Gas Asset Management

Policy Statement:

Pacific Gas and Electric Company (PG&E) is committed to the safe, reliable, affordable management and operation of PG&E's gas assets for its customers, the public, and its employees by doing the following:

- Proactively managing the condition of gas assets,
- Identifying and reducing operational and enterprise risk,
- Meeting or exceeding the requirements of federal, state and local codes, regulations and requirements in an environmentally sustainable manner and,
- Establishing an asset management framework, and directing organizational focus on the most important asset risks and opportunities.

The gas asset management framework includes the following operating principles, aspirations, approach and expectations:

1) Foster a "safety-first" culture where employees and contractors understand the vision, strategic plans and the role they play in meeting PG&E's objectives, including the safe operation of gas assets.
2) Create an environment where employees and contractors feel empowered to report and raise safety and compliance issues by using a non-punitive, self-reporting corrective action system.
3) Understand the criticality and condition of assets and mitigate associated risks through effective use of asset management strategies and plans.
4) Apply process safety principles to design, construct, install, operate, maintain and decommission assets.
5) Use BSI-PAS 55 and, ultimately, ISO 55000 as a common framework to achieve consistent and integrated application of asset management practices by employees across all gas functions.
6) Manage our assets to achieve acceptable and sustainable levels of risk and performance at an affordable cost over the life cycle of gas assets.
7) Maintain up-to-date documentation such as standards, codes, procedures, and drawings to manage gas assets throughout their life cycle; ensuring that this information is effectively communicated to those that need to know them and are qualified to use them.
8) Maintain and make accessible to all relevant users, accurate, traceable, verifiable and complete asset information, including all data and records.

9) Verify that employees, contractors and subcontractors are competent, trained and qualified to design, construct, manage, operate, maintain and retire assets, and understand their critical role in the asset management process.
10) Assess and manage all major changes to assets, processes, organization, and technologies to manage risk and deliver safe, reliable and affordable service.
11) Establish and maintain appropriate Key Performance Indicators that measure progress against goals to reduce risk and keep assets healthy.
12) Investigate and analyze asset-related incidents to determine root causes and develop appropriate corrective actions.
13) Audit the implementation of corrective actions.
14) Regularly benchmark asset management performance internally and externally, and use the findings for continuous improvement.

This policy directs Gas Operations to develop an asset management strategy and objectives that support this asset management framework in alignment with the PG&E vision, and to perform periodic review to provide assurance that the framework is still current and effective.

Target Audience:

This policy applies to PG&E employees and contractors who work on or with PG&E gas assets and associated control systems. This policy does not apply to employees and contractors who work on or with gas assets and control systems owned and operated with third parties, including joint ventures.

Accountability:

The Vice President, Standards and Policies, Gas Operations is responsible for updating and monitoring compliance with this policy, and for issuing standards, procedures, and other guidance that implement this policy.

Approval:

Key Contacts:	Jane Yura, Vice President, Standards and Policies Roland Trevino, Vice President, Public Safety and Integrity Management
Reviewed by:	Jesus Soto, Senior Vice President, Gas Operations Sean Kolassa, Vice President, Gas Operations Jane Yura, Vice President, Gas Operations Roland Trevino, Vice President, Gas Operations Kirk Johnson, Vice President, Gas Operations Sumeet Singh, Sr. Director, Gas Operations Mel Christopher, Sr. Director, Gas Operations
Sponsoring Officer:	Jane Yura, Vice President, Gas Operations
Final Review by Compliance and Ethics:	The Compliance and Ethics representative reviewed the policy on February 15, 2013 as the final step before the policy received final approval.
Approved by:	Nickolas Stavropoulos, Executive Vice President, Gas Operations April 22, 2013
Effective Date:	April 22, 2013
Scheduled Review:	April 1, 2015

Policy Revision History:

Date	Comments
Issued: 05/29/2013	This is a new policy.

Attachment B

Gas QC Locate and Mark Assessment Checklist

Below is a list of questions designed to assist divisions in understanding scorecard items associated with the QC Locate and Mark Assessment Program. This list is a tool to help locators and supervisors ensure they are covering all aspects of the locate and mark process, and to help clarify the calls. This table matches the current QC Locate and Mark Scorecard.

Line	Question
1	Did the Technician attend the Mark and Locate training: Gas-0210?
2	Did the Technician complete the annual Mark and Locate training: Gas-0800WBT?
3	Did the Technician complete the Mobile Computing Ergonomics: Gas-0300WBT?
4	Is the correct calibration form being used? (F-4412-02-01 dated 08/2009)
5	Is the header information section of the form complete? (Manufacturer, model number, serial numbers for transmitter and receiver, depth of test facilities, and baseline signal strength) And calibrated within current month?
6	Is the measured signal strength currently within tolerances? (Measured signal strength may not differ by more than 25% of baseline signal strength, per WP 4412-02.)
7	Is the maximum deviation from centerline currently within tolerances? (Maximum deviation from centerline may not differ more than 3", per WP 4412-02.)
8	Is the measured depth at midpoint currently within tolerances? (Measured depth at midpoint may not differ by more than ± 5% plus 2" from actual known depth, per WP 4412-02.)
9	Was the tag marked on time? NOTE: If one tag is late, all points for this item will be deducted.
10	Were times entered into IRTHnet appropriate?
11	Were the response notes appropriate?
12	Was the ticket completion section completed appropriately? (Area pre-marked box, facility type, surface over pipe, critical facilities, etc.)
13	Were quality pictures taken and attached as required?
14	Was it noted that the excavator was notified of special circumstances? (Critical facilities, un-locatable facilities, etc.)
15	Were the tag completion notes entered in IRTHnet appropriately?
16	Were the facilities marked per PG&E standards? (WP 4412-03, i.e., facility types shown, commodity types shown, sizes of facilities shown, etc.)
17	Was the proper marking method used? (Chalk, paint, flags, or whiskers)
18	Was the technician Operator Qualified?
19	Were all markings verified within 24"?
20	Were all facilities within the delineated area marked?
21	Was the critical facilities process followed?

Pacific Gas and Electric Company

Utility Standard: TD-4023S
Publication Date: 09/25/2013 Rev: 0

Gas Operations Auditing, Standard

Summary

This utility standard provides the requirements for audits that are conducted by Gas Operations Auditing.

This utility standard also establishes PAS-55 asset management system audits requirements to ensure that the asset management system conforms to planned arrangements, has been implemented and is maintained; and as a result, is effective in meeting the asset management policy/strategy/objectives and provides information to management.

Target Audience

Gas Operations personnel (knowledge) and Gas Operations Auditing personnel (application). Audit personnel part of another audit team assisting in a Q&I audit.

Safety

The goal of Q&I is to drive continual improvement that is in alignment with Gas Safety Excellence with the vision of becoming the safest, most reliable gas company in the United States. Safety related actions are incorporated into the audit plan for each audit.

Table of Contents

Requirements

1 Authority to Conduct Audits

1.1 Authority and guidance for planning and conducting Q&I audits are derived from Gas Operations top management, Gas Asset Management Policy (TD-01), and PAS 55-1 clause 4.6.4-Audit.

2 Gas Operations Auditing Objectives

2.1 This standard establishes requirements for audits that are conducted by Q&I, with the following objectives:

1. Align with the vision to become the safest, most reliable gas company in the United States.

2. Establish the degree to which Gas Operations is in compliance with the following requirements: safety, system reliability, business operations, regulatory compliance, and PAS 55-1.

3. Standardize the audit process and procedures.

4. Q&I auditors and those involved in audits abide by the Employee Code of Conduct (see Reference Documents section).

2.2 A Plan-Do-Check-Act (PDCA) continual improvement cycle has been established for the Auditing Process (Appendix A). The key objectives are to:

- Establish an annual audit schedule that takes into account business significance, risk assessments, customer requirements, and previous audits: (Plan) TD-4023P-01, "Gas Operations Auditing, Annual Audit Schedule."
- Ensure quality audits are conducted by qualified, objective, impartial, and ethical auditors in accordance with established procedures: (Do) TD-4023P-02, "Gas Operations Auditing, Procedure."
- Continually monitor, review and update the procedures to improve their effectiveness: (Check) TD-4023P-03, "Gas Operations Auditing, Audit Metrics."
- Enter results of audits into the Corrective Action Program: (Act).

END of Requirements

Definitions

Asset(s): Plant, machinery, property, buildings, vehicles, and other items that have a distinct value to the organization.

Asset Management: Systematic and coordinated activities and practices through which an organization optimally and sustainably manages its assets and asset systems, their associated performance, risks, and expenditures over their life cycles for the purpose of achieving its organizational strategic plan.

Asset Management System: Organization's asset management policy, asset management strategy, asset management objectives, asset management plan(s) and the activities, processes and organizational structures necessary for their development, implementation, and continual improvement.

Audit: Systematic, independent process for obtaining evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled.

Auditor: The person (or persons) who performs the audit.

Audit Findings: The results of the evaluation of collected audit evidence against audit criteria. Findings can indicate either conformity or nonconformity with audit criteria, or opportunities for improvement.

Effectiveness: Extent to which planned activities are realized and planned results achieved.

Objective Evidence: Refers to data that verifies or supports the existence of something. It may be obtained through observation, measurement, testing, or other means and cannot be influenced by prejudice, emotion, or bias. Objective evidence must be sufficient, competent, relevant, and useful.

Audited Organization: The organization audited by Gas Operations Auditing.

Top Management: Appointed and authorized person, or a group of people, who direct and control an organization at the highest level.

Implementation Responsibilities

Q&I will issue a Guidance Tailboard with this Standard.

Gas Operations Superintendents/ Managers must use the Guidance Tailboard to communicate this Standard to impacted employees (see the Target Audience section).

Governing Document

TD-01 Gas Asset Management

Compliance Requirement/ Regulatory Commitment

PAS 55-1:2008 Asset Management, Part 1: Specification for the optimized management of physical assets

Code of Federal Regulations (CFR) Title 49, Transportation, Part 192—Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Subpart L – Operations, Section 192.605, "Procedural manual for operations, maintenance, and emergencies." 49 CFR 192.605 (b) (8)

Reference Documents

Developmental References:

TD-4023P-01, "Gas Operations Auditing, Annual Audit Schedule."

TD-4023P-02, "Gas Operations Auditing, Procedure."

TD-4023P-03, "Gas Operations Auditing, Audit Metrics."

Employee Code of Conduct

Gas Operations Auditing, Standard

Supplemental References:

NA

Appendices

Appendix A: Gas Operations Auditing Process, Plan-Do-Check-Act (PDCA) continual improvement cycle

Attachments

None

Document Recision

RISK-6301P-02, "QA Audit Process"

Approved By

Sara Peralta, Director, Quality & Improvement

Document Owner

Redacted, Audit Supervisor

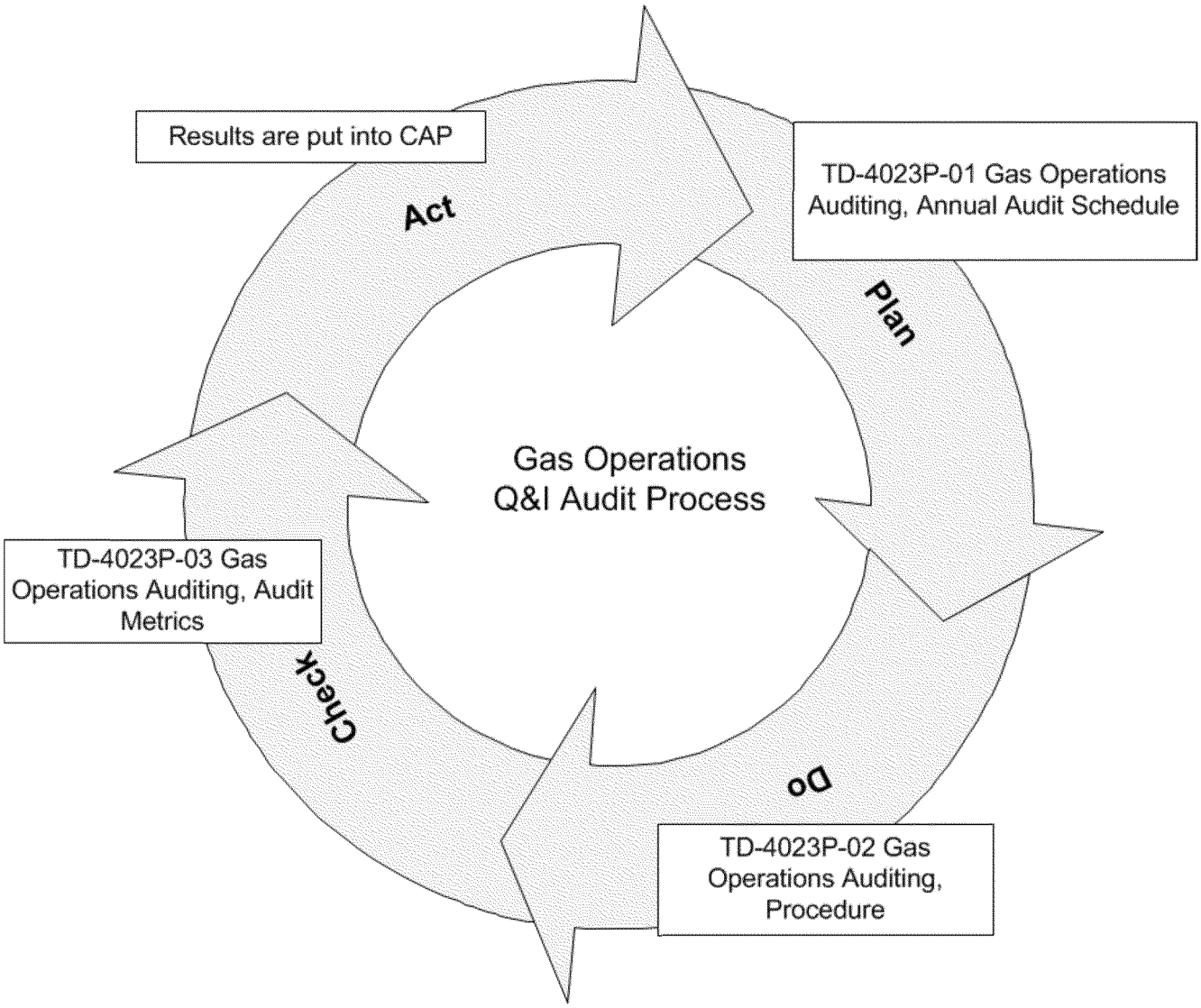
Document Contact

Redacted, Audit Supervisor

Revision Notes

Where?	What Changed?
New document	This is a new utility standard.

APPENDIX A, GAS OPERATIONS AUDITING PROCESS, PLAN-DO-CHECK-ACT (PDCA) CONTINUAL IMPROVEMENT CYCLE



Pacific Gas and Electric Company®

Utility Procedure: TD-4023P-01
Publication Date: 09/25/2013 Rev: 0

Gas Operations Auditing, Annual Audit Schedule

Summary

This utility procedure describes the functions, tasks, and expectations of Pacific Gas and Electric Company (Company) personnel who are responsible for assisting in development of the Annual Audit Schedule.

Level of Use: Information Use

Target Audience

Gas Operations personnel (knowledge) and Gas Operations Auditing personnel (application). Audit personnel part of another audit team assisting in a Q&I audit.

Safety

The goal of Q&I is to drive continual improvement in alignment with Gas Safety Excellence and the vision of becoming the safest, most reliable gas company in the United States. Safety-related actions are incorporated into the audit plan for each audit.

Before You Start

Review TD-4023S, "Gas Operations Auditing, Standard," and the form associated with this procedure (TD-4023P-01-F01, "Gas Operations Auditing, Annual Audit Schedule Form").

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Gas Operations Auditing, Annual Audit Schedule

Procedure Steps

1 Annual Audit Schedule Development

1.1 Gather Relevant Information

1. Results from previously conducted audits, risk assessments, and compliance activities must be gathered by Gas Operations Auditing personnel commencing in the fourth quarter of each PG&E fiscal year. This information shall be used as inputs into the Annual Audit Schedule. The following is a list of inputs that shall be considered to plan, establish, and implement the Annual Audit Schedule:

   a. Safety information: Collect data from safety management to ensure that safety of PG&E personnel and the public is included as an input to the Annual Audit Schedule.

   b. Gas Operations Risk Register: The most recent risk register must be obtained from the Manager, Risk Register. Include risk assessments.

   c. Guidance Document Management updates: Updates must be obtained from the Director, Codes & Standards.

   d. Corrective Action Program (CAP) non-conformances: CAP non-conformances must be obtained from the Manager, Quality Engineering & Improvement (QE&I).

   e. California Public Utility Commission (CPUC) audit schedule: Proposed schedule and timing of upcoming Division/ District CPUC audits must be obtained from Regulatory Relations.

   f. Prior regulatory and outside audit findings: Results from prior regulatory and outside (CPUC, PHMSA, PAS-55 [ISO5500], etc.) audits must be obtained from Regulatory Relations.

   g. Prior T&D and T&R Quality Control results: Quality Control data must be obtained from the respective Quality Control Managers.

   h. Results from prior PG&E audits must be obtained from appropriate auditing departments within PG&E, for example Internal Audit (IA) and Gas Operations Auditing.

   i. Information relating to Gas Operations key process initiatives must be obtained from appropriate Gas Operations personnel.

   j. Management Reviews of the Asset Management System must be obtained from appropriate Gas Operations personnel.

k. Updated industry standards and best practices: Gather industry standard information updated since the last annual audit schedule.

l. Customer feedback inputs, customer relations/service: Gather customer requirement information.

m. Management priorities: Gather management priority information from Top Management.

n. Information relating to audits that were deferred from prior year(s) should also be obtained.

2. The Annual Audit Schedule must include audits to determine whether the asset management system conforms to planned arrangements for asset management, including the requirements of Publicly Available Standard (PAS) 55 Clause 4. The audit process must establish the effectiveness of the asset management system in managing the assets in accordance with the organization's policy and objectives (validation audit) and also establish that the organization is following its own procedures (compliance audit).

2 Develop Draft Annual Audit Schedule (Gas Operations Auditing)

2.1 The information reviewed in step 1.1 must be analyzed and discussed with appropriate Gas Operations Auditing personnel to develop a draft Annual Audit Schedule using TD-4023P-01-F01, "Gas Operations Auditing, Annual Audit Schedule Form." The output of this step is a draft Annual Audit Schedule (TD-4023P-01-F01).

3 Socialize Draft Annual Audit Schedule (Gas Operations Management Gas Operations Auditing)

3.1 The draft Annual Audit Schedule is presented to associated non-audit Senior Management to discuss whether the identified risk for each audit is valid and if so, whether the proposed audit would help reduce the likelihood of risk occurrence or the severity of risk impact. The output of this step is a revised draft Annual Audit Schedule.

4 Estimate Audit Resources

4.1 Each proposed audit in the draft Annual Audit Schedule is selected and resources to complete the audit are estimated.

1. If resources are determined to be available, then those resources are scheduled to be assigned to the audit.

2. If resources are determined to not be available, then the following steps are conducted:

a. The feasibility of moving the audit to a different quarter (either earlier or later in the fiscal year) is considered. If resources are determined to be available after moving the audit to a different quarter, then those resources are scheduled to be assigned to the audit.

NOTE
It may not be recommended to promote or defer an audit to an earlier or later quarter of the fiscal year depending on the inputs and ranking of the risk associated with that proposed audit.

b. If the audit cannot be moved to a different quarter (or resources are not available), then third-party resources are tentatively assigned to the audit.

5 Present Annual Audit Schedule for Approval and Communicate

5.1 If changes to the draft Annual Audit Schedule are not required, or once changes have been made, the revised draft Annual Audit Schedule is presented to the Vice President, Standards & Policies and recommended for approval. The output of this step is an approved Annual Audit Schedule.

5.2 The approved Annual Audit Schedule is distributed to the Audited Organizations in a timely manner. Verification of sending the approved Annual Audit Schedule to the Audited Organizations shall be kept in accordance with step 8.

6 Annual Audit Schedule Change Control

6.1 At least quarterly during execution of the Annual Audit Schedule, Gas Operations Auditing personnel shall meet to discuss the identification of any new audit, risk, and/or compliance activities that might necessitate a revision to the approved Annual Audit Schedule. If a new activity is identified, information relating to the activity should be gathered, reviewed and analyzed in accordance with steps 1.1 and 2.1 above.

6.2 Based on the information gathered, reviewed and analyzed, a risk ranking for the new activity shall be assigned. This risk ranking shall utilize the same criteria as the risk ranking process utilized during development of the Annual Audit Schedule.

6.3 Once resources to complete the new audit have been estimated in accordance with step 4.1 above, Gas Operations Auditing personnel discuss whether the new audit in addition to the previously approved audits can be completed by either Gas Operations Auditing or Internal Audit personnel during that fiscal year. If this is not possible, third-party resources are explored in order to conduct one of the upcoming scheduled audits, or a future audit with a lower risk ranking than the new audit must be deferred to the next fiscal year.

6.4 After the resources have been assigned and the Annual Audit Schedule revised to include the new audit, the revised Annual Audit Schedule is presented to the Vice President, Standards & Policies and recommended for approval.

6.5 Once the revised Annual Audit Schedule has been approved by the Vice President, Standards & Policies, the revised Annual Audit Schedule is distributed and communicated in accordance with the approved distribution list.

7 Document Management

7.1 Working documents generated as part of this procedure may include any of the following:

1. Information relating to previously conducted audit, risk, and compliance activities.
2. Draft ranking of risks associated with these previously conducted activities including their source and justification.
3. Change in ranking of risks (promotion, demotion) after draft ranking.
4. Draft Annual Audit Schedule.
5. Resource schedules, availability and notes.
6. Meeting agendas, minutes, and/or informal discussion notes.
7. Distribution list for approved Annual Audit Schedule.
8. Documentation relating to changes to the Annual Audit Schedule.

7.2 Working documents are not to be maintained once records have been developed and filed.

8 Record Management

8.1 Records generated as part of this procedure must include the following:

1. Approved Annual Audit Schedule (including documentation of approval).
2. Changes to the approved Annual Audit Schedule (including documentation of approval).
3. Documentation substantiating why the audits in the Annual Audit Schedule were selected (e.g., information relating to previously conducted audit, risk, and compliance activities; meeting minutes; interview notes, etc.).
4. Records (emails, etc.) of sending the approved Annual Audit Schedule to the Audited Organizations.

8.2 Records generated during compliance with this procedure shall be stored in the GAS QA network drive, indexed by year, and maintained in accordance with the Company records retention schedule.

8.3 Records are maintained in accordance with GOV-01, "Records Management Policy," GOV-7101S, "Records Management Standard," and Utility Standard TD-4016S, "Gas Operations Records and Information Management."

END of Instructions

Gas Operations Auditing, Annual Audit Schedule

Definitions

Refer to the Definitions section of TD-4023S, "Gas Operations Auditing Standard."

Implementation Responsibilities

Gas Operations Auditing will issue a Guidance Tailboard with this procedure.

Gas Operations Management personnel must use the Guidance Tailboard to communicate this procedure to concerned personnel (see the Target Audience section).

Governing Document

- TD-4023S, "Gas Operations Auditing Standard."

