to document issues and problem resolution strategies as appropriate.

5.1.1 Reporting Schedule

In keeping with the reporting requirements described in section 6.1, the IPS team will generate the following reports.

Type of Report	Frequency	Stakeholders
Project status reports	Monthly	Project Management
QM audit reports	At the completion of each phase	QM team, IV&V team
Management Reports	Monthly or as appropriate	Project leader, QM team
Problem tracking and issue management reports	As appropriate	Project leader, team leads
Process review findings	As reviews are scheduled	QM team
QM status reports	At the completion of each phase	QM team
Noncompliance issues and other findings	At appropriate	QM team, team leads

5.2 Report Metrics

The QM manager will collect and analyze project related documentation and reports listed in the table below based on the metrics listed in the associated column.

Type of Report	Metrics
Project status reports	Cost, schedule, variance, earned value analysis
QM audit reports	Document completeness, process efficiency, compliance with standards and guidelines
Management Reports	Budget, cost, schedule, product quality, project performance
Problem tracking and issue management reports	Effectiveness of corrective action, responsiveness
Process review findings	Effectiveness of process change of corrective action recommendation
QM status reports	Timeliness and level of analysis
Noncompliance issues and other findings	Document completeness, process efficiency, compliance with standards and guidelines

6.0 TOOLS

The QM team will use various tools such as SDM checklists, step-by-step review and audit processes, and record tracking tools to effect quality control. The QM team will work with the project management and technical teams to identify and obtain additional tools to support the QM role. The tools that will be used to support the IPS implementation will include but not limited to the following:

- ??Operating system utilities
- ??Debugging aids
- ??Documentation tools
- ??Code and structure analyzers
- ??Code monitoring tools
- ??Statistical analysis packages
- ??Static or dynamic test tools

7.0 PROJECT CONTROLS

7.1 Product Control

The QM team will work with the configuration management team to monitor the methods and tools used to maintain and store controlled versions of system products. The teams will periodically review these tools to assure they meet the project needs.

7.2 Supplier Control

The QM team will work with the project team to assess the success of all supplier products. The team will review the potential supplier products to check their ability to meet project requirements. IPS project management will make the final decision regarding the purchase of third party tools to support the project.

8.0 TRAINING

Training will be implemented through pre-deployment formal classroom training sessions, and the assignment of subject matters experts at each field location. The IPS training approach will comprise the following:

- ?? Classroom training
- ?? Development of user guides for self-instruction
- ?? Training and assignment of subject matter experts
- ?? Establishment of help desk and user support
- ?? Development of a web-based knowledgebase