# PG&E's MAOP Validation Effort

Provided to the California Public Utilities Commission
Safety and Enforcement Division
Gas Safety and Reliability Branch
Asset Knowledge Management, PG&E
**Date: March 21, 2013**

# Agenda

**Introductions / Building Safety**

**PG&E Gas Transmission Overview**

**San Bruno Incident and PG&E's MAOP Validation Effort**
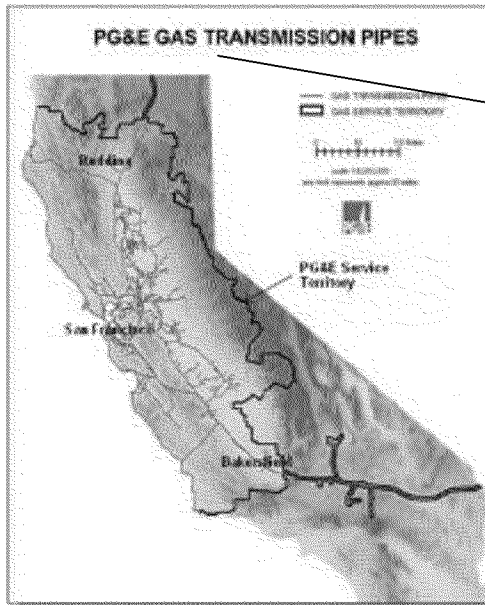
**Pipeline Features List Creation**

**Quality Processes**

**Issues Resolution**

**PRUPF (Process for Resolving Unknown Features)**

# PG&E is one of the Largest Gas Utilities in the US

PG&E GAS TRANSMISSION PIPES

- Incorporated in California in 1905

- 2nd largest combined natural gas and electric utilities in the United States[1].

- Serves approximately 15 million people (1 in 20 US Gas consumers[2]) throughout 70,000-square-mile service area

- ~ 5,800 miles of DOT certified gas transmission pipeline

- ~ 42,000 miles of gas distribution pipeline

- 4.3 M Natural Gas Customer Accounts

- Deliver 970 BCF/year

1. By residential and total customers

2. Per total US Gas Consumers compiled by the US Energy Information Administration http://38.96.246.204/dnav/ng/ng_cons_num_dcu_nus_a.htm

3. ~6,800 miles based on criteria using greater than 60 psig operating pressure

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# San Bruno Incident and PG&E's MAOP Validation effort

**Background**
*(Sep,2010)*

- 30 inch diameter gas pipeline ruptured near San Francisco, California
- 8 deaths, 58 injuries, 108 houses & 74 vehicles damaged or destroyed
- Records showed pipe as seamless while it contained longitudinal welds

**Regulatory Action**
*(Jan,2011)*

- NTSB issued safety recommendations, requiring diligent records search and MAOP Validation of transmission pipelines located in urban areas
- Use <u>traceable</u>, <u>verifiable</u>, and <u>complete</u> records