Compliance Requirement / Regulatory Commitment

- PAS 55-1:2008 Asset Management, Part 1: Specification for the optimized management of physical assets
- Code of Federal Regulations (CFR) Title 49, Transportation, Part 192—Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Subpart L – Operations, Section 192.605, "Procedural manual for operations, maintenance, and emergencies." 49 CFR 192.605 (b) (8)

Reference Documents

Developmental References:

- TD-4023S, "Gas Operations Auditing Standard."
- TD-4023P-01-F01, "Gas Operations Auditing, Annual Audit Schedule Form."
- TD-4023P-02, "Gas Operations Auditing, Procedure."
- TD-4023P-03, "Gas Operations Auditing, Audit Metrics."

Supplemental References:

- NA

Appendices

- NA

Attachments

- TD-4023P-01-F01, "Gas Operations Auditing, Annual Audit Schedule Form."

Gas Operations Auditing, Annual Audit Schedule

Document Recision

- RISK-6301P-02, "QA Audit Process"

Document Approver

Sara Peralta, Director, Quality & Improvement

Document Owner

Redacted, Audit Supervisor

Document Contact

Redacted, Audit Supervisor

Revision Notes

Where?	What Changed?
New document	This is a new document.

Pacific Gas and Electric Company®

Utility Procedure: TD-4023P-02
Publication Date: 09/25/2013 Rev: 0

Gas Operations Auditing, Procedure

Summary

The purpose of this procedure is to describe the responsibilities, requirements and steps involved in planning, conducting and reporting audits by Gas Operations Auditing.

Level of Use: Information Use

Target Audience

Gas Operations personnel (knowledge) and Quality & Improvement (Q&I) personnel (application). Audit personnel part of another audit team assisting in a Q&I audit.

Safety

The goal of Q&I is to drive continual improvement that is in alignment with Gas Safety Excellence with the vision of becoming the safest, most reliable gas company in the United States. Safety-related actions are incorporated into the audit plan for each audit.

Before You Start

Review TD-4023S, "Gas Operations Auditing, Standard," TD-4023P-01, "Gas Operations Auditing, Annual Audit Schedule," and TD-4023P-03, "Gas Operations Auditing, Audit Metrics."

Table of Contents

Gas Operations Auditing, Procedure

Procedure Steps

1 Responsibilities

1.1 Gas Operations Top Management

Gas Operations Top Management are responsible for providing the authority to audit, giving guidance for the Q&I audit process, ensuring that resources are provided to conduct the scheduled audits, ensuring that resources are provided to correct approved issues, and providing inputs into the Annual Audit Schedule.

1.2 Gas Operations Q&I Leadership

Q&I Leadership are responsible for maintaining this procedure, assuring that it meets the needs of Gas Operations and is in accordance with applicable regulatory and PG&E (Company) requirements. Specifically:

- Assuring the Annual Audit Schedule is created, reviewed, approved, and amended according to procedure.
- Assigning auditors to complete audits according to the Annual Audit Schedule (TD-4023P-01) requirements.
- Overseeing auditor training.
- Reviewing and approving audit reports.
- Resolving disputes related to audit findings.

1.3 Audited Organization (organization being audited)

The Audited Organization is responsible for:

- Providing timely responses and resources during the audit.
- Implementing corrective actions necessary as a result of audit findings.
- Working with the Lead Auditor to satisfy audit commitments.
- Supplying the auditors with the necessary documentation, as requested (procedures, links to appropriate locations of record storage, etc.).

Audits are a sampling exercise; there are times when not all records/items can be reviewed during the timeframe of the audit. The Audited Organization is responsible for the full and complete review of all noted systems to ensure overall compliance in addition to responding to specific findings from Q&I audits.

1.4 Q&I Lead Auditor

The Lead Auditor is responsible for ensuring the audit is conducted according to plan, and following the requirements in this procedure. Other auditors or Gas Operations personnel involved in supporting the Lead Auditor during an audit are also responsible for adherence to this procedure.

2 Preparation Phase

2.1 Upon assignment of the audit, the Lead Auditor shall establish a working paper folder for the audit:

NOTE

The selection of auditors and the conduct of audits must ensure objectivity and the impartiality of the audit process. Audits must be conducted by personnel independent of those having direct responsibility for the activity being audited.

1. Establish a new audit folder by selecting the current year's folder, in the "GASQAAudits" folder on the \\Ffshare01-nas\edd\qa QA Shared Drive.

   a. Use the audit number and audit name from the Annual Audit Schedule for the folder name. For example:

      GASQA2013-1GasStorage

   b. Once the audit folder has been established, create the following standard folders in the audit folder:

      (1) Archive

      (2) Audit_Plan

      (3) Checklists

      (4) Emails_Communication

      (5) Interviews

      (6) References

      (7) Audit_Reports

2.2 Establish the Audit Plan

1. The Lead Auditor shall prepare the Audit Plan based on the Annual Audit Schedule and associated documentation. The Audit Plan should facilitate audit strategy, scheduling, and coordination of audit activities in order to achieve the audit objectives effectively and according to plan.

   a. The Lead Auditor shall complete the Audit Plan tab of the Auditing Workbook Form (TD-4023P-02-F01), and save and name the audit plan to the Audit_Plan folder.

2. An audit is a sampling of on-going operations and is intended to be an overview of potential system deficiencies. Below are some guidelines to use for sampling during an audit:

   a. The Audit Plan tab of the Auditing Workbook Form (TD-4023P-02-F01) has a sampling section. Include how many samples will be selected (1 below), and how the selections will be made (2 below).

      (1) How Many: A sample size of 30 items will detect a 10% problem rate with 95% confidence. If 30 items are selected, there is very little difference in the percent of items that will have problems whether the number of items to be audited is 10,000 or 100. Confidence level is maintained even in the case of very high populations.

      The tendency is that the same problems are found over and over again, which may or may not add significance to audit findings. The auditor must determine the audit objectives, identify the population characteristics of interest, and state the degree of risk that is acceptable.

      For a sample size less than 30, the auditor is advised to review all the items.

      Auditors may use their own judgment when selecting an audit sampling size, but it must be statistically based (for example Binomial Staged Sampling Plan).

      (2) How the Selections Will Be Made: Use Simple Random Sampling, Systematic (Interval) Sampling, Stratified (Cluster) Sampling, Haphazard Selection, Block Selection, or Judgment Selection.

2.3 Finalize the Audit Plan with Audited Organization(s)

1. To finalize the Audit Plan, the Lead Auditor may conduct a pre-audit meeting with the management of the affected process/organization to discuss. Use TD-4023P-02-F03, "Gas Operations Auditing, Meeting Attendance Form" to document pre-audit meetings. Email is also an acceptable means of clarifying the Audit Plan with the Audited Organization(s).

2. Upon approval of the Audit Plan by Q&I Gas Operations Audit leadership, the Lead Auditor must schedule an entrance meeting with the Audited Organization(s), and formally begin the Perform Audit Phase. Use TD-4023P-02-F03, "Gas Operations Auditing, Meeting Attendance Form" to document entrance meetings. The entrance meeting shall include the following agenda items:

   - Facility Safety requirements.
   - Introductions.
   - Overview of the audit process, including roles and responsibilities.
   - Review of the Audit Plan, including the audit scope and objectives.
   - Review of audit dates, times, and places.
   - Confirmation of communications channels.
   - Logistics, including access to documents, databases, facilities, and people.
   - Special field and office Safety requirements and PPE considerations.
   - Projected date for the exit meeting.
   - An opportunity for the Audited Organization(s) to ask questions.
   - Significant recent changes to relevant procedures, process, facilities, or organization reporting structure.

3 Perform Audit Phase

3.1 Review the standard audit activity tasks in the Audit Plan Details Tab of the Auditing Workbook Form (TD-4023P-02-F01). The Lead Auditor may modify the sequencing or may add individual audit activities depending on the Audited Organization(s), processes, and specific circumstances of the audit. However, all standard audit activities must be conducted.

3.2 Conduct Audit Activities

The team will begin collecting information relevant to the audit scope and objectives:

- Conduct interviews.
- Review guidance documents (procedures, standards, etc.) to determine the degree of compliance with regulations or procedures.
- Review records, database reviews, and field reviews, and compare them to the Audit Plan criteria.

- Create process maps and input/output diagrams that define audited process (as applicable).
- Use TD-4023P-02-F03, "Gas Operations Auditing, Meeting Attendance Form" as appropriate.

NOTE

When audit activities are being conducted, if an unsafe act is witnessed, the auditor has the authority to intervene and stop the act from being performed.

3.3 Only information that is verifiable should be used as objective evidence to support a finding.

3.4 Gas Operations audits must:

- Confirm whether the system meets the requirements of Publicly Available Specification (PAS) PAS 55-1.
- Establish the degree of compliance with the documented asset management procedures.
- Assess whether or not the system is effective in meeting the asset management policy, strategy and objectives of the organization.
- Identify any corrective actions required to achieve compliance with the requirements.

The audit must include assessing and determining the viability and suitability of the asset management policy, strategy, objectives and plans, particularly in relation to critical assets and asset systems, to ensure that they are:

- Consistent with each other.
- Adequate.
- Achievable.

Establishing whether they are adequate and achievable also requires assessment of the organizations:

- Asset management related assumptions.
- Process(es) and/or procedure(s), methods, tools and techniques.
- Availability/allocation of funds.
- Availability/allocation of resources (including competencies).

- Availability/allocation of time (including timing interdependencies).

3.5 Conduct Daily or Weekly Site Briefings

The audit team must make every effort to keep the Audited Organization(s) current on audit team activities and progress. This report can be on a daily or weekly basis and must include:

- What has been examined so far.
- Discussion of any preliminary findings.
- Any obstacles, concerns, or schedule changes must be carried out by the appropriate parties.

NOTE

The communication can occur by meeting, phone, or email, and must be documented and stored in the Shared Drive folder for the audit.

4 Analyze Audit Findings Phase

4.1 The Lead Auditor and Q&I leadership must confer to:

1. Review the audit findings and other appropriate information collected during the audit against audit objectives and criteria.
2. Agree on the audit conclusions, and the review and analysis of draft audit findings, including:
   a. Identification of trends so that findings can be grouped into a common theme if appropriate.
   b. Extent of conformity with the audit criteria and robustness of the asset management system or process.
   c. Analysis of interview data.
   d. Effective implementation, maintenance, and improvement of the asset management system.
   e. Capability of asset management system and process controls to ensure the continuing suitability, adequacy, effectiveness and improvement of asset management in gas operations.
   f. Achievement of audit objectives, coverage of audit scope and fulfillment of audit criteria.

5 Reporting Phase

5.1 The Lead Auditor must prepare the draft audit report using the Audit Report Form (TD-4023P-02-F02). The audit report must provide a complete, accurate, concise and clear record of the audit. The audit report must reflect the following information:

1. Audit scope, particularly identification of the assets, processes, or organizational/functional units audited.
2. Audit objectives.
3. Identification of the Audited Organization(s), Lead Auditor, and audit team.
4. Dates and location where audit activities where conducted, including Audited Organization(s) (function title only).
5. Audit criteria.
6. Audit findings and related evidence, with the following designations:

   NCR= Non Conformance Report. NCRs represent a preliminary violation of Company procedure and/or regulation. NCRs are entered into the Corrective Action Program (CAP).

   OFI= Opportunity for Improvement. OFIs do not necessarily require formal action such as CAP.
7. Audit conclusions.
8. A statement to the degree to which audit criteria have been fulfilled.
9. A summary of the audit conclusions and the main audit findings that support them.
10. Unresolved or diverging opinions between the audit team and the Audited Organization(s).
11. Opportunities for improvement.
12. Good practices identified.
13. A statement of the confidential nature of the report.
14. Report distribution list.

5.2 Distribute Draft Audit Report

1. The Lead Auditor must distribute the draft audit report to the Audited Organization(s).

2. The Audited Organization(s) shall have 5 business days prior to the exit meeting to review the audit report.

3. IF diverging on audit findings arises,

   THEN the Audited Organization(s) will have an opportunity to offer objective evidence contrary to the finding.

4. IF the objective evidence is accepted,

   THEN the finding must be removed from the report.

   OTHERWISE, the finding must be included in the final audit report.

6 Conduct Exit Meeting

6.1 The Exit Meeting is facilitated by the Lead Auditor and Q&I Leadership.

6.2 The Lead Auditor must prepare and report the audit results.

1. Participants should include the Audited Organization(s) and, where appropriate, those responsible for the areas that have been audited.

2. An agenda and sign-in sheet(s) must be prepared for the meeting and audit findings and report must be presented.

6.3 The output from this step is the Audit Meeting Attendance (TD 4023P-02-F03).

6.4 Issue Final Audit report

1. The final audit report must be converted to a .pdf file and sent by email to the Audited Organization(s) as formal issuance of the report.

2. The final audit report must be issued in a timely manner (within 2 weeks after the exit meeting), and must be distributed to Top Management.

3. Audit findings are supported by objective evidence and are final upon the issuance of the audit report.

4. The Lead Auditor must issue the final audit report upon approval by Q&I Leadership.

5. After the final report is issued, the audit findings must be entered into the CAP system in a timely manner (within 2 weeks).

7 Conduct Post Audit Evaluations and Audited Organization(s) Feedback

7.1 An Audited Organization(s) satisfaction survey (TD-4023P-02-F04 Gas Operations Auditing, Audited Organization Feedback Form) must be sent to the Audited Organization(s) for the purpose of continually improving the Audited Organization(s) engagement and the quality audit process. This survey must be completed in a timely manner after the exit meeting (within 2 weeks).

7.2 Q&I Leadership must conduct a post-audit evaluation of auditors using TD-4023P-02-F05 Gas Operations Auditing, Auditor Evaluation Form for the purposes of continually improving the quality audit process and development/coaching of auditors. The qualification of auditors is also determined by job descriptions and hiring practices.

Results from auditor evaluations and Audited Organization(s) feedback shall be used to evaluate the audit process for continual improvement (see TD-4023P-03 Gas Operations Auditing, Audit Metrics).

8 Close the Audit

8.1 The audit is closed when all:

1. Planned activities have been carried out or when agreed to by the Audited Organization(s), Q&I, and other auditing entities assisting Q&I audits (for example, Internal Audit).

2. Nonconformances and observations have been entered into CAP.

3. Audited Organization(s) feedback and auditor evaluations are recorded.

8.2 Documents pertaining to the audit must be retained in electronic format and filed in the Shared Drive audit folder.

8.3 The audit team must not disclose or release the contents of documents or other information obtained during the audit and the audit report. This information is considered confidential, and release requires approval from the Director of Quality & Improvement.

9 Audit Follow-up

9.1 Corrective/preventive actions resulting from the audit must be verified during a subsequent audit or by direction to conduct a special audit.

10 Change Management

10.1 Once the audit plan has been established (step 2.2), any subsequent changes to the audit plan must be approved by the Audited Organization(s) and Q&I Leadership.

10.2 Auditors may update other sections of the audit plan as needed. Version control shall be used.

11 Records

11.1 Records generated by this procedure are the completed forms from a specific audit below, and any email or other significant correspondence during the audit.

1. TD-4023P-02-F01, "Gas Operations Auditing, Auditing Workbook Form."
2. TD-4023P-02-F02, "Gas Operations Auditing, Audit Report Form."
3. TD-4023P-02-F03, "Gas Operations Auditing, Meeting Attendance Form."
4. TD-4023P-02-F04, "Gas Operations Auditing, Audited Organization Feedback Form."
5. TD-4023P-02-F05, "Gas Operations Auditing, Auditor Evaluation Form."

11.2 Records generated during compliance with this procedure, including physical records of audit activities that can be scanned, shall be stored in the GAS QA network drive, indexed by year, and must be maintained in accordance with the Company records retention schedule. The original physical records of audit activities shall be stored in a secure location within the Gas Operations building.

11.3 Records are maintained in accordance with GOV-01, "Records Management Policy," GOV-7101S, "Records Management Standard," and Utility Standard TD-4016S, "Gas Operations Records and Information Management."

END of Instructions

Definitions

Refer to the Definitions section of Utility Standard TD-4023S, "Gas Operations Auditing, Standard."

Implementation Responsibilities

Q&I will issue a Guidance Tailboard with this Utility Procedure.

Gas Operations Superintendents/Managers shall use the Guidance Tailboard to communicate this Utility Procedure to impacted employees (see the Target Audience section).

Governing Document

- TD-4023S, "Gas Operations Auditing, Standard."

Gas Operations Auditing, Procedure

Compliance Requirement / Regulatory Commitment

- PAS 55-1:2008 Asset Management, Part 1: Specification for the optimized management of physical assets
- Code of Federal Regulations (CFR) Title 49, Transportation, Part 192—Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Subpart L – Operations, Section 192.605, "Procedural manual for operations, maintenance, and emergencies." 49 CFR 192.605 (b) (8)

Reference Documents

Developmental References:

- TD-4023S, "Gas Operations Auditing, Standard."
- TD-4023P-01, "Gas Operations Auditing, Annual Audit Schedule."
- TD-4023P-01-F01, "Gas Operations Auditing, Annual Audit Schedule Form."
- TD-4023P-03, "Gas Operations Auditing, Audit Metrics."
- TD-4023P-03-F01, "Auditing Metrics Form."

Supplemental References:

- NA

Appendices

- None

Attachments

- TD-4023P-02-F01, "Gas Operations Auditing, Auditing Workbook Form."
- TD-4023P-02-F02, "Gas Operations Auditing, Audit Report Form."
- TD-4023P-02-F03, "Gas Operations Auditing, Meeting Attendance Form."
- TD-4023P-02-F04, "Gas Operations Auditing, Audited Organization Feedback Form."
- TD-4023P-02-F05, "Gas Operations Auditing, Auditor Evaluation Form."

Document Recision

- RISK-6301P-02, "QA Audit Process"

Gas Operations Auditing, Procedure

Document Approver

Sara Peralta, Director, Quality & Improvement

Document Owner

Redacted Audit Supervisor

Document Contact

Redacted, Audit Supervisor

Revision Notes

Where?	What Changed?
New document	This is a new utility procedure.

Pacific Gas and Electric Company®

Utility Procedure: TD4023P-03
Publication Date: 09/25/2013 Rev: 0

Gas Operations Auditing, Audit Metrics

Summary

This utility procedure describes the process for monitoring, reviewing, and improving Gas Operations audits.

Level of Use: Information Use

Target Audience

Gas Operations personnel (knowledge) and Gas Operation Auditing personnel (application). Audit personnel part of another audit team assisting in a Gas Operations audit.

Safety

The goal of Quality & Improvement (Q&I) is to drive continual improvement that is in alignment with Gas Safety Excellence with the vision of becoming the safest, most reliable gas company in the United States. Safety-related actions are incorporated into the audit plan for each audit.

Before You Start

Review TD-4023S, "Gas Operations Auditing, Standard," TD-4023P-01, "Gas Operations Auditing, Annual Audit Schedule," and TD-4023P-02, "Gas Operations Auditing, Procedure."

Table of Contents

Procedure Steps

1 Evaluate the Audit Program

1.1 Gas Operations Q&I Leadership annually conducts an evaluation of the Auditing process and results of audits. that must include the following metrics:

1. Conformity to the Auditing Annual Schedule (TD-4023P-01, "Gas Operations Auditing, Annual Audit Schedule").
2. Performance of audit team members, (TD-4023P-02-F05, "Gas Operations Auditing, Auditor Evaluation Form").
3. Feedback from leadership, Process Owners, including survey results. (TD-4023P-02-F04, "Gas Operations Auditing, Audited Organization Feedback Form").
4. Results of audits, trending, and evaluation of findings.

1.2 The results of the evaluation must be reported to the Director of Quality & Improvement.

1. The output from this section is the completed TD-4023P-03-F01, "Auditing Metrics Form."

2. Actions resulting from the evaluation are entered into the Corrective Action Program (CAP).

2 Records

2.1 Records associated with this utility procedure are:

1. Completed TD-4023P-03-F01, "Auditing Metrics Form."

2. Records will be retained per the Company Record Retention Schedule.

3. Records are maintained in accordance with GOV-01, "Records Management Policy," GOV-7101S, "Records Management Standard," and Utility Standard TD-4016S, "Gas Operations Records and Information Management."

END of Instructions

Definitions

Refer to the Definitions section of Utility Standard TD-4023S, "Gas Operations Auditing, Standard."

Implementation Responsibilities

Q&I will issue a Guidance Tailboard with this utility procedure.

Gas Operations Superintendents/ Managers must use the Guidance Tailboard to communicate this utility procedure to impacted personnel (see the Target Audience section).

Governing Document

- Utility Standard TD-4023S, "Gas Operations Auditing, Standard."

Compliance Requirement / Regulatory Commitment

- PAS 55-1:2008 Asset Management, Part 1: Specification for the optimized management of physical assets

- Code of Federal Regulations (CFR) Title 49, Transportation, Part 192—Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Subpart L – Operations, Section 192.605, "Procedural manual for operations, maintenance, and emergencies." 49 CFR 192.605 (b) (8)

Gas Operations Auditing, Audit Metrics

Reference Documents

Developmental References:

- TD-4023S, "Gas Operations Auditing, Standard."
- TD-4023P-01, "Gas Operations Auditing, Annual Audit Schedule."
- TD-4023P-01-F01, "Gas Operations Auditing, Annual Audit Schedule Form."
- TD-4023P-02, "Gas Operations Auditing, Procedure."
- TD-4023P-02-F01, "Gas Operations Auditing, Auditing Workbook Form."
- TD-4023P-02-F02, "Gas Operations Auditing, Audit Report Form."
- TD-4023P-02-F03, "Gas Operations Auditing, Meeting Attendance Form."
- TD-4023P-02-F04, "Gas Operations Auditing, Audited Organization Feedback Form."
- TD-4023P-02-F05, "Gas Operations Auditing, Auditor Evaluation Form."
- TD-4023P-03, "Gas Operations Auditing, Audit Metrics."
- TD-4023P-03-F01, "Auditing Metrics Form."

Supplemental References:

- NA

Appendices

- NA

Attachments

- TD-4023P-03-F01, "Auditing Metrics Form."

Document Recision

- RISK-6301P-02, "QA Audit Process"

Document Approver

Sara Peralta, Director, Quality & Improvement

Gas Operations Auditing, Audit Metrics

Document Owner

Redacted, Audit Supervisor

Document Contact

Redacted, Audit Supervisor

Revision Notes

Where?	What Changed?
New document	This is a new utility procedure.

Pacific Gas and Electric Company

Utility Standard: TD-4020S
Publication Date: 10/23/2013 Rev: 1

Gas Operations Corrective Action Program (CAP)

Summary

This standard establishes the requirements for the PG&E (Company) Gas Operations Corrective Action Program (CAP). CAP is a risk based program that:

- Reports actual and potential asset and process-related issues, which include failures, incidents, and nonconformities.
- Analyzes issues, determines risks and causes, and implements corrective or preventive actions.
- Assesses the effectiveness of corrective or preventive actions and communicates results.

Target Audience

All Gas Operations leadership (manager level and above).

Safety

NA

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Requirements

1 Objectives

1.1 Enable personnel to identify opportunities for decreasing risk and improving safety, quality, and operational reliability.

1.2 Identify and resolve existing and potential issues.

2 Applicability

2.1 This standard applies to asset and process-related issues involving or affecting Gas Operations that are not reported by other reporting processes.

Gas Operations Corrective Action Program (CAP)

3 Program Overview

3.1 The CAP addresses issues by:

1. Reporting
2. Assessing risk
3. Evaluating to determine cause, when appropriate
4. Implementing corrective or preventive actions
5. Determining the effectiveness of corrective or preventive actions
6. Maintaining records of actions taken

4 Roles and Responsibilities

4.1 CAP Executive Process Champion (vice president with program responsibilities):

1. Provides program oversight
2. Aligns the program with the Gas Operations strategic operating plan
3. Ensures compliance with the requirements of this standard
4. Approves resources for program development and implementation

4.2 CAP Owner (director with program responsibilities):

1. Ensures the program, including support systems and infrastructure, is developed and maintained
2. Ensures compliance with the program requirements
3. Allocates sufficient resources for program development and implementation
4. Monitors metrics for continual program improvement

4.3 CAP Manager (manager with program responsibilities):

1. Coordinates program development and maintenance
2. Oversees administration of the program database and user support activities
3. Ensures program documentation is prepared and issued

4.3 (continued)

4. Ensures training is developed and implemented

5. Coordinates development of support metrics and reports

4.4 Issue Owner:

1. Performs evaluations to determine causes and corrective or preventive actions

2. Assigns corrective or preventive actions to appropriate organizations or individuals

3. Monitors the progress toward completion of corrective or preventive actions

4. Ensures acceptable completion of corrective or preventive actions

4.5 Action Owner:

1. Implements corrective or preventive actions

2. Reports completion of assigned corrective or preventive actions

5 Records

1. Records are maintained per GOV-01, "Records Management Policy," GOV-7101S "Records Management Standard," and Utility Standard TD-4016S, "Gas Operations Records and Information Management Standard."

2. Records are retained per the Record Retention Schedule.

END of Requirements

Definitions	**Issue** – An existing or potential failure, incident, or nonconformity.
Implementation Responsibilities	The Corrective Action Program Owner communicates and implements the corrective action program and program improvement.
Governing Document	Utility Policy TD-01, "Gas Asset Management"

Gas Operations Corrective Action Program (CAP)

Compliance Requirement/ Regulatory Commitment

49 CFR 192.617

Reference Documents

Developmental References:

GOV-01, "Records Management Policy"

GOV-7101S "Records Management Standard"

Utility Standard TD-4016S, "Gas Operations Records and Information Management Standard"

Supplemental References:

PAS 55 Part 1: 2008 – Asset Management, Part 1: Specification for the optimized management of physical assets; The Institute of Asset Management, British Standards, ICS code: 03.100.01

Appendices

NA

Attachments

NA

Document Recision

Utility Standard TD-4020S, "Gas Operations Corrective Action Program," Revision 0, issued 03/2013

Approved By

Javid Khan
Sr. Director, Strategy & Process Excellence

Document Owner

Redacted
Principal Engineer, Codes and Standards

Gas Operations Corrective Action Program (CAP)

Document Contact Redacted
Manager, Corrective Action Program

Revision Notes

Where?	What Changed?
Entire Standard	This standard is completely rewritten. • The applicability was revised to address processes as well as asset-related problems. • The source list of problems was deleted. • The program overview was revised to reflect the new CAP process which was simplified. • Record keeping guidance was added. • Deleted the system overview section. • Deleted Appendix 1, "Significance Matrix" and Appendix 2, "Causal Evaluation Methods." • The significance matrix was included in the CAP implementing procedure TD-4020P-01 as part of a risk assessment tool. • The causal methods were moved to the CAP implementing procedure TD-4020P-01. • Changed document contact, owner, and approver.

Gas Operations Corrective Action Program (CAP) Implementation

Summary

This procedure provides the controls for the Gas Operations Corrective Action Program (CAP). CAP is used to reduce risk by identifying, analyzing, tracking, and resolving issues. The program covers the following activities:

- Reporting issues.
- Mitigating consequences.
- Investigating issues to determine causes.
- Correcting issues and preventing recurrence.

This procedure applies to asset and process-related issues involving or affecting gas operations that are not reported by other reporting processes.

Level of Use: Information Use

Target Audience

All Gas Operations personnel

Safety

This procedure helps the Company ensure that actual or potential unsafe conditions are reported, evaluated, corrected, and prevented to the extent possible. All Gas Operations personnel must use a conservative, inquiring bias to report and critically review the personnel safety, public safety, asset safety, and environmental impact of any reported issues.

Before You Start

NA

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Gas Operations Corrective Action Program (CAP) Implementation

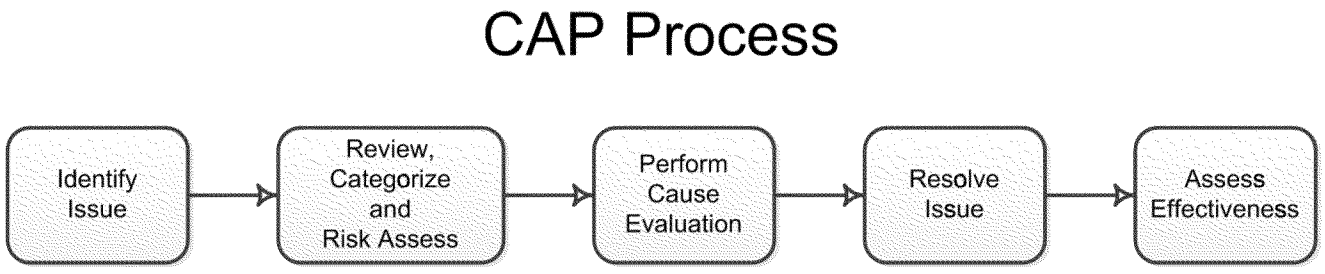

Figure 1

NOTE

- Figure 1 above shows an overview of the CAP process.
- Appendix 1, CAP PROCESS FLOWCHART," shows the CAP process in detail.
- Appendix 2, TIME REQUIREMENTS FOR PERFORMING CAP ACTIONS," provides a summary of the time requirements for performing actions required by this procedure.

Procedure Steps

1 Identify Issue

Initiator

NOTE

Appendix 3, EXAMPLES OF ISSUES TO REPORT AND NOT TO REPORT," provides examples of issues to report or not report.

1.1 Report the issue as soon as practical, but no later than three business days from the issue discovery date.

1. Report the issue even if it is resolved immediately.

2. Omit personal identifying information, such as names.

1.2 Report the issue even if there is doubt about the need to report the issue.

NOTE

Job Aid TD-4020P-01-JA01, "Reporting an Issue," provides detailed guidance for completing the notification.

1.3 Report the issue using one of the following methods:

1. Online CAP notification request form found at http://CAP/.
2. Paper form on Attachment 1, "CAP Notification Form."
   a. Send the paper CAP Notification form using inter-office mail.
3. CAP hotline at **1-855-85-GO-CAP (1-855-854-6227)**.

1.4 Report only one issue on the notification.

1.5 Complete the required fields on the notification and complete the non-required fields if the information is known.

1.6 If reporting an issue anonymously,

Then include enough descriptive information so appropriate follow-up action can be taken.

2 Review, Categorize, and Risk Assess

Coordinator

NOTE

Job Aid TD-4020P-01-JA02, "Reviewing and Assigning an Issue," provides detailed guidance for reviewing and assigning the notification request.

2.1 Within one business day of notification receipt, review and evaluate the issue.

1. Ensure the issue information is complete.
2. Determine if the issue is appropriate for CAP.
   a. If not appropriate for CAP,

      Then route the issue to the appropriate reporting system and cancel the notification.

   b. Notify initiator.
3. Obtain additional information if needed and update the notification.
4. Redact any inappropriate information.

2.2 If the issue was reported on a paper CAP notification form or hotline,

Then perform the following:

1. Transcribe the issue into the CAP database.
2. Enter the online notification number on the paper CAP notification form.
3. Scan and attach the paper CAP notification form to the notification in the CAP database for retention per Section 8, Records.

2.3 Categorize the issue.

1. Enter the category code, or if a category code is already entered, verify the code is correct.

NOTE

The risk assessment tool is shown in Attachment 2, "CAP Risk Assessment Tool."

2.4 Determine the risk level of the issue.

1. Enter the risk level code.
2. Document the basis for the risk level determination.

2.5 Assign the notification to the appropriate issue owner as follows:

1. Within five business days of completing the notification review and evaluation.
2. To the individual who is primarily responsible for ensuring the issue is corrected.

3 Perform Cause Evaluation

Issue Owner

NOTE

Job Aid TD-4020P-01-JA03, "Assigning an Action," provides detailed guidance for assigning corrective or preventive actions.

3.1 General

1. Contact the coordinator and request reassignment of notifications that are inappropriately assigned.

3.2 Issue Evaluation

1. Begin the issue evaluation within three business days of issue assignment.
2. Evaluate the issue and determine the need for:
   - Reporting to regulatory agencies.
   - Interim actions.
   - Root cause or work group evaluation.
3. Close the notification to trend if the issue does not require any additional action.
4. Document the basis for closure.
5. Inform the initiator, unless the issue was submitted anonymously.

3.3 Medium or low risk issues

1. Perform a work group evaluation to determine the likely cause.
2. Determine if corrective or preventive actions are necessary.
3. Document the results of the work group evaluation. The documentation must include:
   - Extent of condition, if known.
   - Likely cause of the issue, if known.
   - Any corrective or preventive actions necessary to resolve the issue.
4. Within 30 calendar days of the date the issue was reported, complete the work group evaluation and assign any resulting corrective or preventive actions.
5. At management discretion, issues with medium or low risk levels may be investigated using root cause evaluations.

3.4 Critical or high risk issues

1. Perform a root cause evaluation to determine the primary cause of the issue and provide corrective actions to prevent recurrence of the issue.
2. Form an investigation team with representatives from the following organizations, at a minimum:
   a. Issue owner organization.
   b. CAP process owner organization.

3.4 (continued)

(1) The team representative from the CAP process owner organization has the responsibility and authority for leading the cause evaluation.

c. Representatives from other organizations with appropriate technical knowledge or skills may be added to the team.

d. Any organization being assigned a corrective or preventive action must be represented on the team.

3. Document the results of the investigation.

a. Documents that contain the results of the investigation may be referenced.

b. Documentation of the investigation results must include:

- Extent of condition.
- Primary cause of the issue.
- Corrective or preventive actions required to resolve the issue.

4. Within 60 calendar days of the date the issue was reported, the root cause evaluation must be completed and the resulting corrective and preventive actions must be assigned.

4 Resolve Issue

Issue Owner

4.1 Immediate and interim actions must be documented, assigned, and implemented as appropriate based on risk.

4.2 Develop a corrective or preventive action plan.

1. Corrective or preventive actions for resolving issues and the schedule for implementing the actions must be appropriate for the risks presented by the issues.

2. Establish due dates with the following characteristics:

a. Established by mutual agreement between the issue owner and the action owner.

b. Based on:

- Risk level of the issue.

4.2 (continued)

- Capability of interim actions to mitigate the consequences of the issue or to reinstate capability.
- Available action owner resources.

4.3 If a corrective or preventive action affects asset records,

Then update the records for that asset in the asset management system.

4.4 Prior to implementation, assess corrective and preventive actions using the Management of Change process.

4.5 If the corrective or preventive action affects a critical asset or requires significant resources,

Then perform an evaluation of the cost, risk, and effect of implementing the action.

Action Owner

4.6 Complete corrective or preventive actions by the established due dates.

1. Due date extensions must be authorized by the issue owner organization as follows:
   a. The first extension must be authorized by the manager or superintendent.
   b. The second extension must be authorized by the director.
   c. The third extension must be authorized by the vice president.

4.7 Document the details of corrective or preventive actions taken in sufficient detail to provide evidence of completion.

1. Reference documents, that provide details of actions taken, if applicable.
2. For example, if the corrective or preventive action is a new procedure or a procedure revision,

   Then document the following:

   - Procedure number.
   - New revision number.
   - Publication date.
   - Brief description of the change.
   - How the change resolves the issue.

4.8 Close the action when the corrective or preventive action is complete.

Issue Owner

4.9 Perform the following when all corrective or preventive actions are complete:

1. Verify the corrective or preventive actions are complete.
2. Verify that any temporary modification or containment that was installed as an interim action is removed.
3. Close the issue.
4. Initiate a new notification if the corrective or preventive actions do not resolve the issue.

5 Independent Verification of Corrective or Preventive Actions

Independent Verifier

5.1 An individual from the CAP organization must verify completion of corrective or preventive actions for critical and high risk issues.

5.2 Within 30 calendar days of issue closure, the independent verification should be completed.

5.3 The independent verification should be:

1. Comprehensive, timely, and documented.
2. Based on a review of the evidence provided by action owners that supports completion of their actions.

6 Effectiveness Assessment

Issue Owner

6.1 Initiate a new notification to perform an effectiveness assessment of corrective or preventive action implementation for critical or high risk issues.

6.2 Within 6 to 12 months from the date the issue notification was closed, complete the following:

1. Prepare an effectiveness assessment plan, including the following elements, to guide the assessment:
   a. A description of the methods that will be used to verify that the actions taken had the desired outcome.

6.2 (continued)

(1) Methods may include performance of a self-assessment, walkthrough, mock-up or simulation, document review, performance indicator monitoring, etc.

b. A description of the attributes that will be monitored or evaluated for effectiveness.

c. The success or acceptance criteria for the attributes that will monitored or evaluated.

2. The effectiveness assessment plan must be approved by the issue owner.

3. Issue an effectiveness assessment report.

6.3 If the effectiveness assessment determines that the corrective or preventive actions were not effective in resolving the cause of the issue,

Then initiate a new notification.

7 Other Programs

7.1 CAP data will be used to support other programs and processes including, but not limited to:

1. Risk Management Process.

2. Compliance Evaluations.

3. Investment Planning.

8 Records

8.1 Records, regardless of media, are maintained per GOV-01, "Records Management Policy," GOV-7101S "Records Management Standard," and TD 4016S, "Gas Operations Records and Information Management."

8.2 Records are retained per the Record Retention Schedule.

END of Instructions

Definitions

- **Action Owner:** The individual assigned the task of completing a corrective or preventive action.

- **Asset:** Plant, machinery, property, buildings, vehicles, and other items that have value to Gas Operations.

Gas Operations Corrective Action Program (CAP) Implementation

- **Asset Management System:** An organization's asset management policy, strategy, objectives, plans, and the activities, process, and organizational structure necessary for their development, implementation, and continual improvement.
- **Asset System:** A group of assets that interact or are interrelated and perform a business function.
- **Consequence:** The result of an action or condition.
- **Coordinator:** The person who evaluates the issue and determines the category, risk level, and owner. This may be an individual or a coordination group.
- **Corrective Action:** An action taken to correct an existing issue or to prevent the recurrence of an issue.
- **Critical Asset:** An asset that has the greatest impact on the achievement of the organizational strategic plan.
- **Effectiveness Assessment:** An assessment to check that the actions taken to resolve an issue adequately corrected the issue and are effectively preventing its recurrence.
- **Extent of Condition:** The extent to which an actual condition exists, or may exist, in other assets, asset systems, processes, programs, or human performance.
- **Failure:** The inability of an asset or asset system to perform its design function.
- **Incident:** An adverse or damaging occurrence that affects an asset or asset system.
- **Interim Action:** A temporary action taken to mitigate the consequences of an issue or to reinstate capability while minimizing degradation.
- **Issue:** An existing or potential failure, incident, or nonconformity.
- **Issue Owner:** The individual who is responsible for correcting an issue or for ensuring an issue is corrected.
- **Mitigate:** To make less severe.
- **Nonconformity:** A deviation from a requirement of the asset management system, relevant policies, procedures, practices, work standards, legal requirements, etc.
- **Notification:** A form, either computer or paper, which documents an issue and tracks its resolution.
- **Preventive Action:** An action taken to prevent the occurrence of an issue.
- **Risk Assessment:** The systemic evaluation of an issue to determine its probability of occurrence and the severity of the consequences of its occurrence.

Gas Operations Corrective Action Program (CAP) Implementation

- **Risk Level:** A term used to categorize an issue based on its consequence significance and its probability of occurrence. The terms are critical risk, high risk, medium risk, and low risk.
- **Risk Level Code:** A code assigned to an issue based on its consequence significance and its probability of occurrence.
- **Root Cause Evaluation:** A formal evaluation that uses industry-accepted analytical methods to determine the primary causes of an issue.
- **Trend Code:** A code used to categorize issues into bins and track their frequency of occurrence.
- **Work Group Evaluation:** A logical evaluation of an issue to identify reasonable corrective or preventive actions needed to resolve an issue.

Implementation Responsibilities

- All Gas Operations personnel are responsible for reporting existing or potential issues.
- All Gas Operations leadership personnel are responsible for addressing and resolving reported issues

Governing Document

Utility Standard: TD-4020S, Gas Operations Corrective Action Program (CAP)

Compliance Requirement / Regulatory Commitment

49 CFR 192.617

Reference Documents

Developmental References:

GOV-01, "Records Management Policy"

GOV-7101S "Records Management Standard"

Utility Standard: TD-4016S, "Gas Operations Records and Information Management"

Supplemental References:

PAS 55-1:2008, Asset Management, Part 1: Specification for the Optimized Management of Physical Assets; The Institute of Asset Management, British Standards, ICS Code: 03.100.01.

Appendices

Appendix 1, CAP PROCESS FLOWCHART

Appendix 2, TIME REQUIREMENTS FOR PERFORMING CAP ACTIONS

Appendix 3, EXAMPLES OF ISSUES TO REPORT AND NOT TO REPORT

Attachments

TD-4020P-01-F01 - Attachment 1, "Cap Notification Form"

Attachment 2, "CAP Risk Assessment Tool"

Document Recision

TD-4020P-01, Gas Operations Corrective Action Program (CAP) Instructions, Revision 0, 03/13/2013 (superseded)

Attachment 1, "CAP Event Web Entry Quick Reference Guide," Revision 0, 03/13/2013 (canceled)

Attachment 2, "CAP Web Entry Quick Reference Guide," Revision 0, 03/13/2013 (canceled)

Attachment 3, "CAP 6D (ECTS) Quick Reference Guide," Revision 0, 03/13/2013 (canceled)

Document Approver

Steve Pratt
Manager, Corrective Action Program

Gas Operations Corrective Action Program (CAP) Implementation

Document Owner

Redacted
Principal Engineer, Codes and Standards

Document Contact

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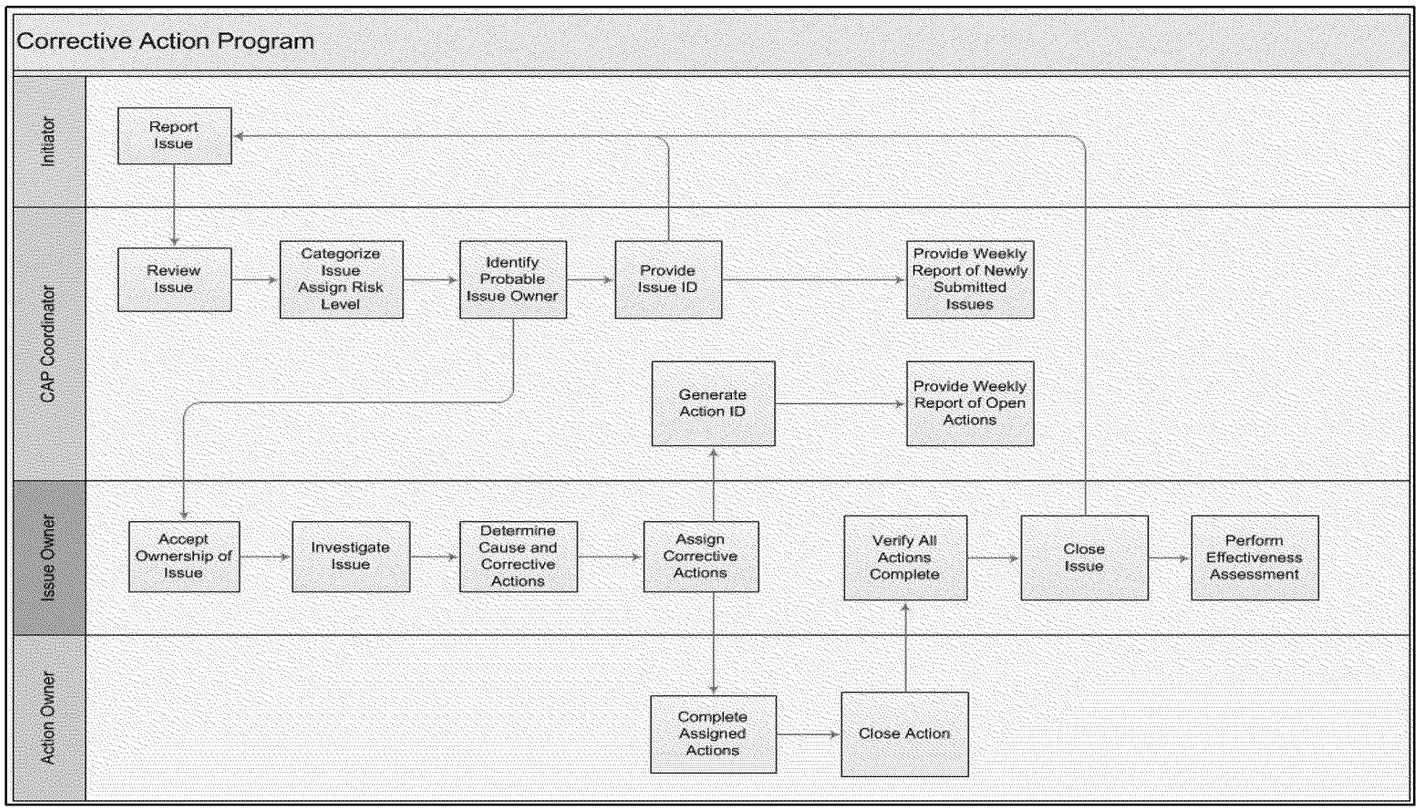
Supervisor, Corrective Action Program

Revision Notes

Where?	What Changed?
Summary	Revised the purpose and simplified the language. Deleted the reference to ECTS database as CAP will move to a different database. Added guidance on applicability of CAP.
Procedure Steps	This section is completely revised. Created and provided links to three new Job Aids
Definitions	Definitions have been added or deleted as appropriate to include only those terms used in the procedure. Some definitions from the previous revision have been revised.
Appendices	Revised this Section to replace the previous four appendices with new Appendices 1-3.
Attachments	Canceled Attachment 1, "CAP Event Web Entry Quick Reference Guide," Revision 0 issued 03/13/2013, Attachment 2, "CAP Web Entry Quick Reference Guide," Revision 0 issued 03/13/2013, and Attachment 3, "CAP 6D (ECTS) Quick Reference Guide," Revision 0, issued 03/13/2013. Added new Attachment 1, "Cap Notification Form" and new Attachment 2, "CAP Risk Assessment Tool."
Document Approver	Changed document approver.
Document Owner	Changed document owner.
Document Contact	Changed document contact.

Gas Operations Corrective Action Program (CAP) Implementation

Appendix 1, CAP PROCESS FLOWCHART
Page 1 of 1



Appendix 2, TIME REQUIREMENTS FOR PERFORMING CAP ACTIONS

WHO	WHAT	WHEN
Initiator	Report the issue.	As soon as practical, but no later than three business days from the issue discovery date.
Coordinator	Complete the review and evaluation of the issue.	Within one business day of notification receipt.
Coordinator	Assign the notification to the issue owner.	Within five business days of completing the issue review and evaluation.
Issue Owner	Begin the investigation of the issue.	Within three business days of issue assignment.
Issue Owner	Assign corrective or preventive actions resulting for a work group evaluation.	Within 30 calendar days of the date the issue was reported.
Issue Owner	Assign corrective or preventive actions resulting for a root cause evaluation.	Within 60 calendar days of the date the issue was reported.
Issue Owner	Complete and issue the effectiveness assessment report.	Within 6 to 12 months from the date the issue notification was closed.