**PG&E Response**
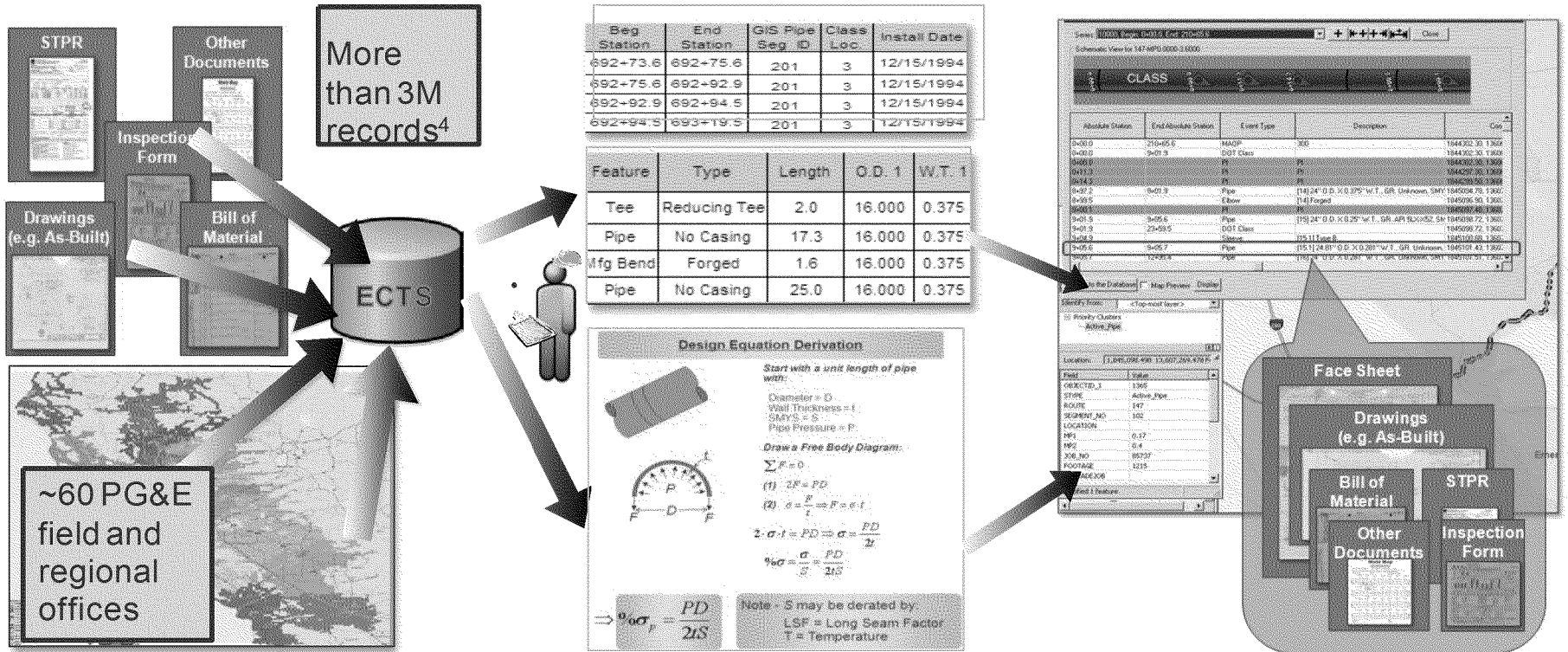*(Jan, 2011 to Apr, 2013)*

- Validating MAOP of <u>**all**</u> gas transmission pipelines within its service area
- Ensuring that records accurately reflect pipelines' components and specifications
- Integrating results into an enhanced GIS platform

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# PG&E's MAOP Validation effort

| Records Collection and Records Review | PFL Build and Engineering Analysis | MAOP Validation and Data Management |
|---|---|---|
| Retrieval, Scanning, Indexing and review of relevant documents | Compilation of Pipeline Components and Specifications | Leverage collected data to validate MAOP and integrate records in a core enterprise system, GIS |



More than 3M records[4]

~60 PG&E field and regional offices

| Beg Station | End Station | GIS Pipe Seg. ID | Class Loc. | Install Date |
|---|---|---|---|---|
| 692+73.6 | 692+75.6 | 201 | 3 | 12/15/1994 |
| 692+75.6 | 692+92.9 | 201 | 3 | 12/15/1994 |
| 692+92.9 | 692+94.5 | 201 | 3 | 12/15/1994 |
| 692+94.5 | 693+19.5 | 201 | 3 | 12/15/1994 |

| Feature | Type | Length | O.D. 1 | W.T. 1 |
|---|---|---|---|---|
| Tee | Reducing Tee | 2.0 | 16.000 | 0.375 |
| Pipe | No Casing | 17.3 | 16.000 | 0.375 |
| Mfg Bend | Forged | 1.6 | 16.000 | 0.375 |
| Pipe | No Casing | 25.0 | 16.000 | 0.375 |

**Design Equation Derivation**

Start with a unit length of pipe with:

Diameter = D
Wall Thickness = t
SMYS = S
Pipe Pressure = P

Draw a Free Body Diagram:

$$\sum F = 0$$

$$(1) \quad \sum F = PD$$

$$(2) \quad \sigma = \frac{F}{t} \Rightarrow F = \sigma \cdot t$$

$$2 \cdot \sigma \cdot t = PD \Rightarrow \sigma = \frac{PD}{2t}$$

$$\%\sigma = \frac{\sigma}{S} = \frac{PD}{2tS}$$

$$\Rightarrow \%\sigma_y = \frac{PD}{2tS}$$

Note - S may be derated by:
LSF = Long Seam Factor
T = Temperature

4. As of 3/31/2012

# PG&E's Pipeline Features List – Developed

- **Each row is a Feature - such as Pipe, Field Bend, Tee**
- **Each row has a unique Feature Number**
- **Material specifications, length and job information is collected**
- **Images associated with every row**