Appendix 3, EXAMPLES OF ISSUES TO REPORT AND NOT TO REPORT

A. Examples of issues to report to CAP include:

1. Gas system related issues affecting the health and safety of the public or utility personnel.
2. Issues impacting the safe operation or reliability of the gas system.
3. Inadequate, unavailable, or ineffective processes, policies, procedures, or training.
4. Audit findings.
5. Reportable incidents.
6. Compliance issues.
7. Overpressure events.
8. At-fault dig-ins.
9. Near hits.
10. Employee feedback and improvement suggestions.

B. Examples of other reporting systems for issues not to report to CAP include:

1. Integrated Gas Information System (IGIS).
2. Material Problem Report (MPR).
3. Gas Corrective Maintenance Notification.
4. Compliance and Ethics Hotline.
5. Safety and Health Reporting (includes the 24/7 Nurse Report Line).
6. Facility Maintenance.
7. Computer and Information Technology Support (TSC).

Pacific Gas and Electric Company

Records Verification and MAOP Validation Project Phase 3

Quality Assurance Plan for PFL Build

Version 06

May 29, 2012

Document Version Control

Version No.	Date	Amended By	Amendment Details
Ver. 01	June 15, 2011	AS	Using specification tolerances v1
Ver. 02	June 22, 2011	AS	Re-defined criticality based on impact to MAOP calculation Added Corrective Action Register (Appendix 4)
Ver. 03	Feb 07, 2012	RR	Updated to reflect current process, which now occurs after IR review
Ver. 04	Feb 08, 2012	RR	Updated based on peer review comments
Ver. 05	March 14, 2012	RR	Updated to reflect refinements to process
Ver. 06	May 29, 2012	RR	Updated to reflect current process

1. Purpose

The purpose of this document is to detail the Technical Quality Assurance (QA) test procedures related to the PFL build. Technical Quality Assurance is an independent function on the project and exists to highlight all identified non-compliances and to ensure that agreed-upon corrective actions are taken. The Pipeline Features List (PFL) Technical QA team is tasked with testing whether the PFLs are being developed in accordance with the PFL Build and IR procedures, **and that the data that is critical to the Maximum Allowable Operating Pressure (MAOP) calculation is traceable, verifiable, and complete.**

This procedure should be read in conjunction with the MAOP Validation Project (Phase III) QA/QC Overview.

2. References

MAOP Validation Project (Phase III) QA/QC Overview
Specification Ranking and QA/QC Tolerances
PFL Cluster Master
PFL Build QA Log Template
PFL Build QA Summary Template
PFL Build Random Sample - Priority 1
PRUPF (2/10/12 version A)

3. Definitions

Specification Ranking

Each feature has critical, required and non-critical specifications defined as follows:

Critical:	The value of the specification has a direct impact on the MAOP calculation.
Required:	The value of the specification may be used to justify an assumption of a critical specification.
Non-critical:	The specification is for information only (this is a combination of the PFL Build procedure rankings of “important”, “useful”, “nice to have”, and “reference”).

QA assessment for pass, error and fail

Type 1 Pass: No error: the spec is within the defined tolerance range (refer to Technical QA/QC Tolerances)

Type 2 Error: The error does not affect the MAOP calculation.

Type 3 Error: The error affects MAOP, but the input value is more conservative than the correct value.

Type 4 Error: The error affects MAOP, and the input value is less conservative than the correct value.

Type 5 Error: Not only does the error affect MAOP, with the input value being less conservative than the correct value, but the MAOP of the entire PFL becomes lower when the correct value is input.

4. Methodology

There are two sets of PFLs which will be sampled by the Technical QA team each week. One set of PFLs will undergo a Technical QA evaluation post-QC, and the other set of PFLs will be evaluated post-FVE.

Post-QC Technical QA process

The PFLs which are tested post-QC are evaluated with a focus on Build and QC performance, in general, as well as with a focus on comparing performance amongst Build vendors. The Technical QA team will sample eight PFLs each week (one from each Build vendor, at random).

Process

- Starting on Thursday of each week, eight post-QC PFLs will be chosen randomly (ensuring only that one PFL is chosen from each of the eight Build vendors) for the post-QC Technical QA sample.
- Complete Technical QA review of the selected PFLs per guidance set forth in "Deliverable" guidelines outlined below, and enter information in Build-QC Technical QA status log, located on Sharepoint (Shared Documents > Phase II PFL Build > 50 QA –PFL Build FVE and Issues QA > Technical QA > Build-QC Technical QA Log_MMDDYYYY).
- Post-QC Technical QA summary results and suggested corrective actions will be communicated to the Build/QC Manager and Build/QC leadership team each week.
- Technical QA team and Build/QC team will collaborate to ensure corrective actions are communicated to appropriate team.

Post-FVE Technical QA process

For the second set of sample data, a PFL is complete and ready for post-FVE Technical QA evaluation when it has passed Engineering QC Complete and the IR Image macro has been run on the PFL. These are the same requirements for a PFL to become Ready for Upload into GIS. The Technical QA Team will sample a representative number of PFLs, as they become Ready for Upload. Technical QA of a PFL includes testing all aspects of the PFL, and in the meantime assessing the robustness of all PFL procedures, from Build/QC all the way through FVE, 100% QC and Image Macro check.

Process

- Starting on Thursday of each week, the first six PFLs that become Ready for Upload will be automatically diverted to the "Technical QA" status. These 6 PFLs become the weekly post-FVE Technical QA sample.
- Complete Technical QA review of the selected PFLs per guidance set forth in "Deliverable" guidelines outlined below, and enter information in Technical QA status log, located on Sharepoint (Shared Documents > Phase II PFL Build > 50 QA –PFL Build FVE and Issues QA > Technical QA > Technical QA Log_MMDDYYYY).
- If an error is found, change status of PFL to "Technical QA Issue"; If an error is not found, change status of PFL to "Ready for Upload".
- Technical QA results and suggested corrective actions will be communicated to the FVE Manager and FVE leadership team each week. Technical QA team will update the status of the corrective actions log (included in Technical QA Status log) on a weekly basis.
- Technical QA team will work with the QA Manager to ensure that corrective action gets communicated to the entire FVE team. FVE Manager will be responsible for correcting PFLs with a status of "Technical QA Issues" and will possibly implement process changes within their team.
- After PFLs with Technical QA Issues are corrected, the team which made the correction will check in the PFL and change the status to "Ready for Upload".

Deliverable

- PFL scope and accuracy – to check the appropriateness and accuracy of data for each feature.
- PFL traceability – to check that the recorded data can be traced to the source document(s) used
- Document Retention – to check that the electronic image of the documents referenced on the PFL are retained in the appropriate location.

A PFL is deemed to have passed if all of the following criteria are satisfied:

- All critical features within the assigned boundary end points are detailed on the PFL. A critical feature is defined as any feature with a true length (i.e., excludes tap, casing).
- All MAOP critical specifications for all critical features are correctly captured on the PFL and traceability exists to the source document or standards reference.

Each PFL will also be evaluated for the following:

- Accuracy of MAOP critical specifications.
- Accuracy of required specifications.
- Accuracy of non-critical specifications.
- STPR inclusion.
- Job Number information.
- Traceability of the data captured - to check that all data captured can be sourced from the referenced documents.

Special attention will be given to the FVE process, verifying that the unknown MAOP critical specifications have been resolved in a verifiable, traceable and complete manner. The Issues Resolution Field Verification Engineering Team solves each unknown specification by one of the following methods:

- Determining that the value is N/A, rather than unknown.
- Interpreting information on a document already referenced on the PFL.
- Finding a new document (not previously referenced on the PFL) and using data.
- Using the PRUPF tables to assign a value which represents a conservative historical minimum.
- Using Sound Engineering Judgment (SEJ)
- Excavating the pipe to inspect and/or test to ascertain specification properties.

One purpose of this Technical QA step is to check that the unknown properties have been assigned a value using one of the approved methods and that this has been done in accordance with documented procedures. Traceability of the resolution will be tested and recorded.

Review each feature and examine the cells that have been updated by the FVEs (denoted by red text). Each feature with a change should have an explanation of the change in the column labelled "FVE Comments." Review these notes and trace the reasoning. Examples of the changes that may have been made include, but are not limited to:

- Interpreting information on a document already referenced on the PFL.
- Finding a new document (not previously referenced on the PFL) and using data.
- Using PRUPF tables or appendices to assign a value which represents a conservative historical minimum.
- Excavating the pipe to inspect and/or test to ascertain specification properties.

If a document or a PRUPF table/appendix are referenced, then the source must be identified. To do this, consider the following:

- Document already referenced in PFL - open the PFL QC complete folder for the Line and MP being reviewed and look for the document referenced in the FVE comments. Examine the document for the information added.
- New document not referenced in PFL - use ECTS to search for and open the document referenced in the FVE comments. Examine this document for the information added.
- PRUPF Table or Appendix - Reference the Suggested Values columns and take note of whether the value that the FVE input is lower than the Suggested Value; since the Suggested Values come from the PRUPF and are the lowest historical value, an input value lower than that should be questioned. On that same note, if the FVE updates SMYS, WT, or

Seam Type, referencing the PRUPF, and the input value does not match what was produced by the Suggested Values macro, the Technical QA checker should double-check the value using PRUPF logic. Excavation - assume this information is correct.

Process for reviewing changes based on the PRUPF:

- FVE uses any known information that exists for a feature to locate information in the PRUPF. The O.D. of the feature is all that is required, but install or purchase date and seam type for pipe may also be useful.
- If the FVE does not have the purchase date of the feature, the install date will be used. However, for pipe, a buffer of up to 10 years prior to installation is considered to assist in selecting the worst case scenario (weakest) specification of a feature. The weakest specification at any point during the 10-year period prior to install date should be used.
- Appendices are date specific. Therefore, use of an appendix may be invalid if the purchase date or 10 year buffer on installation date does not fall in this period.
- For fittings and valves that have unknown information, either an ANSI or WOG rating must be chosen. The following criteria apply for this assumption to be correct:
- Appendix E allows this assumption if the feature was installed post 1963. Check working pressure (psi) associated with any rating chosen and verify that this exceeds the lowest design pressure (DP) for a pipe within the year/job.
- Analyse all referenced paragraphs within the PRUPF and verify FVE correctly interpreted.

Process for reviewing the rationale for all changes

- For each change made in the FVE process, a rationale has to be given explaining why the change was made, and this must be verified.
- The rationales are as follows:
  - Blank (0 after the QA macro is used) = a blank in the rationale column means there is sufficient evidence (in the engineer's judgment) that documentation supports the value, which can either be from an EDMS or ECTS image. This is referred to as Found a Supporting Document (FSD). A blank can also mean that the FVE is satisfied with the PG&E QC PFL data so no action is needed.
  - 1 = means an Assumed Allowable Minimum (AAM), Historical Record Documentation (HRD), or Sound Engineering Judgment (SEJ) was used by the FVE. This includes use of the PPRUPF to find specifications.
  - 2 = no information was available on the feature and assumptions for minimums could not satisfy (meet) a pressure that matches or exceeds one of the following pressures:
    - Installed pre 1963 - MAOP of record for the date the feature was installed.
    - Installed post 1963 - Design pressure of the pipeline system.

    Therefore, a dig was performed to validate the specifications of the pipe or fitting and to try to verify that the pressure did not have to be lowered to meet one of the above pressures.
- The process for reviewing the previous acronyms, referred to as categories, is explained in Section 8.

Process for reviewing the Assumption Category:

- The FVE must categorize each assumption that is made while choosing specs. These categories have been defined as:
  - FSD = Found supporting document (rationale of "blank").
  - AAM = Assumed allowable minimum (rationale of 1).
  - HRD = Historical record documentation (rationale of 1).
  - SEJ = Sound engineering judgment (rationale of 1).
  - FVD = Field verified dig (rationale of 2).

- These categories should reasonably match the comments provided by the FVE.

5. Sample

The QA statistical parameters being used for stabilized processes are: 95% confidence interval, 96% precision and an estimated 2% error rate. As the PFL Build is a new process which has not reached maturity, the estimated error rate has been raised to 5% for Priority 2 miles. As shown below, the total sample size based on these parameters is 108 PFLs.

Attributes Sample Sizes (non-stratified)

Population Size	2,000
Confidence Level	95%

		Desired Precision Level														
		1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
Expected Occurrence Rate of an Attribute	1%	320	91	42	24	16	11	8	6	5	4	4	3	3	2	2
	2%	548	173	81	46	30	21	16	12	10	8	7	6	5	4	4
	3%	718	246	117	68	44	31	23	18	14	12	10	8	7	6	5
	4%	850	312	152	89	58	41	30	23	19	15	13	11	9	8	7
	5%	955	372	185	108	71	50	37	29	23	19	15	13	11	10	9
	6%	1,041	427	215	127	84	59	44	34	27	22	18	15	13	11	10
	7%	1,112	477	245	146	96	68	50	39	31	25	21	18	15	13	12
	8%	1,172	523	272	163	108	76	57	44	35	28	24	20	17	15	13
	9%	1,223	565	298	180	119	84	63	49	39	31	26	22	19	16	14
	10%	1,268	604	323	196	130	92	69	53	42	35	29	24	21	18	16

The sample of 108 PFLs will be Technical QA'd at a rate of about 12 PFLs per week for 10 weeks.

This estimated error will be reviewed for subsequent priorities based on results of the Priority 2 Technical QA effort and the optimization of the PFL build process. Upon review of the results, the sample size may increase or decrease accordingly.

6. Quality Assurance Assessment

Specification Criteria for Pass, Error and Fail
Tolerances have been agreed upon for each specification, based on the impact on the MAOP calculation; these are detailed on <Specification Ranking and QA/QC Tolerances> (Appendix 1).

Each feature will be evaluated for accuracy on critical, required and non-critical specifications, and the PFL's traceability on critical and required specifications. The test results will be recorded <Technical QA Log> and summarized on the <Technical QA Summary Slides>.

Corrective Actions
Corrective actions will be required where failures or errors occur on critical specifications, or when a process improvement is identified. These actions will be detailed on the <Technical QA Log>. The log will be maintained by the QA team to verify that corrective actions are closed out.

Communication of Results

QA results, including documentation of any errors in the PFL, shall be shared with the PG&E Build team, QC team and Issues Resolution team. The weekly Technical QA results will be shared with the QA/QC Manager by Thursday of each week.. The QA/QC Manager will then disseminate the results to the appropriate team manager and communicate the appropriate corrective action.

A summary of results will be presented weekly at the core team meeting and stored on the PG&E SharePoint at the following location:

http://wss/sites/GasProgramAndPerfMgmt/Shared%20Documents/Forms/Standard.aspx?RootFolder=%2fsites%2fGasProgramAndPerfMgmt%2fShared%20Documents%2fSan%20Bruno%20Incident%20PMO%2fGT%20Data%20Validation%20Project%2fQA%5fQC%2fPhase%20II%20PFL%20Build%2f50%20QA%20%2dPFL%20Build%20FVE%20and%20Issues%20QA%2f4%2e%20QA%20Test%20Results&FolderCTID=&View=%7bF1B22174%2d7BB3%2d4221%2dA760%2d7D195C604679%7d

Appendix 1: Specification Ranking and QA/QC Tolerances

Records Verification and MAOP Validation Project			
PFL Build QA/QC Tolerances			
Overall PFL	**Item**	**Property Ranking**	**Pass Criteria**
	Features	Critical	No critical features missing (i.e.. features with >0 length)
	Boundary Points	Critical	Includes all features within assigned milepoints
	Boundary Points	Required	Includes additional features outside of MPs for the purpose of integrating PFLs
PFL Section	**Column Header**	**Property Ranking**	**Pass Criteria**
Required Feature Information	Feature Number	Required	Exact
	Line No.	Required	Exact
	Main Line Size	Critical - all except tap & PCF	Exact
	Type	Required	Exact
	Beg Station	Required	Subsequent feature = end of previous feature
	End Station	Required	Feature with actual length: +/- 5ft or 10%, whichever if higher Sleeve (gas carrying with no independent length): 0.1 from begin Tap: 0.00 from begin
Reference only Columns	Milepoint	Reference	
	Field ST.	Reference	
	Pipe ST.	Reference	
	Project ST.	Reference	
From PG&E GIS	Approx. Pipe Segment	Required	Exact
	CL. Loc.	Useful	Exact
Pipe, Valve, Bend, Reducer, Tee, Sleeve Data	W.T.	Critical: Pipe, Bend, Reducer, Tee, Sleeve Required: Valve	Exact
	Pipe Spec	Required: Pipe	Exact
	SMYS	Critical: all except valve	Exact
	MFTR	Important	Exact
	Seam Type	Critical: Pipe, Bend Non-critical: Valve, Reducer, Tee, Sleeve	Exact
	Purchase Doc #	Important	Exact
	Install Date	Important	Correct year
External Coating	Coating Type	Important	
	DESC	Useful	
	Install Date	Useful	Correct year
Sleeve - Reinforcement Data	Beg Station	Important	+/- 5ft or 10% whichever is higher
	End Station	Important	Begin station + actual length
	Type	Critical	Exact
	Spec Rating	Required	Exact
	Material Type	Useful	Exact
	Actual OD	Critical	Exact
	Purchase Doc #	Important	Exact

Tap Data	Station	Required	+/- 5ft or 10% whichever is higher
	Type	Important	Exact
	Method	Useful	Exact
	ANSI Pressure Rating	Required	Exact
	Fitting Size	Required	Exact
	MFTR	Required	Exact
	Insertion	Useful	Exact
	Drill Hole	Useful	Exact
	Drip/Probe Length	Useful	+/- 20%
Manufactured Bend Data	Station	Important	+/- 5ft or 10% whichever is higher
	Type	Required	Exact
	ANSI Pressure Rating	Critical	Exact
	V Angle	Useful	+/- 20%
	HZ Angle	Useful	+/- 20%
	Radius (ft)	Useful	+/- 20%
	Fabricated Assembly	Useful	Exact
Field Bend Data Point Event (zero length pipe event)	Type	Important	Exact
	Radius (ft)	Useful	+/- 20%
	V Angle	Useful	+/- 20%
	HZ Angle	Useful	+/- 20%
	Orient	Important	Y/N
Tee Data	Type	Useful	Exact
	OD Main	Critical	Exact
	WT Main	Critical	Exact
	OD Branch	Critical	Exact
	WT Branch	Critical	Exact
	ANSI Pressure Rating	Critical	Exact
Valve	Station Center	Useful	Station Center
	Name	Important	Exact
	Type	Important	Exact
	Size	Important	Exact
	ANSI Pressure Rating	Critical	Exact
	Max Working Pressure	Useful	Exact
	Operator Type	Useful	Exact
	Serial Number	Nice to Have	Exact
	Shell Test Pressure	Useful	Exact
Reducer Data	Station	Important	Station Center
	Type	Useful	Exact
	OD	Critical	Exact
	WT	Critical	Exact
	OD 2	Critical	Exact
	WT 2	Critical	Exact
	ANSI Pressure Rating	Critical	Exact
Flange	Type	Useful	Exact
	Size (in)	Important	Exact
	ANSI Pressure Rating	Critical	Exact

PCF or Misc Fitting	Station	Important	Station Center
	Type	Useful	Exact
	ANSI Pressure Rating	Critical	Exact
	Name	Useful	Exact
Relief Valve	Size	Important	Exact
	Type	Important	Exact
	ANSI Pressure Rating	Critical	Exact
	MFTR	Nice to Have	Exact
	Install Date	Nice to Have	Exact
Meter	Station	Important	Station Center
	Type	Important	Exact
	Name	Useful	Exact
	MFTR	Nice to Have	Exact
Reference Document Images Section 1	Drawing Number 1	Important	Exact
	Drawing Quality 1	Important	Exact
	Drawing Number 2	Important	Exact
	Drawing Quality 2	Important	Exact
	Image Name 1	Important	Exact
	Image 1 Quality	Important	Exact
	Image Name 2	Important	Exact
	Image 2 Quality	Important	Exact
	Image Name 3	Important	Exact
	Image 3 Quality	Important	Exact
	Notes Comments	Useful	
Reference Only	Feature Number	Required	Exact
Strength Test Data	Beg Station	Required	+/- 5ft or 10% whichever is higher
	End Station	Required	+/- 5ft or 10% whichever is higher
	Type	Important	Exact
	Media	Critical	Exact
	Test Pressure	Critical	Exact
	Duration (hrs)	Critical	Exact
	Adj Test Pressure	Critical	Exact
	Test Date	Critical	Exact
	Supervisor	Critical	Exact
	Test Company	Critical	Exact
Job Number Data	Beg Station	Required	+/- 5ft or 10% whichever is higher
	End Station	Required	+/- 5ft or 10% whichever is higher
	Job Number	Critical	Exact
	Install Date	Critical	Correct year
Profile	Station	Nice to Have	Station Center
	Elevation (ft)	Nice to Have	+/- 20%
	Depth (in)	Nice to Have	+/- 20%
Field Notes	Station	Nice to Have	Station Center
	offset	Nice to Have	+/- 20%
	Type	Nice to Have	Exact
	Desc	Nice to Have	
	Comment	Nice to Have	
Appurtenance	Station	Nice to Have	Station Center
	Type	Nice to Have	Exact
	Desc	Nice to Have	
Pig Trap or Launcher	Station	Useful	Station Center
	Type	Important	Exact
	Name	Useful	Exact
	Install Date	Useful	Correct year

Casing Data	Beg Station	Required	+/- 5ft or 10% whichever is higher
	End Station	Required	+/- 5ft or 10% whichever is higher
	OD	Critical	Exact
	Type	Important	Exact
	Material	Nice to Have	Exact
	Vented	Useful	Exact
	Insulator Type	Useful	Exact
	Seal Type	Useful	Exact
	Install Date	Useful	Correct year
Reference Document Images Section 2	Drawing 3 Number	Important	Exact
	Drawing 3 Quality	Important	Exact
	Drawing 4 Number	Important	Exact
	Drawing 4 Quality	Important	Exact
	Image Name 4	Important	Exact
	Image 4 Quality	Important	Exact
	Image Name 5	Important	Exact
	Image 5 Quality	Important	Exact
	Image Name 6	Important	Exact
	Image 6 Quality	Important	Exact
	Notes Comments	Useful	
	Discrepancy List	Important	
	Tap List	Important	

Data and Document Migration project QA implementation "Playbook"

Draft version 2
August 1, 2012

(This document will be converted to the PG&E Guidance document template. This version is a first draft)

Outline

Document Revision Control [Back to Table of Contents]

Document revision guideline:

- Used for major revisions that impact full sections of a document
- Date of revision, name of person responsible for revision, status and comments supporting the revision must be recorded
- Signatures from all persons identified as stakeholders are required to approve major revisions

Revision Control Sheet:

Version	Date	Status	Modified	Comments	Signature

How to use this Document: [Back to Table of Contents]

The document consists of a QA implementation checklist and a "guidebook" to use as a reference when designing, implementing and performing QA testing.

1. Read the introduction to gain context and understanding of the goal and role of the data migration project QA
2. Coordinate with **project management team** [def.] on a particular initiative, determine if any items on the QA checklist are not applicable for a particular project (most items are mandatory for all projects)
3. Coordinate with project management, perform the activities outlined in the guidance document to assess risk, design and execute QA oversight testing. Refer to the guidance document for information and context.
4. Use the checklist and guidance document as supporting tools during communication with project team and project leadership

The Process is built of phases, steps, and activities. The guidance document is organized around those phases steps and activities. It is meant to be referenced as a source of information, and is not meant to be prescriptive to all scenarios. The diagram below conveys the general organization of the phase, step, and activity descriptions in sections 1 - 4 of this document:

Introduction [Back to Table of Contents]

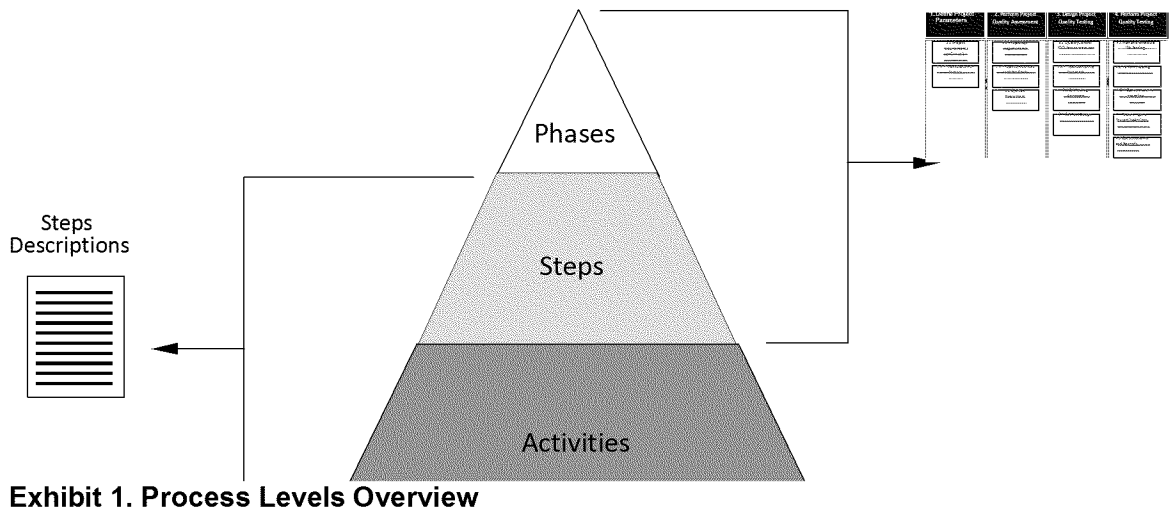


Exhibit 1. Process Levels Overview

Document Purpose

The purpose of this document is to provide a guideline for developing and executing quality assessment (QA) plan(s) for **data and migration projects** [def.] within the Gas Operations Asset Knowledge Management Organization. This document outlines key steps for QA plan development and execution, and is meant to be used by the project QA team members to:

- Communicate the role and the activities of the **QA team** [def.] to the project team(s)
- Work with project teams to identify and assess prerequisites for QA assessment and testing design
- Work with project teams to assess process risks
- Serve as a guide for the design of QA testing and oversight activities
- Serve as a guide for the performance QA testing and oversight activities

This guidance document is meant to be used as a reference for a QA team member to consult while designing and performing QA activities and to allow management to hold data migration project managers accountable for the quality of project outputs. The information in the guidance document should assist the QA team member with coordination and communication between the project team members and the QA team. It should help define and describe the prerequisites needed from the project team, and how those prerequisites will be used in the QA process. It should also help the QA rep and the project team to form a "Project QA checklist" to guide the testing development and implementation. The ultimate goal is to establish a consistent approach for quality oversight of Asset Knowledge Management data migration initiatives.

Exhibit 2 below illustrates that the overall approach to Quality Assurance includes 4 phases, each with distinct activities and tasks: (to navigate directly to one of the sections via the hyperlinks, scroll the mouse over the box and hold Ctrl + Click). For a more detailed depiction of the underlying elements of each phase, see exhibit 3.

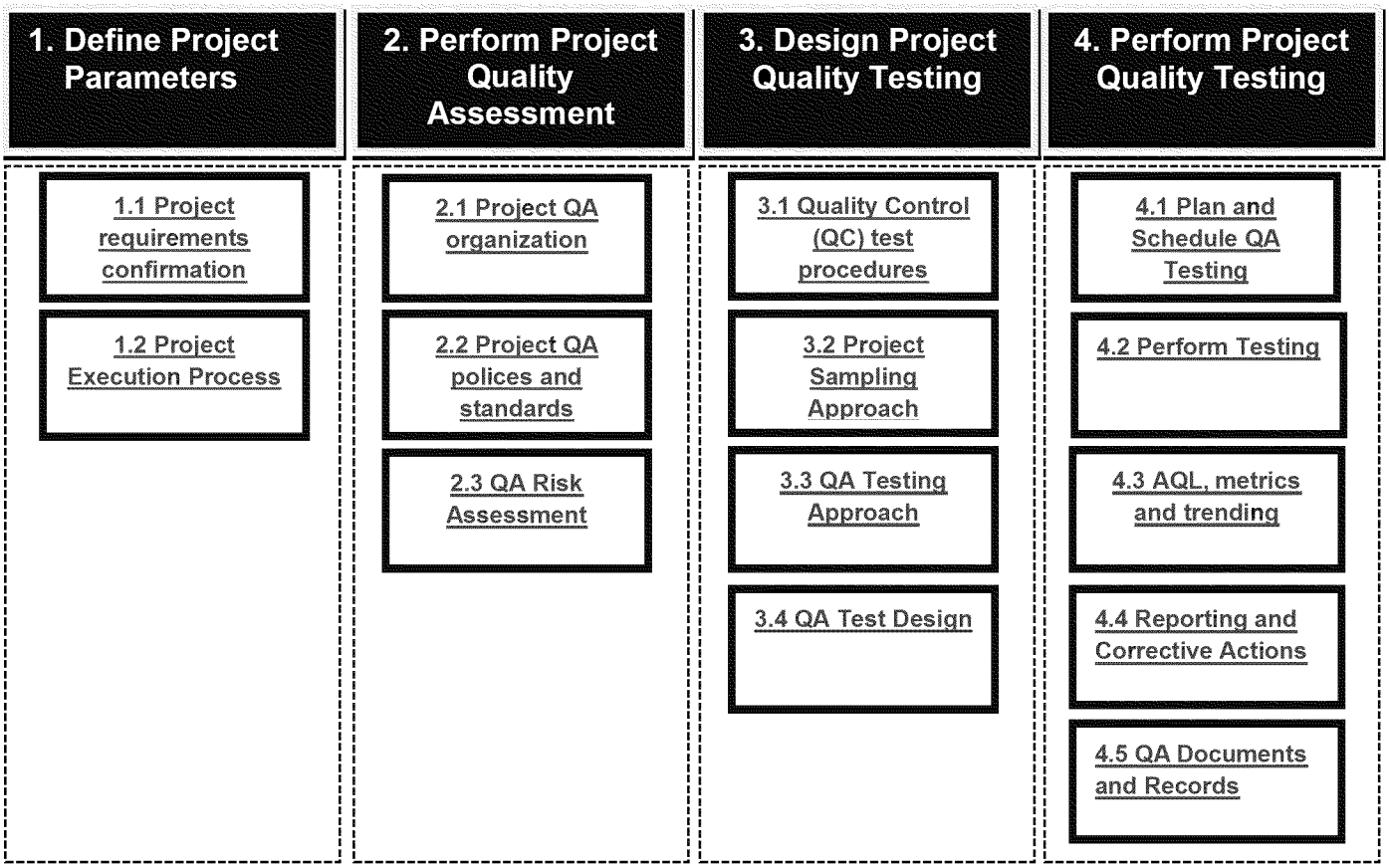


Exhibit 2. Quality Assurance Phase Level Depiction

	Phase 1: Define Project Parameters	Phase 2: Perform Project Quality Assessment	Phase 3: Design Project Quality Testing	Phase 4: Perform Project Quality Testing
Activities	-Review scope definition (1.1.2.1) -Review future state process / stakeholder impact (1.1.2.2) -Review signed-off stakeholder matrix (1.1.2.3) -Review project execution procedure, handoffs, and control points (1.2.2.1, 1.2.2.2, 1.2.2.3)	-Validate structure and roles of QA function on project team (2.1.1) -Review applicable internal and external QA standards and policies (2.2.2) -Identify process risks (2.3.2.3, 2.3.2.5)	-Review and assess existing QC procedures (3.1) -Define error and failure criteria (defects versus defective) (3.1.2.3) -Determine QA testing approach (3.2.2.1, 3.3.2.1) -Determine process control point testing (3.4.2.1) -Establish a QA testing grading criteria (3.4.2.2)	-Create QA test schedule (4.1.2.1, 4.1.2.2) -Perform QA testing (4.2.2.2) -Flag and research test cases that require follow up (4.2.2.3) -Report test results and validate with process owners (4.4.2.1) -Interpret test results through root cause analysis and trend analysis (4.4.2.3) -Report results to project management and recommend corrective actions (4.4.2.2, 4.4.2.4) -Establish test data archive and traceability (4.5.2.1, 4.5.2.2, 4.5.2.3)
Outputs (owner)	Defined and documented project scope (Project Mgmt; 1.1.2.1) -Defined future state process (Project Mgmt; 1.1.2.2) -Record of stakeholder feedback (Project Mgmt; 1.1.2.3) -Documentation of project execution steps (Project Mgmt; 1.2.2.1, 1.2.2.2, 1.2.2.3) -Documentation on approach for data reconciliation (Project Mgmt; 1.2.2.2)	- QA team / project team reporting structure (Project Mgmt; 2.1.2.1, 2.1.2.2) -List applicable QA standards / policies (QA Lead; 2.2.2) -A listing of high level risk categories (QA Lead; 2.3.2.3, 2.3.2.4) -List of process control points (QA Lead; 2.3.2.5) -Documented risk register (QA Lead; 2.3.2.6) -Risk monitoring and review plan (QA Lead; 2.3.2.6) -Documented residual risks (QA Lead; 2.3.2.6)	-Definition of QC test procedures (Project Mgmt; 3.1) - QC procedure gaps identified in risk register (QA Lead; 3.1) -Definition of process defects and defective output (QA Lead; 3.1.2.3) -Role of QA testing in the execution process (QA Lead; 3.3.2.2) -Defined process output grading criteria (QA Lead; 3.4.2.1, 3.4.2.2) -Documented QA testing procedures (QA Lead; 3.4.2.3, 3.4.2.4, 3.4.2.5)	-Documented testing schedule and test activities / checklists (QA Lead; 4.1.2.1, 4.1.2.3) -Measurement of actual project outputs (QA Lead; 4.2.2.2) -Periodic test results summaries, metrics and dashboards (QA Lead; 4.3.2.1) -Updated corrective actions log with status (Project Mgmt & QA Lead; 4.4.2.5) -Archive of QA documentation and test results (QA Lead; 4.5.2.1, 4.5.2.2, 4.5.2.3)

Exhibit 3. ***Phase activities and outputs***

Context/Background [Back to Table of Contents]

PG&E's Asset Knowledge Management Organization (AKM)

- **Data/Asset Knowledge Management** Description (from PG&E intranet) - Managing asset information from field recording to input in asset registry and storage. Managing requests for information from data management systems.

AKM's role within the PG&E organization

AKM's objective:

- Provide and sustain real time, traceable, verifiable, complete and accurate gas transmission and distribution asset information.

How the QA function helps ensure data integrity for the PG&E Gas Organization

PG&E Gas operations processes and systems rely on the data generated and managed by the PG&E Asset Knowledge Management organization. As the organization upgrades its systems and processes, the Asset Knowledge management organization will collect existing pipeline asset and operational data and upload it into a system (e.g. SAP) where it can be used for compliance reporting and operational decision making. The data migration projects are the mechanism for locating, reviewing, assessing and preparing the data for upload into the future operational system.

- Data migration projects enhance the safety of the PG&E gas system by improving the accessibility and reliability of asset information.
- These migration projects focus on replacing paper-based processes, connecting field crew to systems using mobile technology and ultimately improving the accessibility and reliability of pipeline information.
- Data migration projects serve AKM's key goals of enhancing public safety, enabling quality, ensuring compliance and increasing productivity.

It is imperative that the data uploaded by project teams into the system(s) of record meet the needs of the future state process. A main focus of the QA team is to work with the project teams and the operational process owners to **continually assess the completeness and accuracy of data to be migrated based on the requirements of the operational process of the PG&E Gas Operations organization.**

Overview of QA roles [Back to Table of Contents]

What is QA – distinction from QC

- Quality Control (QC) is a process that provides routine and consistent checks on the project activities to ensure integrity and correctness. It is embedded as a component of project processes and activities, and works to identify, correct and prevent errors. This process is carried out by personnel directly involved in the project's activities (i.e. data retrieval, data migration).
- Quality Assessment (QA) is a process that runs independent of the QC activities. It is conducted by personnel not directly involved in the project's activities (i.e. data retrieval, data migration). The purpose of QA is to assess the degree to which the project process output meets requirements in order to equip management with information to make business decisions. The QA function performs this role through assessing risks, and measuring the occurrence of errors or non-conformances in the final project deliverable.

Why is QA important?

A QA plan is designed to systematically test project processes to ensure they meet the quality standards set by the project and to prevent error propagation. The QA plan plays a critical role to make certain that the objectives of the project are met with accuracy and completeness. The QA plan works in parallel to the QC process to identify errors or gaps in the project process and to fix problems in their early stages.

When should QA be used?

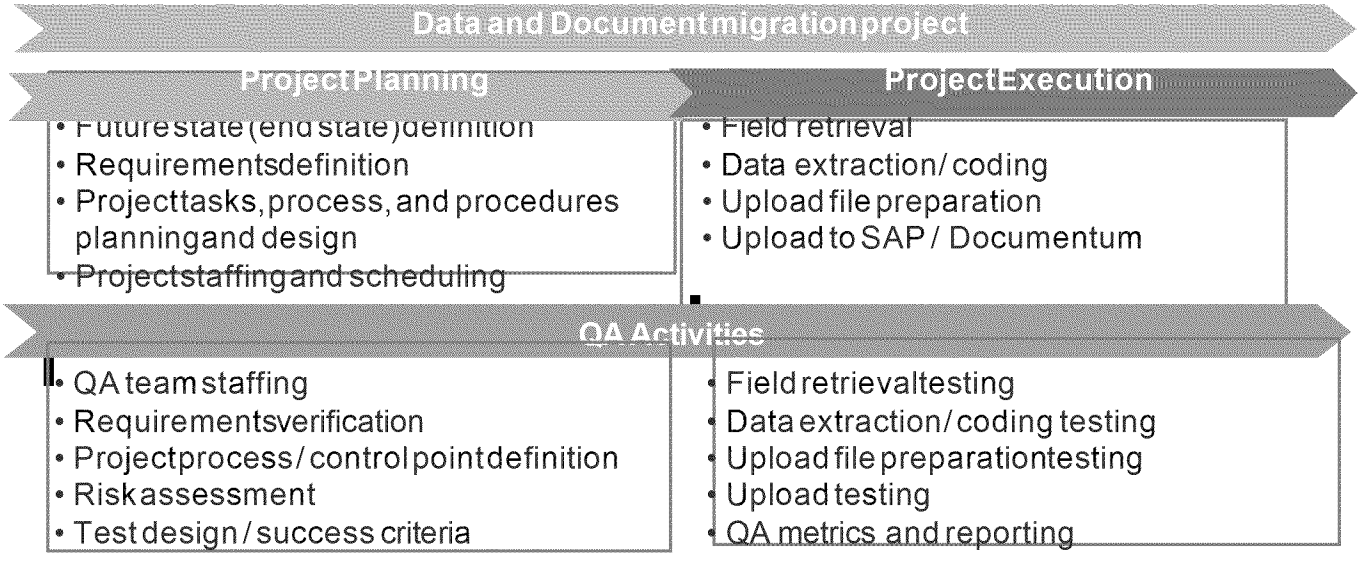


Exhibit 4. High Level Project Example

QA should be involved in the project from the beginning. Identifying areas for potential error and understanding any concerns for the project in the early stages will help prevent problems that may arise. The QA plan should be built in parallel with the project to systematically create check points in the project at different stages. The QA plan should be used to ensure quality standards are met throughout the project.

Who will be responsible for the QA role and developing the QA plan?

The project management team should designate personnel to perform the QA role for the project. These personnel will develop and execute the QA plan for the project. Once the QA plan is developed, the QA personnel should share the plan and solicit input from project stakeholders before the QA plan is implemented.

The QA team should remain independent from project execution responsibilities. The QA team will interact with project resources and project management frequently. The QA team's testing, observation, and reporting processes should objectively measure process results and remain independent from the constraints and influences of project execution. The QA team should consult and inform project execution resources on QA testing results. This consultation should serve to inform project execution team members of relevant QA results and to verify QA results as needed.

Program Management should ensure that a QA function exists on the program, and that project QA teams are staffed appropriately. A key component of the QA function is a program QA Lead that is independent of Project Management and project execution tasks. Consider having the project QA team members report to a Program QA lead for oversight of QA plans, tools and activities. Project QA team members should report testing results and corrective actions to project management. The schematic below illustrates this dual reporting arrangement.

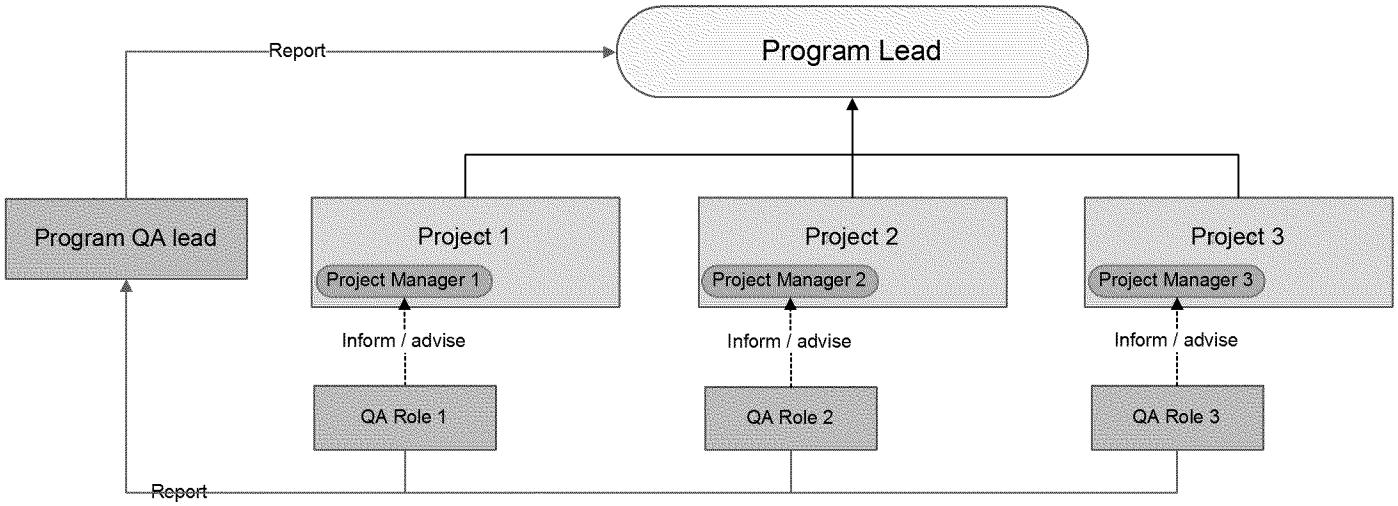


Exhibit 5. Organizational Chart Example

Desired capabilities and experience of a project QA representative:

- Experience with process design and implementation
- Experience in project management
- Proficiency with Microsoft Word, Excel, Visio and PowerPoint

QA Process Design Approach [Back to Table of Contents]

Quality Assurance for AKM data migration projects provides project management with an independent assessment of how accurately and comprehensively a particular project meets its data and information production goals. In order to accomplish this aim, the QA function follows a disciplined approach to design and execute process assessments and product tests. This approach seeks to provide management with confidence that:

- The project goals (or mission) have been vetted by the proper subject matter specialists and management representatives
- The processes implemented to achieve project goals are designed based on approved project requirements
- The project processes contain the proper checks and quality oversight activities to provide project management with insight into the degree of compliance with project goals and requirements
- Quality testing and oversight activities are performed with the intent of identifying non conformances and implementing corrective actions in time to avoid rework

It is worth emphasizing here that the purpose of project quality oversight and testing is to not only provide test results and metrics, but to use the test results and metrics to co-develop (with the project management team) necessary changes and corrections to project processes in time to achieve a comprehensive, accurate, and verifiable data set for upload into the future PG&E Gas Ops system of record.

In order to assess where potential errors are most likely to occur, the QA team and the project team should use the project process description(s) to review the "handoffs" between each step, and anticipate where errors are most likely to occur. Checks and testing can be implemented to protect the output from these potential errors. In

addition, **the critical review of the processes by project management and the QA team during the assessment phase often leads to process refinements that eliminate potential errors before they occur.**

The process for designing and implementing these quality activities for a data migration project should follow the project phases outlined and summarized below:

1. Define project parameters: This phase of activity focuses on collecting and reviewing information related to the project goals or mission, understanding the detailed requirements to be achieved by the project, and understanding the details of the process the project will use to achieve the project goals. This information serves as a set of "prerequisites" for project quality activities. These details are required if testing and oversight activities are to be based on the correct "success criteria." It is best to involve the quality team as early as possible in the project goals and requirements discussions, and the design of the project processes the project team will execute, as the quality team will use this information to design the testing criteria.

2. Perform quality assessment: The product of this phase of activity is an assessment of the project processes and identification of the risk areas where quality testing should focus. This involves understanding the quality standards and policies that the project is subject to, understanding the project's "success criteria" and analyzing the project processes to determine where opportunities for error exist. This assessment forms the foundation of management's understanding of exposure to errors, and allows management to design quality testing to provide protection from potential errors.

3. Design quality testing: This phase focuses on the technical aspects of the design and implementation of the QC and QA testing activities. Included are the specific testing procedures, the definition of defect / defective, the sampling approach and rationale, and a definition of the Acceptable Quality level (AQL). Tests should be designed with detailed instructions on where and how to pull samples, how to interpret results, and how to resolve differences of opinion between operators and testers when analyzing results. Testing activities should have an embedded QC and an independent QA point of view.

4. Perform quality testing: This phase contains the descriptions of how to actually perform the testing, and the descriptions should be specific to the individual test. It should cover not only testing procedures, but also logistics and administrative matters that are critical to testing success. It is important to note that testing includes not only the collection of results, but also the analysis of those results to determine if the risks identified during the assessment phase have been mitigated, and to determine if correction or corrective action are necessary based on the testing results.

1 Phase 1: Define Project Parameters [Table of Contents][Next Phase]

1.1. Project Requirements Review [Next Step]

1.1.1. Step Description

In order to properly assess risk and design quality testing, the quality team needs to first collect information to be used as the baseline from which to make assessments. The quality team should coordinate with the project team to understand the project's goals and mission by reviewing the formal documentation of project goals and requirements. The formal documented goals and requirements should be used as the basis of testing and assessments and those documents should be subject to the proper change control procedures to ensure that the project team and the quality team are using a consistent set of assumptions, and to ensure that those assumptions are approved by project team leadership and stakeholders.

Step sequence- Requirements confirmation should be the initial step in designing the quality processes. The project team is responsible for verifying the appropriateness of the requirements. The project QA team should verify that the requirements exist and have been vetted by the appropriate project team members. For example, if the requirements call for additional fields to be added in SAP, then the QA team should ensure that a member of the operational team agrees with the need for the added fields, and also a member of the SAP team has reviewed and accepted the requirements before the project planning phase concludes.