| 23 | Version | PFL Spreadsheet for line | | 400 | | Mainline | | | Mainline MP | | | | | | | | | MAOP Specifications | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Beg Static | End Static | GIS Pipe Segmen | Class Loc | Job Numb | Install Date | Feature Numbe | Feature | Type | Length | Notes / Comments | Mile Point | Field Static | Pipe Static | O.D. 1 | V.T. 1 | O.D. 2 | V.T. 2 | Seam Type | Specification / Rating | SMYS |
| 0+09.0 | 0+15.0 | 100.6 | 1 | 145418 | 12/07/61 | 2.0 | Pipe | No Casing | 6.0 | Image MAOP11001926.jpg is a purchase order for the casing | | 0+09.0 | | 36.000 | 0.531 | | | Double Submerged Arc Weld | API 5LX-X52 | 52,000 |
| 0+15.0 | 0+70.7 | 100.6 | 1 in Public Road Crossing | 145418 | 12/07/61 | 3.0 | Pipe | Casing | 55.7 | Length of pipe came from drawing. Image MAOP11001926.jpg is a purchase order for the casing. Casing is ASTM-A283 Grade C | | | | 36.000 | 0.531 | 42.000 | 0.438 | Double Submerged Arc Weld | API 5LX-X52 | 52,000 |
| 0+70.7 | 0+88.7 | 100.6 | 1 | 145418 | 12/07/61 | 4.0 | Pipe | No Casing | 18.0 | Stationing off from length. | | 0+52.0 | | 36.000 | 0.531 | | | Double Submerged Arc Weld | API 5LX-X52 | 52,000 |
| 0+88.7 | 1+18.7 | 102 | 1 | 145418 | 12/07/61 | 5.0 | Pipe | No Casing | 30.0 | Length of pipe came from the field station | | 0+70.0 | | 36.000 | 0.438 | | | Double Submerged Arc Weld | API 5LX-X52 | 52,000 |
| 1+18.7 | 1+18.7 | 102 | 1 | 145418 | 12/07/61 | 6.0 | Field Bend | Unknown | 0.0 | Angle and orientation from As-built. Used Pipe specifications for field bend. | | 1+00.0 | | 36.000 | 0.438 | | | Double Submerged Arc Weld | API 5LX-X52 | 52,000 |
| 1+18.7 | 2+29.7 | 102 | 1 | 145418 | 12/07/61 | 7.0 | Pipe | No Casing | 111.0 | Length of pipe estimated from stationing and GIS from the field station | | | | 36.000 | 0.438 | | | Double Submerged Arc Weld | API 5LX-X52 | 52,000 |
| 2+29.7 | 2+44.7 | 102.1 | 1 | 30712203 | 10/14/10 | 7.1 | Pipe | No Casing | 15.0 | Length from As-built. | | | | 36.000 | 0.500 | | | Double Submerged Arc Weld | API 5L X-65 | 65,000 |
| 2+44.7 | 2+49.1 | 102.1 | 1 | 30712203 | 10/14/10 | 7.2 | Tee | Reducing Tee | 4.4 | Scrapper Bars. | | | | 36.000 | 0.500 | 30.000 | 0.625 | Unknown > 4 inch | Y-70 | 70,000 |
| 2+49.1 | 2+64.1 | 102.1 | 1 | 30712203 | 10/14/10 | 7.3 | Pipe | No Casing | 15.0 | Length from As-built. | | | | 36.000 | 0.500 | | | Double Submerged Arc Weld | API 5L X-65 | 65,000 |
| 2+64.1 | 6+56.1 | 102.2 | 1 | 145418 | 12/07/61 | 7.4 | Pipe | No Casing | 392.0 | Length of pipe estimated from GIS and T-plate | | | | 36.000 | 0.438 | | | Double Submerged Arc Weld | API 5L X-X52 | 52,000 |