Relation to QA purpose - QC and QA activities exist to ensure that management goals and objectives are met within an acceptable level of error. In order to achieve this, the quality team must know what those objectives are, and must know that those objectives have been officially decided upon by management. Before designing sampling and testing approaches, the project objectives must be clearly understood so that the testing and sampling can most accurately protect the processes from error. The QA team should review these prerequisites for completion, because the contents and information will be further scrutinized during the risk assessment activity.

1.1.2. Activity description

1.1.2.1 Scope definition document assessment

The QA representative and the project manager should review the project scope definition document in order to develop a consistent understanding of the project boundaries. The review should answer the questions:

- Does a formal project scope document exist?
- Is the project scope clearly articulated?
- Has the project scope been formally agreed to by project management?

A scope definition document formally defines project goals and the boundaries of the project's activities to achieve the stated goal. It provides the QA team with the confirmation that management and stakeholders understand and approve the project's goal and are aware of the operational processes that will be affected by the project. In order for the project to achieve the operational goals, the project must not exclude activities and information that might be crucial to project success. The scope definition document should provide the basis for scope discussion with project management and stakeholders and include:

- Scope description - A statement of the project's purpose (signed off)
- Deliverables - A description of the operational processes to be changed / modified / enhanced by the project's activities
- Success criteria - A statement that defines how the project team will determine when the project has fulfilled its objectives
- Exclusions - A description of operational processes that will be excluded or not addressed by the project
- Assumptions - Any assumptions
- Constraints - Any known project constraints

1.1.2.2 Future state (end state) operational process impact assessment

The Project QA team should review the project team's impact assessment on the **future state operational process** [def.]. This impact should describe at a high level any changes to future state operational processes whose success is dependent upon data or documents that the project is retrieving and uploading. This future state description will also be important when assigning the QA testing success criteria. For example, if the future state process will require geospatial locations, then the project retrieval process should ensure all required mapping and location information is accurately retrieved and uploaded.

The QA team should review the project teams' impact assessment on the operational process and destination system of record and articulate:

- Changes to existing operational processes
- Changes to existing or future operational systems
- Changes to organizational consumers of the information

1.1.2.3 Stakeholder requirements matrix

The **stakeholder matrix** [def.] should identify the people responsible for the operational process or system impacted by the project. It is the mechanism by which stakeholders "sign off" that they are aware of and have provided input (when appropriate) to the project team about what impact the project's activities will have on their areas of responsibility. The QA representative and the project manager should review the stakeholder matrix to assess whether:

- All relevant stakeholders have been included
- Stakeholders have been made aware of the project's deliverables and prerequisites
- Stakeholders have provided adequate feedback and potential risks

The QA team should ensure the owner of the system(s) and operational process(es) are aware of the project's potential requirements and impact and has signed off that the impact is understood and can be mitigated. This ensures that the project team does not work in a vacuum and make project decisions that impact the existing system in a way

that renders the data unusable and leads to the project not delivering the intended goals and benefits.

1.2. Project Execution Processes Review [Back to Phase] [Previous Step]

1.2.1. Step description

This step in the collection of prerequisites addresses the processes and tasks that the project management team creates and implements to execute the project activities. The project team could at times use existing processes to accomplish their goals, or they could stand up entirely new processes from "scratch." Either way, these processes describe how the project personnel will coordinate efforts to achieve the project goal. One example of the project process could be a process to send teams to the field offices to collect and scan job file documents, and another could be the process to upload a data set into a system of record. In both of these cases, the project process should contain:

- A definition of the process output
- A description of the activities undertaken to deliver the process output (manual)
- A depiction of the handoffs and control points within those processes (process map)

See Map Example [ex.]

Step Sequence: The collection and review of the project execution process and documents should begin simultaneously with the collection and review of the project requirements. Both are prerequisites for the QA risk assessment and QA test design

QA Purpose: In order to design an effective QA testing program, the test needs to be designed to "protect" the process output from errors that occur during its production. If the process goal is a "clean" data set, then we want to be sure that the final product is free from errors, gaps, and duplication that could be inadvertently introduced during the various process steps. In order to assess where in the process these errors are most likely to occur, the QA team and the project team should use the process description(s) to review the detailed steps and the "handoffs" between each step to decide where errors are most likely to occur so that checks and testing can be implemented to protect the output from these potential errors. In addition, **the critical review of the process(es) by project management and the QA team during the assessment phase often leads to process refinements that eliminate potential errors before they occur.** Well planned and well documented processes enable this critical review to be most productive.

1.2.2. Activity description

1.2.2.1. Review project document / **data retrieval procedures** [def.]

Review the project procedures that describe the retrieval of hard copy documents or data from the various sources in PG&E's organization. At a minimum check for the following:

- A sequential description of the detailed steps undertaken to accomplish the retrieval activities
- A description of handoffs in the process
- A listing of the various sources of the information, (both hard copy and database sources)
- A description of where in the process a particular requirement is met
- A description of the control points in the process
- Determination of whether the retrieved information will remain in the field offices or be removed to a central location

- A process to account for and communicate to leadership unexpected or out of scope documents / data discovered during retrieval activities

1.2.2.2. Review project document / **data and reconciliation process (es)** [def.]

Review the project procedures that describe the reconciliation of the data obtained from the hard copy documents or data from the various sources in PG&E's organization. At a minimum check for the following:

- A detailed list of the data and information to be extracted from documents or databases
- A description of where on documents or in databases the information is expected to be found
- A "rulebook" governing the reconciliation of missing data, contradictory data, duplicate data, or unusable data
- A "rulebook" governing the normalization of data values coded from documents or extracted from databases
- A sequential description of the detailed steps undertaken to reconcile the data, both in a system (e.g. Concordance) and manual processes
- A description of handoffs in the process, both systemic and manual
- A description of where in the process a particular requirement is met
- A description of the control points in the process, both systemic and manual
- A process to account for and communicate to leadership inaccurate or unusable data discovered during reconciliation activities

1.2.2.3. Review project document / **data upload process (es)** [def.]

Review the project procedures that describe the upload activities for the data obtained from the hard copy documents or databases from the various sources in PG&E's organization. At a minimum check for the following:

- Destination system requirements,
- Process to ensure that the project documents / data can meet those requirements
- A detailed list of system upload procedures
- Control points in the process, both systemic and manual

2 Phase 2: Perform Project Quality Assessment [Previous Phase] [Next Phase]

2.1 Project QA Organization Assessment [Next Step]

2.1.1 Step description

Assess the structure of the project QA team in relation to the project execution team. The project QA representative should have no project execution responsibilities, and should have an independent voice to the project manager.

Step Sequence: The assessment of the structure of the project QA team should come before performing the risk assessment step. Set up of proper QA staffing and reporting lines should

also come before any QA testing is performed. This sequence will enable the QA function to deliver the intended value to the project team.

QA Purpose: The intent of the QA process is to help confirm that objectives of the project are met with accuracy and completeness. Developing the correct QA organization on the project by creating independence, setting up the correct reporting lines, and enabling project team interaction will allow the QA process to function as intended.

2.2 Project QA policies and standards [Back to Phase] [Previous Step] [Next Step]

2.2.1 Step description

The Project QA team should consult with the PG&E Gas Operations Standards and policies group for the applicable process, organizational and industry standards, policies, and regulatory requirements the project QA function is subject to. Project team should coordinate with operational process owner and PG&E Gas ops organization QA department / Standards and Policies to cross check applicable policies and standards.

Step Sequence: Prior to commencing the risk assessment, the QA team should review applicable processes, organizational and industry standards, policies, and regulatory requirements that the project QA is subject to and design QA testing and QA record retention activities based on the applicable policies and standard.

QA Purpose: The purpose of this step is to be sure that the project's activities do not inadvertently risk noncompliance with a standard or policy. This is different from ensuring that the operational business process conforms to all policies and standards. (For operational business processes, this question should be addressed during the project requirements gathering activities, and is part of the prerequisites in 1.1.2.2 Future State Process Impact Assessment provided to the QA team by the project team).

See Policies and Standards Example [ex.]

2.2.2 Activity description

2.2.2.1 Specifications and Standards

The applicable governing documents and standards should be defined, and the adherence to the standard described in the sub process product and process description.

Certain elements of product and process could be subject to more stringent industry and/or PG&E governing documents and standards. Where this is the case, the more stringent will take precedence, as appropriate. See below for an illustrative hierarchy:

Project Deliverable Quality Requirements	Requirements definitions
Industry Quality Requirements	ISO, PAS 55, PHMSA, etc
Corporate Quality Management System	PG&E Quality Standards and Policies
Program Quality Plan	Program Specific Quality Plan
Project Quality Assurance	Project Quality Assurance Testing and Oversight Plan
Project Quality Control	Project Processes, Procedures, and Control Point Inspection
Project Processes	Process Execution Steps Work Instructions

Exhibit 6. Illustrative Hierarchy

2.3 Risk assessment [Back to Phase] [Previous Step]

2.3.1 Step description

In order to properly develop quality assurance testing procedures to mitigate project risks, the quality team must first assess risk areas in the project. Initially, the quality team must review the requirements, success criteria, and overarching policies & standards that govern the relevant project, which should have been collected in phase 1. Next, the quality team should evaluate the project execution processes to identify existing process procedures, control points and any potential gaps. The quality team's process evaluation should seek to identify risks to meeting project goals and objectives. The quality team should rely on the defined project success criteria, as defined by project management, to guide their identification and prioritization of these risks. The quality team should document all risks in a **prioritized risk register** [def.]. The quality team should review this risk register frequently with project management over the course of the project.

Step sequence: Executing the risk assessment step depends upon inputs from the project parameters Phase I. Therefore, the risk assessment step should follow both the review of project requirements and review of project execution processes. The project management team is responsible for providing the requirements and execution processes to the quality team for execution of the risk assessment. The quality team should verify that the requirements exist and have been vetted with the stakeholders, that success criteria has been defined, and that project execution processes have been documented before proceeding with identifying project risks.

QA purpose: The risk assessment step exists to identify areas of risk that could impact whether the project meets management goals and objectives. The risk assessment leverages the project requirements and success criteria to identify project execution focus areas over which quality assurance testing procedures should then be developed. These focus areas, or risks, are documented in a risk register. The risk register is a tool for management to evaluate risk mitigation strategies against objectives and budget. Before designing quality assurance sampling and testing approaches, the risk assessment step should be conducted.

2.3.2 Activity description

2.3.2.1 Review of project goals and requirements [Review the Requirements]

Prior to commencing the risk identification and assessment, the quality team should review the project scope, goals and requirements to confirm that they are vetted with the proper stakeholders and are documented. Project scope, goals and requirements will inform the quality team of the purpose of the project. This provides the quality team with the proper context to understand what would represent a risk to the project. Without this knowledge of project goals and requirements, the quality team could not accurately identify potential project risks.

- Review the project Scope, goal, and detailed requirements that make up the goal. It is important that project management, QA, and stakeholders have a clear and consistent understanding of the parameters of the project. **The overall project goal provides the baseline to assess all project activities. The question asked repeatedly is: how does the activity under review help (or hinder) successful completion of the project goal.** [Review Scope and Goals]
- Review the stakeholder matrix and assess whether all required or recommended stakeholders have been consulted on the scope, goals and requirements. It is important to be sure that the relevant Subject Matter Specialists have contributed their knowledge and experience. [Review Stakeholder Matrix]
- Review the assessment of the impact that the project's output will have on the operational process. Seek to understand which project deliverables are critical to the future state operational processes. [Review Future State Processes]

2.3.2.2 Review of project processes

Prior to commencing the risk assessment, the quality team should confirm that project execution processes have been defined and documented. These processes explain how the project team will achieve the purpose of the project. In a data migration project, execution process could explain how the team will retrieve documents in the field, code them into a database, and upload data into a system. The execution processes allow the quality team to identify existing control points and determine the risk areas. The following outputs are expected from this portion of the risk assessment:

- Understanding of the sequential activities and tasks that the project team will utilize to accomplish the project's objectives.
- Understanding of where in the sequential activities the project outputs will be completed. Some outputs will be completed in earlier tasks, allowing for potential quality testing early in the process.
- Understanding of the particular tasks that lead to completion of a particular project output.
- Understanding of which project team resources will perform each of the tasks in project execution.

2.3.2.3 Review of project process success criteria

Prior to commencing the risk assessment, the quality team should review the project success criteria. The project success criteria define how to measure whether project objectives or goals were met. For example, the project objective could be to digitize a specific physical asset record. In this example, one project success criteria could be the accuracy of how data from that physical asset record is coded into a system. The project success criteria guide the quality team on how to prioritize risks to project objectives in the risk register. The following are outputs expected from this portion of the risk assessment:

- List of vetted process success criteria signed off and reviewed with project management and process owners.
- Understanding of how the team will define when an output has met the success criteria.
- Understanding of how the project will define, capture, and report the portions of assumptions or success criteria that the project discovers cannot be met.

See Review of Success Criteria Example [ex.]

2.3.2.4 Risk categorization

Using the project success criteria, the quality team should identify the high level buckets of risks to meeting project objectives. Project success criteria will determine the specific measures of project success, such as how accurately data should be coded into a system. Using these success criteria, the quality team, in this scenario, should identify that accuracy is a risk category. After identifying all risk categories, such as accuracy or completeness, the quality team should walk through the project execution process and identify opportunities for error in that specific risk category. The following are outputs expected of this portion of the risk assessment:

- List of vetted risk categories signed off and reviewed with project management.
- List of error opportunities for each high level risk category vetted by project team. These risk opportunities should be aligned to specific project deliverables and should be targeted at specific steps in the project execution process where the risk is expected to occur.

See Risk Categorization Example [ex.]

2.3.2.5 Review of project controls and QC check procedures

After the quality team reviews the requirements, success criteria, and overarching policies, the team should evaluate the project execution processes. This evaluation should identify existing **process control points** [def] and QC procedures. Process control points are checks within the project execution process performed by project execution team members that drive quality within the execution process. For example, if part of the execution process is to scan a document, a second project resource may confirm the quality of the initial scan. This secondary review by a project resource represents a control point. The quality team should review all existing control points and any potential gaps within the execution processes. The quality team's risk assessment needs to consider the existing control points against the project success criteria. The following are outputs expected of this portion of the risk assessment:

- List of vetted process control points in the project execution process. This should / could correspond to the process map (or equivalent process description).
- A description of the risks that the control points expect to mitigate.
- A QA / project management joint assessment of potential gaps in control points for the execution process based on risk categories and project success criteria. These potential gaps should be entered into the project risk register, and should

be mitigated with a process change, a control point insertion, and QA testing where appropriate.

2.3.2.6 Assess and report risk and gaps in processes and activities

Based upon the review of the project execution process controls and gaps, the quality team should comprehensively identify risks that could impact project objectives. The defined project success criteria and risk categories should guide the quality team to identify risks. The success criteria will also allow the quality team to prioritize all risks in a documented risk register. The quality team should review this risk register frequently with project management over the course of the project. The following are outputs expected for this portion of the risk assessment:

- Risk Register comprehensively identifying risks to meeting project objectives (signed off by project management).
- Prioritization methodology for risk register based on project success criteria.
- Mitigation plans for project risks.
- **Residual Project risks** not covered by QA or QC testing. Residual Project risks are risks to the project that are not mitigated by process, QC or QA activities. These risks should be understood by project leadership and QA team members, and revisited throughout the project lifecycle in order to detect and monitor Some examples of residual risks could be:
  - **Inherent risk** [def.]
  - **Control risk** [def.]
  - **Detection risk** [def.]

3 Phase 3: Design Quality Testing [Previous Phase] [Next Phase]

3.1 Review QC Test Procedures [Next Step]

3.1.1 Step description

One potential outcome of the QA risk assessment could be the need to design and implement additional QC procedures, or the need to modify existing QC procedures to mitigate risks. QC procedures should be designed as an integral part of the project process, and can either be a 100% check or a sample check, depending on the type of risk encountered.

Step Sequence: QC Test procedures should be refined or implemented after the QA risk assessment has been performed and reviewed by project QA representative(s) and project management.

QA Purpose: The purpose of the refinement or implementation of QC procedures is to place checks on the process in the most reasonable step to help enable a first pass correct output. This should lead to an efficient production process and avoid costly re work activities. QC testing and metrics also give project management near real-time information on the health of the process and the overall quality of the process output. QC control points are also an efficient way to monitor the impact of a process change, and to assess process consistency.

3.1.2 Activity description

3.1.2.1 Designing QC into the process

A process design and implementation typically involves a single or a series of quality control "check" steps to be sure that the output meets the requirements. These QC steps are integral to the process and represent a final step before the product is finished. The purpose of this step is to identify nonconformances to the product as soon as possible in

order to make the necessary changes to the process to prevent an excessive amount of re work. The focus of QC is on **correction and prevention**, not just testing and results. The closer the QC activities are to the work being performed the better. A quick feedback loop to the process execution people helps ensure that mistakes or process errors are caught as quickly as possible. The QC function should collect and share metrics to be sure that other areas of a process are aware of error trends so that errors can be avoided.

In field retrieval or data coding teams are spread across the service area doing similar work in different locations. As such, it is easy for one team to learn of and mitigate a source of errors, while the other teams will not realize that the error has occurred or that there is a fix for it. Regular communication of QC results and corrective actions will help keep errors from propagating.

3.1.2.2 100% check or sample

A question often posed to QC activities is "should we look at everything or sample?" The answer to this question depends on the risk the error causes if it is not found and corrected. A way to ask this question could be: "Is it OK if this error is not caught and makes it through into the system of record. If so, how many errors of this type are too many?" Some processes contain information so sensitive that no error is acceptable (MAOP calculation) so the work product undergoes a 100% check. On other activities, the likelihood of an error could be so small, and the impact slight as to alleviate the need to check every single product. In this case, a sampling of the process to ensure that the error rate remains below a desired threshold would be sufficient.

3.1.2.3 Differentiation of errors and defects

A process can produce different types of errors, so how do we differentiate between them. Are all errors equally bad? **To answer this question focus on the impact that the error has on the downstream or final product**. A single small error could render the product completely unusable, while a series of errors could be costly but not have an impact on the final product. The two terms generally used to describe this are Defects vs Defective.

Defective - A defective product contains a flaw that prevents it from achieving its intended purpose. A unit of product or service containing at least one defect, or having several imperfections that in combination cause the unit not to satisfy intended normal, or reasonably foreseeable, usage requirements is defective. "Defective" is appropriate or used when a unit of product/service is evaluated in terms of usage (as contrasted to conformance to specifications). An example would be if an iPhone contains an error that will not allow it to power up. The product is not usable.

Defects - A product with a defect has a nonconformity or deviation from a standard or specification. A defect will be considered an "imperfection" that does not affect the product's ability to meet the ultimate usage requirement (e.g. to serve as a basis for MAOP calculation). An example would be if an iPhone were painted the wrong color, or if the paint were scratched. While the product might need to be repainted, the paint color does not affect its ability to power up and make a phone call.

Acceptable Quality Levels (AQL) AQL is the quality level that is the limit of a satisfactory process average. Satisfactory process average can be established using avg % defective or avg defects / 100 units. An example of this would be: how many iPhone errors are acceptable before a process change (and $ investment) would be required?

3.2 Determination of project sampling approach [Back to Phase]

[Previous Step] [Next Step]

3.2.1 Step description

The discussion on sampling is meant to communicate a process that can be used to sample test, but is not meant to be prescriptive to every scenario. The project and QA team should decide on a sampling approach that fits the particular project in question.

Step Sequence: The sampling approach should be decided upon during the design and implementation of QC (and potentially QA) procedures.

QA Purpose: The sampling approach enables the QA team to test and evaluate more areas of the project with fewer resources. It provides a "snapshot" look at process output to gain insight into the entire output population. Sampling also provides a look into how closely the process output matches the requirements. It allows management to prioritize oversight activities onto the areas where the greatest risk is, while monitoring the areas of lower risk.

Sampling should be used when it does not make business sense to perform 100% testing on a particular output. This business decision could stem from a few reasons:

- The process in question has a history of stable, consistent output within the AQL
- The population in question is too large to be tested 100%

3.2.2 Activity description

3.2.2.1 Sampling Approach - attributes vs. variable sampling

Inspection by Attributes - Inspection by attributes determines whether a unit of product is classified simply as defective or non-defective with respect to a given set of requirements. The item tested is determined to be either right or wrong, good or bad.

A variable sampling plan determines how good or bad, what degree right or wrong an item is.

On data migration projects, a record, or a field in a record is treated as either right or wrong based on a given set of criteria. For instance, if a record in SAP should contain data that matches a hardcopy record, and it doesn't, then that record is determined to contain an error. We generally do not assess to what degree the information was wrong, just whether it was wrong or not.

To determine the sampling and inspection plan for a data migration project, complete the following steps:

- Decide what attributes to test (what errors to protect ourselves from)
- Decide how those errors will be defined
- Decide what level of confidence and precision we are comfortable with to determine the sample size to be tested
- Ensure randomness both in products and attributes tested (randomly select which attribute within the selected item will be tested, as necessary dependent on risk)

3.2.2.2 Representative samples

The QA team uses a sample calculator in an excel worksheet that is set to determine a representative sample size for a population for a given error rate. The sheet is formulated for a 95% confidence level. In the example below, for a population of 3600 items, and an estimated error rate of 5%, the appropriate representative sample size would be 111. If after testing the actual error rate is greater than 5%, then 111 would not be representative. If the observed error rate was 9%, then the sample should be 187. One

would have to test a total of 187 AND see an error rate of <= 9% in order to have a representative sample.

Attributes Sample Sizes (non-stratified)

Population Size	3,600
ConfidenceLevel	95%

Expected Occurrence Rate of an Attribute	DesiredPrecisionLevel														
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
1%	345	93	42	24	16	11	8	6	5	4	4	3	3	2	2
2%	623	179	82	47	30	21	16	12	10	8	7	6	5	4	4
3%	854	260	121	69	45	31	23	18	14	12	10	8	7	6	5
4%	1,047	335	157	90	59	41	30	23	19	15	13	11	9	8	7
5%	1,212	405	192	111	72	50	37	29	23	19	16	13	11	10	9
6%	1,353	471	226	131	85	60	44	34	27	22	18	15	13	12	10
7%	1,476	533	259	150	98	69	51	39	31	25	21	18	15	13	12
8%	1,584	591	290	169	110	77	57	44	35	29	24	20	17	15	13
9%	1,680	646	319	187	122	86	64	49	39	32	26	22	19	16	14
10%	1,764	698	348	204	134	94	70	54	43	35	29	24	21	18	16
11%	1,840	746	375	221	145	102	76	58	46	38	31	26	23	20	17
12%	1,908	792	401	237	156	110	81	63	50	41	34	28	24	21	18
13%	1,969	835	426	253	166	117	87	67	53	43	36	30	26	23	20
14%	2,025	876	450	268	177	125	93	71	57	46	38	32	28	24	21
15%	2,076	914	473	283	186	132	98	75	60	49	41	34	29	25	22

3.2.2.3 Confidence and precision

Confidence can be described as how many times out of 100 can one expect a given result. Precision can be described as how tightly the results are clustered around a given value or point. An observed error rate of 4% based on 95% confidence with +/-2% precision would mean that if a population were tested 100 times, then the observed error rate would fall between 2% and 6% 95 out of 100 times.

3.2.2.4 Assumed error rates

When assuming an error rate, use judgement based on how mature the process is. It is OK to start with 5% or less, just be prepared to test more (if the observed error rate is above the estimated error rate) in order to have a set of valid results.

3.2.2.5 Calculating the sample

For an example of how to pull a sample see: Test Sample Creation [ex.]

3.3 Determine QA testing approach [Back to Phase] [Previous Step] [Next Step]

3.3.1 Step description

The QA testing approach should be designed to augment the QC testing and procedures. In a mature process, the QC procedures embedded in each process would provide the necessary protection from process errors, and QA testing would serve as an independent verification of the effectiveness of those QC procedures.

In some occasions, management could decide to perform independent QA testing on a process that does not have QC embedded, in order to determine the error rate and the associated risks.

Step Sequence: QA testing should be designed and implemented after the assessment of and implementation of the QC testing.

QA Purpose: QA testing should augment QC testing and oversight. In a mature process, QA testing should serve to "validate" the results management sees from the QC metrics. QA testing should validate or disprove the following assumptions:

- The process produces a consistent outcome
- The outcome achieves a consistent level of quality

- The level of quality achieved is acceptable to the business
- The results of quality testing can be independently repeated and verified

3.3.2 Activity description

3.3.2.1 Independent QA testing vs. QA oversight sample testing

Depending on the needs of the process, one can choose to either perform sample testing on the QC tests, or perform QA testing that is independent of the QC process. A good example of this choice could be within a data coding process. The process involves transcribing information from a scanned image into a database. The QC process involves a 100% check of the database against the source image. An option for QA testing could be to perform an identical test on a sample of the completed product to verify the QC testing results. This serves to validate the results that already exist from the QC test. However, the QA team could choose to perform a different test if the team feels there might be a risk that exists. An example of this could be if the QC results show a large percentage of errors in one field of data, QA could choose to pull a new, larger sample of the single data field and check the accuracy across a wider population of source documents. This would serve to shed more insight into whether the abnormally high error rate is prevalent across the rest of the population.

The re-performance of the QC test (QA oversight testing) in this example above simply serves to validate an existing set of QC quality metrics, and is typically performed on a cadence (weekly, monthly) on a process that is mature.

The independent QA test (the new, larger sample of a single data field) described in the example above serves to validate that the process is producing within acceptable quality levels, and is generally an event driven test to provide insight into a specific risk scenario. This generally happens during process implementation, or following a process change.

3.4 QA test design [Back to Phase] [Previous Step]

3.4.1 Step description

The design of a QA test should begin with the definition of the process output success criteria and consider the process risks articulated in the QA risk assessment. The QA test should serve to test the process output and provides insight into whether or not the process risks have been mitigated. The design of a QA test comes after the determination of the appropriate QA test approach. Design of a QA test generally follows the process described below:

- Define the step in the process where a requirement is met (or accomplished).
- Use the success criteria to establish a baseline for grading the degree the output matches the requirements.
- Define how the process output will be assessed against the success criteria.
- Define the steps for pulling samples.
- Define steps for conducting the test.
- Define the protocol for sharing and validating results with process owners.
- Define the process for reporting results and assessing the "health" of the process.

Step Sequence: QA test design should follow the QA risk assessment and should be accomplished during the "pilot" phase of process implementation (if possible).

QA Purpose: The QA test design is the point in the QA process where the prerequisites, success criteria, and QA risk assessment come together into a detailed testing process to systematically assess defects / defective outputs and to provide management transparency into project process performance. It answers the following question for management: **Does the process output population meet the established success criteria? If not, what are the nonconformities?**

The answer to these two questions equips management with the information to make business decisions based on known criteria instead of assumed values.

3.4.2 Activity description

3.4.2.1 Process deliverables

QA test design begins with locating the point in the process where a certain deliverable requirement is met. The QA test designer should seek the point in a process beyond which no more modifications to a process output occurs. If a process output is modified beyond its intended point of completion, then a QA test performed "upstream" of that point could miss errors created downstream of that point.

3.4.2.2 Success criteria and "grading criteria"

A QA test should be designed to focus on a particular set of criteria that are accomplished at a particular point in a process. At the point of completion, the QA tester should subject the process output to a predetermined set of "grading criteria" based on the success criteria outlined in the project (and process) scope definition. It is important to note that one of the most common challenges to the results of quality testing is the claim that the tester was using the wrong "grading criteria." It is therefore especially important that the grading criteria be understood by both QA and project management, so that results can be assessed effectively.

3.4.2.3 Sample selection

The samples to be tested should be pulled at the point in the process after which no further modification is to occur on the process deliverable. Samples should be random, and the sampling cadence should align with the process production cadence. For example, if a process produces 10 deliverables a week, it may be OK to sample once every two weeks.

3.4.2.4 Transparency of test procedures

The activity related to pulling the sample, testing the sample, and recording the results should be transparent to the process owner. The QA tester must be prepared to demonstrate the steps in the QA testing process in order to gain and maintain the trust of the process owners and management. Design test steps to follow a logical progression towards a comparison of the sample output against the established success criteria.

3.4.2.5 Test results

Testing results should be collected in a format to allow for data analysis, data integrity validation, and data archiving. Expect to keep a cumulative account of all testing results to refer to throughout the process execution. A database could provide robust control of the results collection. If an excel spreadsheet is used, be sure to archive the results after every test session.

4 Phase 4: Perform Quality Testing [Back to Table of Contents][Previous Phase]

4.1 Plan and schedule testing [Next Step]

4.1.1 Step description

This step involves developing an overall schedule as well as a tactical plan for conducting QA testing. The QA test schedule should be developed based on the testing frequency agreed in the QA test design. The test planning involves logistical and process coordination necessary prior to conducting actual QA testing.

The overall QA schedule should be developed in collaboration with the project team to ensure minimal productivity impact to other project and QC processes, and to ensure availability of key contributors and resources during QA testing. The plan and schedule should be communicated to and approved by the appropriate project stakeholders.

Step sequence: It is necessary to understand the QA design and objectives prior to planning and development of a test schedule. As a result, this step should occur after the QA design has been reviewed and approved by the project Stakeholders and approvers.

QA purpose: The objective of QA testing execution is to measure the quality of project process deliverables/outputs based on the project requirements and established success criteria. The QA test planning and scheduling steps are essential to ensuring that all parties involved understand both the frequency of testing and the activities to be performed during testing.

4.1.2 Activity description

4.1.2.1 Schedule test activities

This step includes two components: the overall QA testing schedule as compared to the project schedule, and the schedule of activities for each individual test. In both cases, it is essential for the QA team to closely coordinate the QA schedule with the project schedule.

The overall schedule may be developed as part of the planning process based on the frequency agreed by the project team. For instance, if the retrieval activities are expected to occur over a period of six months, the decision may be to conduct a monthly QA or a weekly QA on a sample of completed retrieval activities over each month or week during the six-month period. In this case, a high-level QA schedule can be developed against a project schedule.

Each of these individual tests, (i.e. the monthly or the weekly tests mentioned above) would then be more closely coordinated with the **process lead** [def.] on a month by month, or week by week basis, as required.

It may be worthwhile to establish the end-to-end components of a periodic test cycle during this step. For example, if the tests are conducted weekly, then a schedule of the weekly QA testing may involve the following steps to be repeated through the duration of the QA testing schedule:

- Day 1 – Select site and coordinate testing activities
- Day 2 – Conduct Testing
- Day 3 – Analyze, document and distribute results, summary observations, and findings
- Day 5 – Review results with process owner and project team. Implement agreed corrective actions and recommendations.

4.1.2.2 Coordinate with process owners

Once the overall QA testing schedule has been established, the planning for each of the individual tests needs to be coordinated closely with each of the process owners (i.e. monthly, weekly, daily, etc.). Since the QA testing is independent, involvement of the process owner will enable:

- Site selection (in case of field visit), access and other logistics such as parking, workspace, etc.
- Communication and collaboration with **impacted teams** [def.]

- Access to and availability of appropriate personnel during site visits (ex: mapper, site supervisor)
- Access to appropriate information systems, network files and physical files

4.1.2.3 Prepare testing materials

This step ensures that the tools needed for testing have been prepared in advance, including the following:

- Detailed QA test plan, procedure and check list that will be followed when conducting testing
- List/record of test sample
- Reference materials

See Prepare Testing Materials Example [ex:]

4.1.2.4 Communicate testing plan

The overall test plan should be communicated to the entire (project) team involved in the QA testing process. This communication will generally occur through and will be coordinated by the process owner.

For the weekly / monthly QA tests, an initial communication to the impacted team should occur via the process owner. The QA team resources may communicate directly with the project resources involved in the QA testing process once the process owner has initiated an initial communication.

4.2 Perform testing [Back to Phase] [Previous Step] [Next Step]

4.2.1 Step description

This step involves the execution of the QA testing per plan and includes actual testing conducted per the procedures outlined in the QA design/plan.

Step sequence: The QA testing should begin after the QA plan has been approved by the project leadership and communicated to the QA testing participants from the project team. The QA team also needs to be trained on project background, QA plan, relevant project information systems and all project processes related to QA testing prior to beginning all testing.

QA purpose: QA testing enables measurement of actual project outputs against project requirements and established success criteria. Results will confirm the quality of project deliverables and/or enable recommendations for further quality improvements.

4.2.2 Activity description

4.2.2.1 Select and pull sample

For each scheduled QA test, the test sample is calculated using an Excel based statistical calculator, and selected from the population of total process output. The selection can be made randomly out of the entire available population, or it can be pulled from a subgroup within the population.

See Select and Pull Samples Example [ex:]

4.2.2.2 Perform test

After the sample is selected, the QA team will measure this sample of actual project outputs against project requirements and the established success criteria. QA test

performance procedures and examples have been provided for the three key data migration processes: 1) Field Retrieval, 2) Document Coding, and 3) Data Migration.

See Perform Test Example [ex:]

4.2.2.3 Flag non-conformances and "secondary review" items

After performance of the QA test, the QA team will identify items where the QA tester has questions or where the test records are unclear. These items are flagged for "secondary review" with **subject matter specialist (SMS)** [def.]. The review with the SMS provides an opportunity to clarify questions on one-off issues.

See Flag Non-Conformances and Secondary Review Items Example [ex:]

4.2.2.4 Research anomalies (as required) (can this be combined with the above)

4.3 AQL, metrics and trending

[Back to Phase] [Previous Step] [Next Step]

4.3.1 Step description

This step involves summarizing results to create metrics, and ongoing analysis and trending of test results.

Step sequence: This step begins with and occurs through-out the duration of QA testing. Result metrics are created after each test cycle. Trends are continuously observed from period to period, and since the inception of the test cycle.

QA purpose: Metrics and trending provide a basis for quantitative comparison of project output against the established success criteria.

4.3.2 Activity description

4.3.2.1 Charting results

Results are charted through-out the test cycle. These may be recorded in an excel spreadsheet. Cumulative data is maintained so that weekly, quarterly and annual snap shots may be provided for trending and analysis.

4.3.2.2 Analyzing trends

Test results from each individual test cycle may undergo **root cause analysis** [def.]. Cumulative test results may also be reviewed on a periodic basis to understand overall trends such as repeated errors by a specific retrieval team or resource, unfound jobs at specific sites due to poor record maintenance or other unknown factors.

4.4 Reporting and corrective actions

[Back to Phase][Previous Step] [Next Step]

4.4.1 Step description

This step provides the opportunity to record, communicate and agree on the test results with the process owner and teams. It also provides opportunity to provide corrective actions and/or recommendations for process improvement.

Step sequence: Results are created and reported at the conclusion of each test cycle. Corrective actions are recommended and agreed to during the review and presentation of test results to the process owner and team.

QA purpose: This step adds value to the process deliverables by ensuring their compliance against project requirements. It catches any discrepancies and provides opportunities to

implement corrective actions to bring the quality of process output within established success criteria.

4.4.2 Activity description

4.4.2.1 Verifying results with process owner

The QA results are documented in a cumulative database (or excel spreadsheets). An ongoing summary dashboard can be created for a preliminary results discussion. This provides an opportunity for the process owner to understand the source and frequency of errors, as well as an opportunity to reconcile any disagreements associated with the findings.

The process owner is also able to provide a SMS perspective for any anomalies or records tagged for secondary review. Finally, they have an opportunity to discuss and implement a corrective action or improvement plan.

4.4.2.2 Sharing results with project management

A managerial summary of the final results agreed with the process owner and team should be presented to the project management team on a periodic basis to keep them abreast of the quality of process outputs and alert them on any needed process improvements.

4.4.2.3 Interpreting results

The QA plan establishes the success criteria and acceptable error rates. The test results are interpreted against these established and approved criteria. Results or trends negatively surpassing the established criteria call for management action and require in-depth analysis.

4.4.2.4 Recommending corrective actions

Corrective actions are recommended based on findings after each test cycle. This may include process and/or approach improvements. These are recommended with the test results and agreed to during the results review.

4.4.2.5 Corrective action follow up

Agreed corrective actions should be logged in an **corrective action log** [def.], and should be periodically followed-up based on the established resolution dates. Periodic updates on action progress may be reported on the ongoing results summaries.

4.5 Archiving QA documents and records [Back to Phase] [Previous Step]

4.5.1 Step description

This step identifies the various QA documents and outlines the process for archiving records.

Step sequence: This step occurs after the conclusion of each individual QA test cycle and at the conclusion of all QA activities.

QA purpose: Traceability is a key component of a QA plan. This step ensures traceability of all the data and records that were utilized for QA testing. It establishes a single, traceable repository/archival of all test and source data utilized during the QA testing.

4.5.2 Activity description

4.5.2.1 Archiving procedures

This involves archiving of all test and source data and includes: population lists for each test cycle, lists of test samples, detailed results logs, results summaries and dashboards, corrective actions logs, process documents and check lists.

Generally, a folder for each of the record elements is created in a shared area (ex: SharePoint, network folder, etc.) Each of the record elements is archived in its respective folder at the conclusion of each test cycle such that a complete list of records for the full QA testing duration can be found at the single designated shared location at the conclusion of all QA activities.

4.5.2.2 Archiving testing results

Test results for each individual test should be archived on the appropriate Sharepoint site. Do not archive results on the U drive if at all possible.

4.5.2.3 Archiving corrective actions

Corrective actions should be logged and should be tracked and closed out. The record should be retained on a Sharepoint site. If similar projects start at a later date, results and corrective actions from similar previous projects should be reviewed in order to avoid repeating the same mistakes.

Appendix

Definitions [Back to Table of Contents]

Project Management Team

For AKM organization data and document migration initiatives, the project management team is the group assigned to plan and execute the project. Can be both PG&E employees and contract employees.

Data and Migration Projects

Projects or initiatives in the AKM organization whose purpose is to discover, collect, analyze, prepare, correct, and/or upload data, documents or scanned images into a PG&E system of record

QA Team

AKM organizational team with the responsibility for planning and performing Quality Assurance activities and objectives for AKM initiatives and projects

Future State Operational Processes

The “to be” state of a PG&E operational process after a modification or improvement activity

Stakeholder Matrix

A listing of personnel responsible for particular project. Commonly depicted as a RACI chart (Responsible, Accountable, Consulted, Informed). It can be specific to person or organization

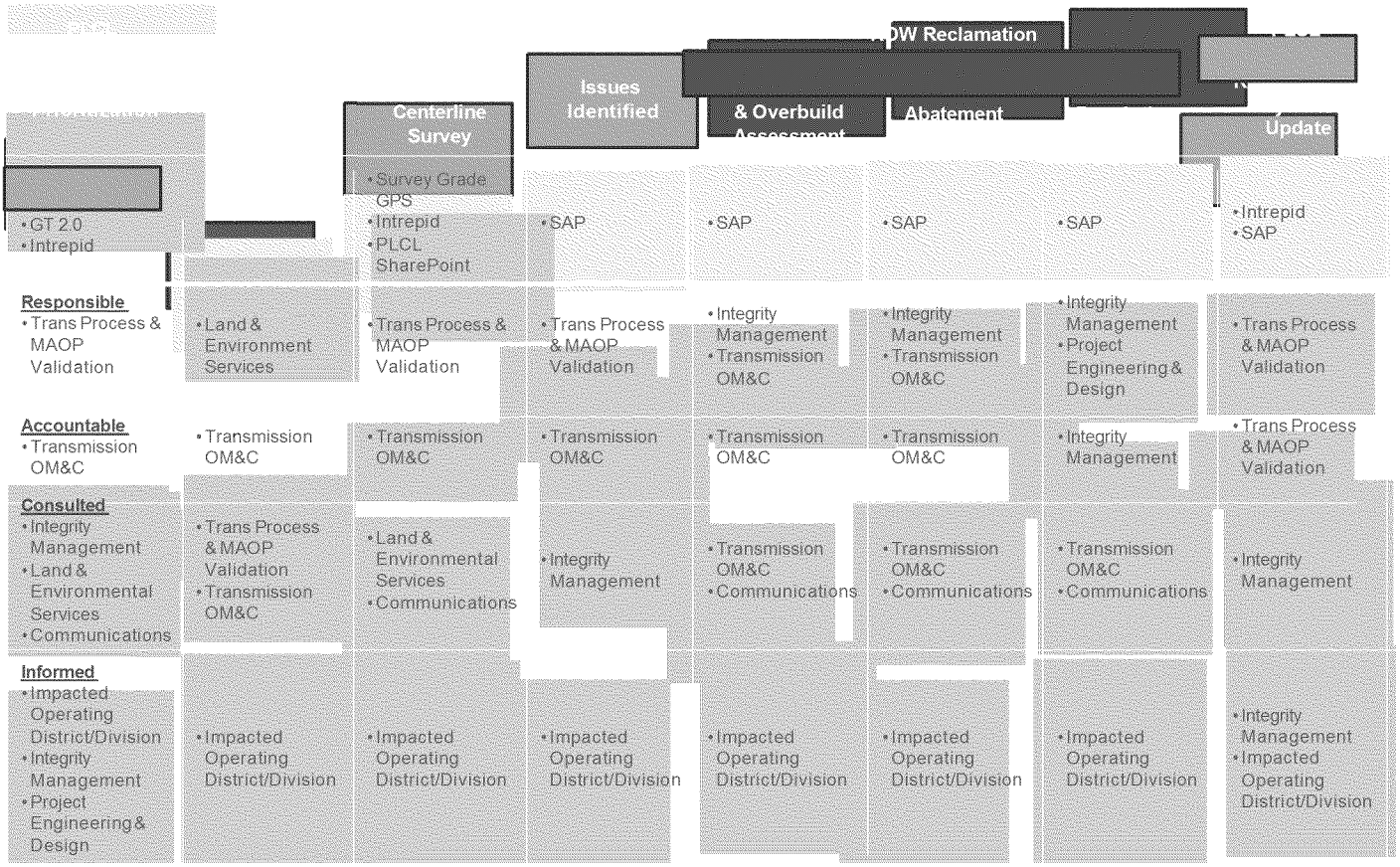


Exhibit 7. Stakeholder Matrix

Data Retrieval Processes

The process to pull data from a PG&E system in a field office or other location. This could be collection of physical hard copy records, or an extract from a system or database.

Data Reconciliation Process(es)

The process to analyze, prioritize, and accuracy check data that has been collected and prepared for upload into a system. Data should be checked for formatting, duplication, consistency, and compliance with the stated objectives of the project

Data Upload Process(es)

Upload of collected and reconciled data into the permanent system of record for operational use

Prioritized Risk Register

A register of project process risk, prioritized according to potential impact. This is an output of the Risk Assess phase, and should be updated as risks are mitigated or realized throughout the project execution

Process Control Points

Steps in a process where a particular requirement of a process output is tested for adherence to stated requirements. An example could be: field retrieval is complete and list of retrieved documents has been produced. The control point would be to review the list of collected documents to be sure all information is filled out, and spot check the documents to be sure that the documents listed on the list have actually been scanned

Inherent Risk

Risks that are unknown to the project and QA team. These are usually discovered during the project execution phase and require immediate responses and corrective action to mitigate. An example could be the discovery of an off-line process used by one of the field offices to store data

and information. This offline process poses a risk that the data collected will be not be complete and traceable.

Control Risk

Risks that the checks and controls in the process fail to identify and correct a defect in time to mitigate its effect on the final product. The project team should strive to keep control risk to a minimum.

Detection Risk

Risks that errors will go undetected either from inadequate sampling techniques or human errors. The team should ensure that the sample is representative of the population being tested, and that critical points in the process receive the proper oversight and confirmation.

Process Lead

In charge of the day to day execution of the process being tested.

Impacted Teams

The teams that will have to accommodate the QA testers into their daily work schedule if required.

Subject Matter Specialists (SMS)

Person with particular expertise concerning the process being tested. This person would help add clarity to test results by communicating how an error would impact the project process and the operational process.

Root Cause Analysis

An analysis of the underlying causes of a particular process error. Typically accomplished by reviewing the activities in the process steps preceding the occurrence of an error to find where the underlying cause of the error originates.

Corrective Action Log

A log of agreed corrective actions and their resolution

Examples [Back to Table of Contents]

Phase 1

1.21 Map Example (from MAOP Doc typing)

Image 1

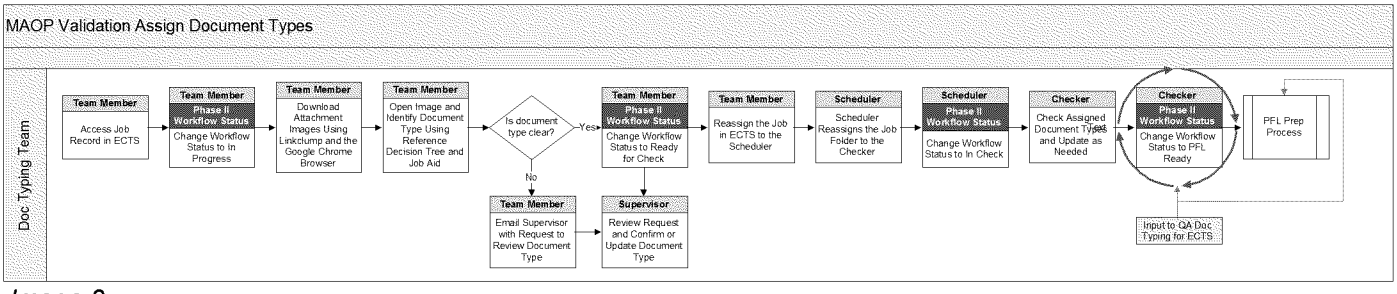
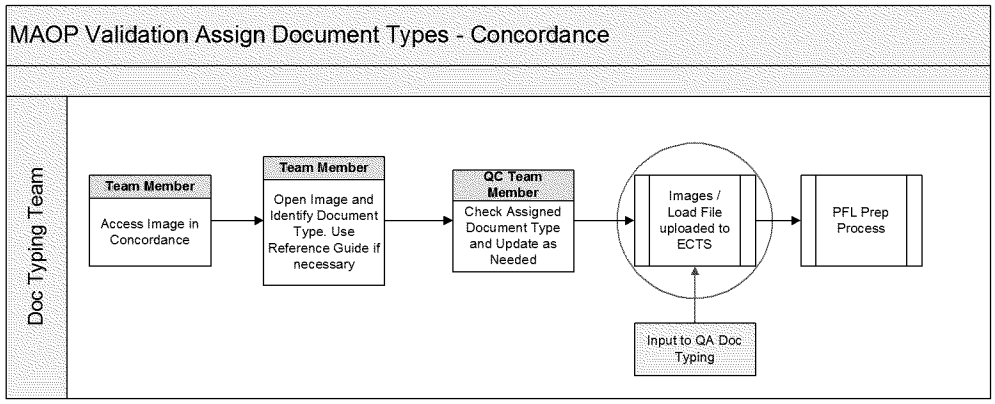


Image 2



Phase 2

2.21 Policies and Standards

Example: The *Project* team must extract data from a form with 7 distinct data fields and upload the data into SAP. The project team determines that the future state process only requires 6 of the data fields to be uploaded. The question of whether or not these 6 fields meet all the regulatory and operational requirements should be answered by the cross functional project team, and should be a basis for a project requirement. The QA team should not be tasked with determining whether an operational process change meets regulatory compliance responsibilities, but should instead require that the project team has ensured that the project requirements have been vetted by the appropriate regulatory requirements Subject Matter Specialist. The QA team is responsible for designing a testing and sampling approach that conforms to proper industry QA standards.