- **Multiple people review and quality check every PFL**
- **Image names included on each row of the PFL**
- **Indicates the exact feature number referenced to the drawing**
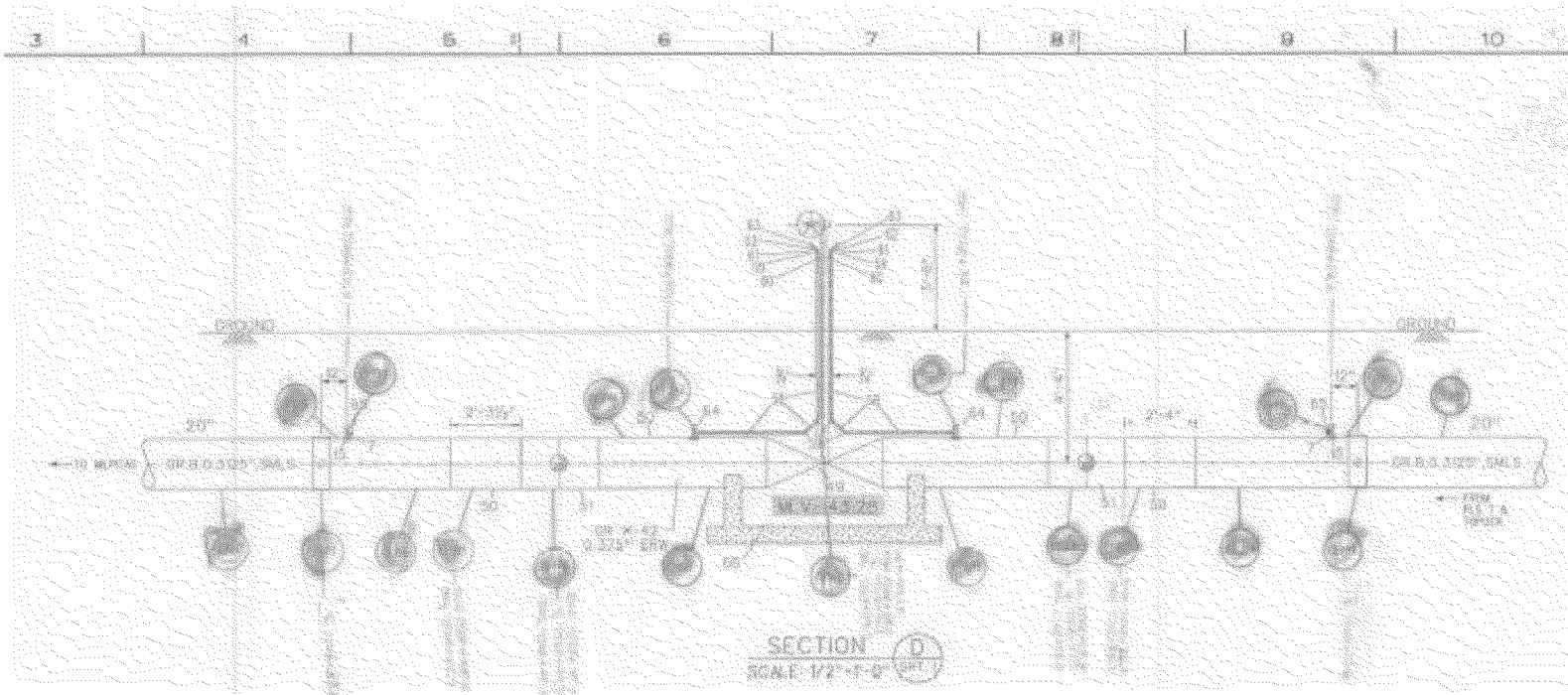
# Bubble Sheets Cont'd

- Indicates the exact feature referenced to the bill of material or other information.

For Material Specifications such as:

- **Outside Diameter**
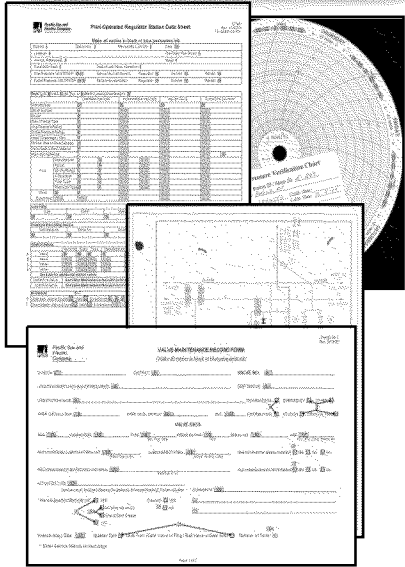- **Wall Thickness**
- **SMYS – specified minimum yield strength**
- **Long seam**