2.3.2.3 Review of Success Criteria (add)

Example: the project may assume that all required data for upload is contained in the IGIS database. Upon further review, it could be discovered that some of the required data is not actually available in IGIS. This represents a project assumption that was proven invalid by the actual project experience. When this happens, the project should be prepared to capture this exception to the requirements and success criteria and communicate to management.

2.3.2.4 Risk Categorization

For AKM Data Migration projects three main categories of risks are:

- Complete- Is the data set to be uploaded complete per the project scope and requirements?
- Accurate – Does the data set contain accurate information that conforms to project scope and requirements?
- Verifiable – Does a document trail exist from source to system that allows the data to be verified by an independent third party?

Phase 3

3.2.2.5 Calculating the Sample (add)

CREATING THE TEST SAMPLE:

1. Retrieve all items (data or files) to be grouped together as a single set of population data. Consolidate all into a single file so that it serves as a single source of population data set for a given period.
2. Create a column labelled Random1. Randomize the population data set using the excel *'Random'* function in this column. The command for the random function is "=rand()". Create an additional data column called Random1 next to the population set and use the Excel random function to assign a random number to each line item in the population. Then create a new column next to Random1 labelled Random2 and copy/**paste the randomized fields as values** in this column for each line item. Since the *'Random'* function creates dynamic values, pasting the data as values prevents continuous randomization of the data. Delete the Random 1 column after the values have been pasted in Random 2 column.
3. Sort the population data set by the Random2 column, lowest to highest.
4. Calculate the sample size for each document type using the statistical tool. To do this, paste the total count in the population in the *'population size' field* in the statistical tool. The tool calculates the sample size based on the population size (total count of a given value), desired precision level and expected error rate.

Attributes Sample Sizes (non-stratified)

Population Size	3,600
ConfidenceLevel	95%

Expected Occurrence Rate of an Attribute	Desired Precision Level														
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
1%	345	93	42	24	16	11	8	6	5	4	4	3	3	2	2
2%	623	179	82	47	30	21	16	12	10	8	7	6	5	4	4
3%	854	260	121	69	45	31	23	18	14	12	10	8	7	6	5
4%	1,047	335	157	90	59	41	30	23	19	15	13	11	9	8	7
5%	1,212	405	192	111	72	50	37	29	23	19	16	13	11	10	9
6%	1,353	471	226	131	85	60	44	34	27	22	18	15	13	12	10
7%	1,476	533	259	150	98	69	51	39	31	25	21	18	15	13	12
8%	1,584	591	290	169	110	77	57	44	35	29	24	20	17	15	13
9%	1,680	646	319	187	122	86	64	49	39	32	26	22	19	16	14
10%	1,764	698	348	204	134	94	70	54	43	35	29	24	21	18	16
11%	1,840	746	375	221	145	102	76	58	46	38	31	26	23	20	17
12%	1,908	792	401	237	156	110	81	63	50	41	34	28	24	21	18
13%	1,969	835	426	253	166	117	87	67	53	43	36	30	26	23	20
14%	2,025	876	450	268	177	125	93	71	57	46	38	32	28	24	21
15%	2,076	914	473	283	186	132	98	75	60	49	41	34	29	25	22

This calculator will give the appropriate sample for an expected error rate (left column) and a desired precision level (top row) at a 95% confidence level. This calculator works only for the 95% confidence level.

This example shows a highlighted box that represents the appropriate sample size for a population of 3,600 items with an expected error rate of 5%, and a desired precision of +/- 4%. **In order to pull the sample, select the first 111 items from the list sorted in step 3 above and perform the QA test on those items.** Enter (or paste) these items into the test file.

After testing the 111 items, if the observed error rate is <=5%, we can say with 95% confidence that the sample of 111 is representative of the entire population of 3,600 items with +/-4% precision. For example if the observed sample error rate = 4.5%, we can reasonably expect the error rate within the entire population to be 4.5% +/- 4%. Another way to say this could be: If we perform 100 sample tests on the entire population, 95 of those tests will return an error rate between 1% and 9%. The population of 3,600 could contain as few as 36 errors (1%), or as many as 324 errors (9%). It would be a management decision on whether or not that range of observed error rates is acceptable.

If however the observed error rate turns out to be 7%, then we would need to increase our sample size by moving down the same +/-4% column in the spreadsheet to the 7% error rate

row. In this scenario we would need to test a total of 150 items (7% error rate on the left column at +/-4% precision on the top column), AND still see an observed error rate of <=7% in order to be 95% confident that the 7% error rate is representative of the population of 3,600 items.

Attributes Sample Sizes (non-stratified)

Population Size	3,600
ConfidenceLevel	95%

Expected Occurrence Rate of an Attribute	DesiredPrecisionLevel														
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%
1%	345	93	42	24	16	11	8	6	5	4	4	3	3	2	2
2%	623	179	82	47	30	21	16	12	10	8	7	6	5	4	4
3%	854	260	121	69	45	31	23	18	14	12	10	8	7	6	5
4%	1,047	335	157	90	59	41	30	23	19	15	13	11	9	8	7
5%	1,212	405	192	111	72	50	37	29	23	19	16	13	11	10	9
6%	1,353	471	226	131	85	60	44	34	27	22	18	15	13	12	10
7%	1,476	533	259	150	98	69	51	39	31	25	21	18	15	13	12
8%	1,584	591	290	169	110	77	57	44	35	29	24	20	17	15	13
9%	1,680	646	319	187	122	86	64	49	39	32	26	22	19	16	14
10%	1,764	698	348	204	134	94	70	54	43	35	29	24	21	18	16
11%	1,840	746	375	221	145	102	76	58	46	38	31	26	23	20	17
12%	1,908	792	401	237	156	110	81	63	50	41	34	28	24	21	18
13%	1,969	835	426	253	166	117	87	67	53	43	36	30	26	23	20
14%	2,025	876	450	268	177	125	93	71	57	46	38	32	28	24	21
15%	2,076	914	473	283	186	132	98	75	60	49	41	34	29	25	22

Phase 4

4.1.2.3 Prepare Testing Materials

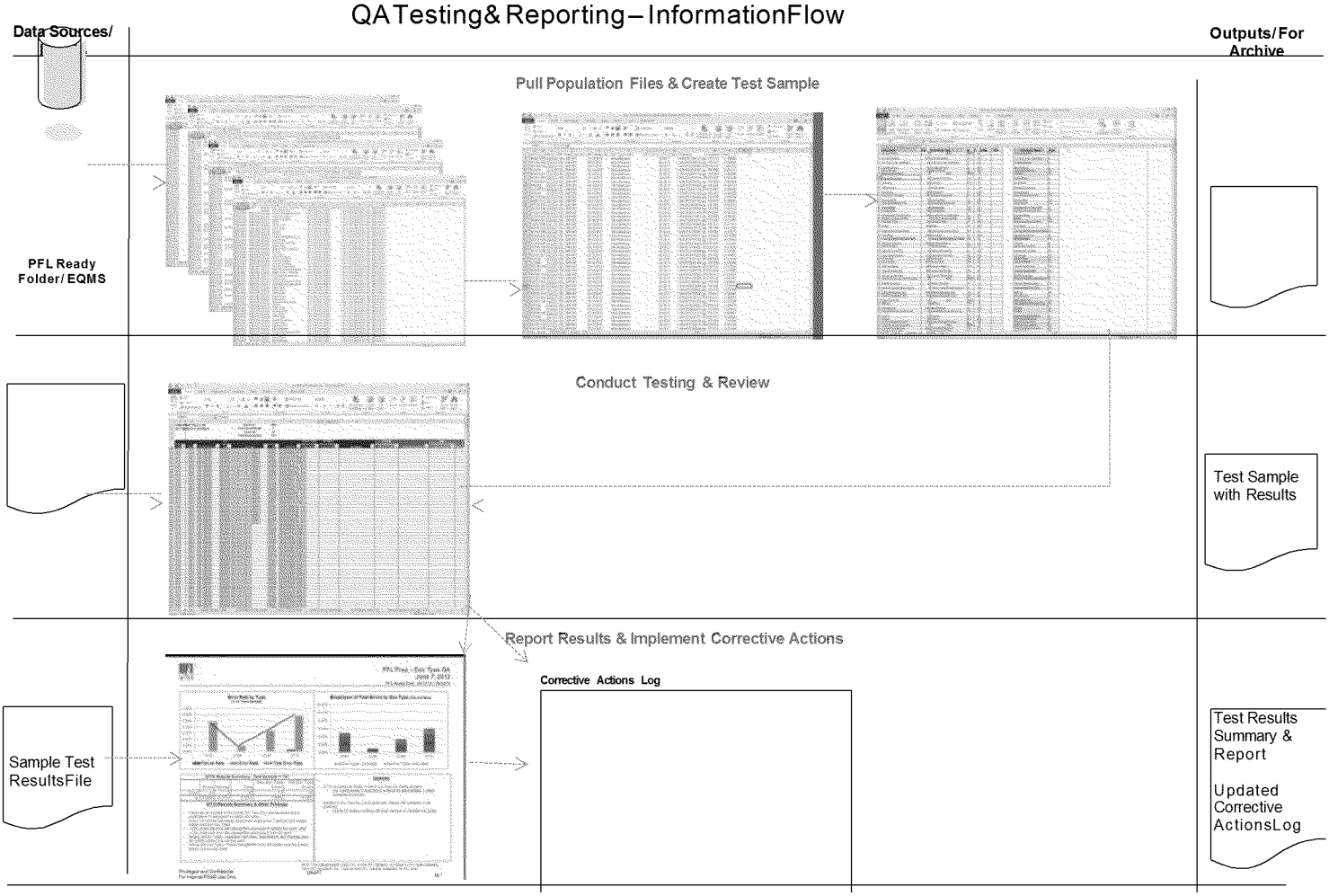


Exhibit 8.

4.2.2.1 Select and Pull Samples

Example 1 - Field Retrieval: As an example, for the MAOP retrieval QA, the population available for testing consisted of a list of "target" records for retrieval from the field offices. This list would contain the results of a field retrieval activity, and each target record would be marked as found or not found. The QA team would randomly sample the target list, and perform a search in the field office to see if their sample yielded the same search results as the Retrieval team. In performing the test, the QA team, management and the retrieval team all agreed that there was minimal benefit to verifying that a record was found. Instead, they focused their testing and sampling on the list of "not found" records, in order to be sure that lists of not found records was truly accurate. The random sample for testing was pulled from the subgroup of "not found" records from each office.

Example 2 -Document Typing/Coding: In the case of document coding (doc typing) for the MAOP program, the test population consisted of all documents that were doc typed during each test period. For example, if the test period was weekly, then all the documents that were doc typed in the week prior to the test date would be included in the test population.

The test sample was determined by each doc type and was based on two factors: 1) doc types present in a given test population, and 2) doc types scheduled for testing based on a rotation cycle.

For example, 67 different document types existed during Phase 3 of the MAOP program; however, all 67 document types were not always present in a given test population.

Additionally, the various doc types were divided into four different test cycles such that all documents were tested at the completion of the fourth cycle. The four week test cycle was then repeated through-out the project duration.

Exhibit 9. below provides a view of the test cycles and the document types scheduled for testing during each cycle.

Per the table, the sample for each test cycle includes all the Document types with frequency D plus all the documents checked for a periodic test, i.e. PS frequency. For cycle C1 (02/27 t0 03/04), the sample includes all documents checked under that column plus all documents marked with frequency D.

Category	Document Type	QA Frequency (D/PS)	C1	C2	C3	C4
			02/27 to 03/04	03/04 to 03/11	03/12 to 03/18	03/18 to 03/25
Drawings	Drawing-Distribution Plat	PS	DT59			
Drawings	Drawing-Transmission Plat	PS				DT62
Drawings	Drawing-Other	PS	DT59			
Drawings	Drawing-Index	PS			DT61	
Materials	Engineering Materials Memo (EMM)	PS		DT60		
Materials	Invoice-Gas	PS			DT61	
Materials	Material Requisition-Gas	PS		DT60		
Materials	Mill Test	PS			DT61	
Materials	Specifications	PS		DT60		
Materials	Transport Tag-Gas	PS				DT62
Reports & Forms	Inspection/Test:Other	PS				DT62
Reports & Forms	Operating Pressure Chart	PS				
Reports & Forms	Operating Pressure Log	PS	DT59			
Reports & Forms	STPR	PS				
Reports & Forms	STPR Chart	PS				
Reports & Forms	STPR Log	PS				
Reports & Forms	STPR Sketch	PS	DT59			
Reports & Forms	Weld Map	PS			DT61	
Accounting	Journal Voucher-Gas	PS		DT60		
Miscellaneous – Job	Soils/Trenching Information	PS				DT62
Miscellaneous	Miscellaneous	D				
Non-PFL	Non-PFL	D				
Drawings	Drawing-Construction	D				
Drawings	Drawing-Detail	D				
Drawings	Drawing-Plan & Profile Sheet	D				
Drawings	Drawing-Vicinity	D				
Job Estimate	Detail Sheet	D				
Job Estimate	Face Sheet	D				
Materials	Bill of Material	D				
Reports & Forms	A-Form & Leak Test/Report	D				
Reports & Forms	H-Form	D				
Reports & Forms	Hydrostatic Test Plan	D				
Reports & Forms	MAOP Document	D				
Reports & Forms	Uprate Procedure	D				
Reports & Forms	X Ray Document (includes summary and detail)	D				
Reports & Forms	Gas Service Record	D				
Reports & Forms	Regulator Data Sheet	D				
Reports & Forms	Valve Maintenance Record	D				

Exhibit 9.

Exhibit 10. below provides an excerpt of the total population of each doc type present for a given test period with their corresponding sample size for testing. The sample size for each document type was generated using the statistical calculator. For a description on how to use the statistical calculator to create sample size based on a given population, see section 3.2.2.

Doc Type	Populatic	Size	Sampl
Accounting-Other	4588	30	Y
A-Forms & Leak Test/Report	209	27	Y
As-Built QA Lists	178	26	Y
Bill of Material	842	30	Y
Cathodic Protection	31	16	Y
Contracts	215	27	Y
CPUC Letters	8	7	Y
Detail Sheet	2055	30	Y
Drawing-Construction	1049	30	Y
Drawing-Detail	48	19	Y
Drawing-Distribution Plat	82	23	Y
Drawing-Index	22	13	N
Drawing-Other	1296	30	Y
Drawing-Plan & Profile Sheet	53	20	Y
Drawing-Transmission Plat	16	11	N
Drawing-Vicinity	230	27	Y
Emails	899	30	Y
Engineering Materials Memo	24	14	N
Face Sheet	4797	30	Y
Gas Service Record	3267	30	Y
GIS Information	15	11	Y
H-Form	6	6	Y
Hydrostatic Test Plan	25	14	Y
Inspection/Test-Other	87	23	N
Invoice-Gas	249	27	N
Invoice-Other	508	29	Y
Job Cost Report	781	30	Y
Journal Voucher-Gas	948	30	N
Journal Voucher-Other	320	28	Y

Exhibit 10.

After the sample size for each of the doc types to be tested has been determined, the actual test records are pulled from the population file and inserted in a new file, which then serves as the test file and contains the full test sample for a given period.

4.2.2.2 Perform Testing

Example 1 – Field Retrieval

QA test performance includes the following steps:

- Meet with the retrieval team and observe the retrieval process to ensure that the retrieval procedures are completely and consistently followed across all teams
- Execute the retrieval procedure to identify and retrieve documents identified in the test sample
- Meet with site support personnel for assistance with in-depth search activities
- Record preliminary observations and findings related to any process anomalies
- Record preliminary QA results of sample selection. Results would be classified as Pass, Fail or Error per the definitions in the QA plan (see example of Pass, Fail and error)

- Meet with the retrieval team to review preliminary QA results. This may also involve initial discussions on root cause analysis for any observed fails and errors.

Example 2 – MAOP Retrieval QA:

An example of a typical retrieval QA has been provided below through MAOP field retrieval QA case scenario. Please refer to the following MAOP related retrieval QA document as references for the process overview provided below, and as a starting point for developing retrieval QA processes for other initiatives:

- MAOP QA Retrieval Process
- MAOP QA Process Flow
- Retrieval Check List

The testing process begins after a test site (retrieval test site) has been selected and all appropriate test communication with the respective retrieval team and site management has occurred through the retrieval QA Lead.

1) Process overview discussion

Upon arrival at the test site, the QA specialist made initial contact and met with the on-site retrieval team. The objective of this meeting was to interview the retrieval team about their retrieval process to help establish: 1) the completeness of the process followed by the retrieval team, as well as, 2) the consistency with which the process is being followed across multiple teams.

At the conclusion of the discussion, the QA specialist was provided a tour of the facility to point out the physical locations for files, and was introduced to key site personnel, such as the mapper and the site supervisor. These key personnel served to provide assistance with in-depth searches for unclear retrieval requests and/or unfound files.

2) Process observation

The QA specialist then performed an observation of the end-to-end document search and retrieval process performed by the retrieval team. The objective of this step was to check that the retrieval team followed all the steps outlined in their documented process.

At the start of this step, the retrieval team shared a list of retrieval requests for the site/location. The QA specialist then potentially selected example retrieval requests from which to observe the retrieval process in action.

Retrieval process steps followed by the retrieval team member included: 1) locating a document's physical location, 2) retrieving/pulling the document, 3) scanning the document for electronic transmission, and 4) re-filing the document in its original location (or transmitting/couriering the original document when requested).

For any unfound documents / retrieval requests, the QA specialist focused on the thoroughness and completeness of the search conducted by the retrieval team. These search steps potentially included validating the retrieval request against plat maps to verify the address and record IDs, and meeting with the site mapper to obtain further assistance in record identification.

3) Process testing

After the process discussion and observation, the QA specialist conducted an independent test of unfound retrieval requests at the test site. This sample list of unfound requests was selected from the active search list or from prior retrieval visits.

In performing this test, the QA specialist followed the same documented retrieval steps as followed by the retrieval team. The QA specialist's goal was to conduct a search of the

unfound documents to test that process steps were not missed. The QA specialist also involved the site mappers to locate the document.

4) Findings and close-out

The QA specialist recorded all findings, observations and anomalies for each of the QA test processes. At the conclusion of the test, the QA specialist met with the retrieval team to:

- provide a high level summary of overall process findings and observations

- discuss the results of retrieval process test, i.e. the results from sample retrieval records search

The discussion led to inputs and clarifications from the retrieval team on both the process observation and sample testing results. The retrieval team input was integrated in the preliminary results analysis and the management report.

DOCUMENT TYPING/CODING

QA test performance includes the following high-level steps:

1. Pull the population of test data set
2. Create a sample set for testing per the coded documents scheduled for the period's testing
3. Conduct the test
4. Record preliminary results, i.e. Pass, Fail or Error per the definitions in the QA Plan (see example of Pass, Fail, Error)
5. Record any findings or observations
6. Review records marked for "secondary review" with client and vendor SMS teams
7. Finalize and publish results

Example 3 – Document Typing/Coding QA:

The following documents were utilized under the doc type testing:

-Doc Type Test file for the test period

- Document_Typing_Examples

- Job_Aid_DocumentType_Definitions

- Keywords

To perform testing, the image for each test record in the test file was accessed via ECTS. The image was then compared against the doc type examples. The objective of the test was to ensure that the image has been correctly doc typed per the definition of that doc type given the examples provided for that doc type in the examples guide. If the image matched the agreed doc typed definition and one of the examples provided for that doc type, then the record was given a 'pass' status.

If the record did not match against the established definition or image, then it was marked as 'error' or 'fail' based on the type of error, and the error/fail criteria established in the QA procedure.

If the record tested did not match with any of the examples provided in the examples guide, was a new format, or was unclear to the QA specialist, then the record was marked for "secondary review', which is described below.

UPLOAD / MIGRATION

UPLOAD / MIGRATION

QA test performance includes the following high-level steps:

1. Identify uploaded / migrated data set ("batch") to test
2. Pull data for the batch to be tested
3. Conduct the test
4. Record any findings or observations
5. Review records marked for "secondary review" with client and vendor SMS teams
6. Finalize and publish results

EXAMPLE – UPLOAD QA:

To perform testing, the following data points were captured for a specific batch of data:

- **Source** – Image Archive Server – database load file scripts with listing of files to be uploaded
- **Source** – Image Archive Server – file names of image files stored on server
- **Destination** - ECTS – listing of files uploaded

In performing the upload QA, this involves determining if all data from the source (database load file, actual image files) was uploaded to the destination (ECTS). The execution of the testing involved comparison of the image file names stored on ECTS against the listing of file names captured in the database load file, as well as the listing of the actual file names stored on the server. If a file was found to exist across all three data sources, the file was given a 'pass' status.

If a file was not found to exist across all three data sources (e.g., listed in the database load file script and on the image file server, but was not found in ECTS), then it was marked as 'error' or 'fail' based on the type of error. The QA specialist then met with the appropriate IT resource to resolve any discrepancies identified, or determine if a file that was "missing" from one batch had actually been subsequently uploaded in another batch.

4.2.2.2 Perform Test

Example 1 – MAOP Retrieval QA: Any process nonconformance and errors (as defined in the process document) related to retrieval search efforts were initially reviewed with the retrieval team on site. After this review, certain results could be marked for "secondary review" with a SMS. In these cases the retrieval team and the QA specialist could not reach clarity or consensus on the issue.

The SMS input provided the final clarification and status (i.e. pass, fail, error) around each "secondary review" item. Lessons learned from the QA and secondary review process were agreed upon and potentially implemented as corrective actions.

For instance, if the QA specialist found a previously unfound record, then that particular record was marked as "Fail", and was communicated to the retrieval team and marked for "secondary review". During the secondary review, the SMS reviewed the unfound request against the found record to confirm a match. By confirming this, the SMS agreed to the classification of the record as a "Fail".

During the secondary review, the QA specialist also provided analysis around any procedural errors that may have led to the unfound record. For instance, the retrieval team may have

only looked for the document in the exact location where it was expected to be found, and not have looked in front or back of the document's actual location, in case it was mis-filed.

Example 2 – Document Typing/Coding QA: During testing, for any record where the QA specialist was uncertain of the correct doc type, the record was marked for 'secondary review'. This status meant that further review and input were needed from SMSs prior to finalizing the doc type QA results for those specific records. In cases where a doc type was marked for 'secondary review', notes explaining the reasons for the uncertainty and possible alternatives for doc type names were also provided.

Additionally, notes were also provided for all records marked as errors or fails. The notes generally included a brief explanation of why the record was considered an error or fail, and an alternative doc type for correction.

At the conclusion of testing, a compilation of all records with a status of fail, error and secondary review was provided to the Vendor Lead for further review. The purpose of this exercise was for the Vendor Lead to: 1) agree or disagree with fail/error status of each record, and 2) provide an argument and/or an alternative doc type for correction where disagreement with QA status of a record exists.

Any discrepancies between the QA status and Vendor Lead assigned status were resolved through a final review of all records with error, fail and secondary review status with the SMS.