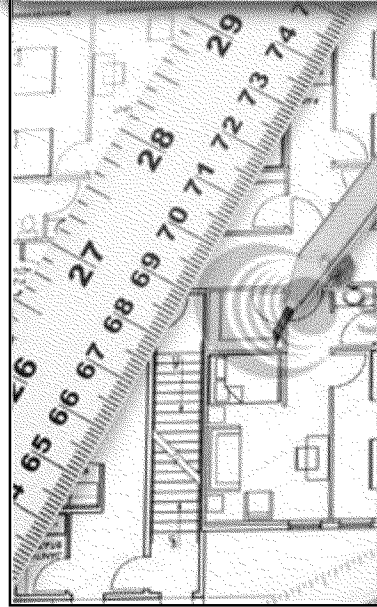| PG&E CODE | ITEM NO | QTY | UNIT | DESCRIPTION | CATALOG OR DRAWING REFERENCE | OTHER DATA |
|---|---|---|---|---|---|---|
| | | | | **2009 CONSTRUCTION - PM 30603908** (FOR PIGGING) | | |
| | 222 | 54 | FT | PIPE, 20" O.D., X-42, 0.375" WT, SMLS, BARE | GS&S A-15, A-16 | PO# 2500117628 |
| | 223 | 1 | EA | TEE, STRAIGHT, 20", 0..375" WALL, Y42, WELD ENDS BEVELED TO MATCH 0..375" WT 20" PIPE, MANUFACTURED IN ACCORDANCE WITH SPECIFICATION MSS-SP-75, AND PG&E SPEC 4121, AND WITH SCRAPER BARS IN ACCORDANCE WITH PG&E 4117. | GT&D UO 4117 & 4121 | PO# 2500079848 |
| | 224 | 1 | EA | ELBOW, 20" PIPE, 0.375" WALL, 45 DEG, LONG RADIUS, Y42, WELD ENDS BEVELED TO MATCH 0.375" WT 20" PIPE, MANUFACTURED IN ACCORDANCE WITH MSS-SP-75 AND SPECIFICATION 4121, (SUITABLE FOR SEGMENTING) | GS&S B-20 | PO# 2500079848 |
| | 225 | 1 | EA | BALL VALVE, 20", FULL PORT, ANSI 300, GEAR OPERATED, WELD ENDS, ENDS BEVELED TO MATCH 0..375" WT, X42 PIPE. WITH HIGH HEAD EXTENDED GEARING, C-C VALVE TO HANDWEEL ("A") = 6' 10". VALVE SHALL COMPLY WITH API-6D AND MANUFACTURED IN ACCORDANCE WITH PG&E GS&S F-21.1, FIGURE 1 (EXHIBIT 1). FOR NATURAL GAS AND BURIED | GS&S F-21.1. FIGURE 1 (EXHIBIT 1) | PO# 2500083755 |

# MAOP Validation Project Process
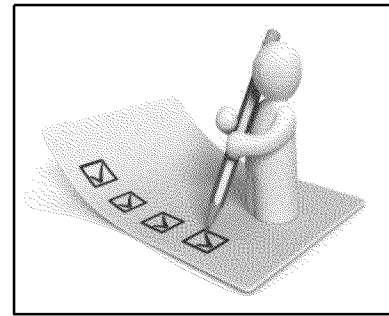
## Quality Assurance (QA) and Quantitative Analysis

| Document Preparation | PFL Build | PFL Build Quality Control (QC) | MAOP Validation |
|---|---|---|---|

# Document Preparation Process

## Combined Plat Walk

START

- D Plats
- H forms
- Operating Maps
- Operating Diagrams

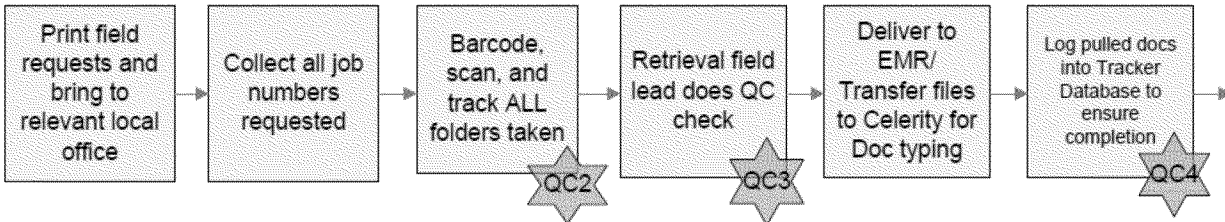| Find Documents for each assigned GIS segment | Find Index Sheets/ T Plats plus blanket search for docs in EDMS | Associate all found to line and mile points in ECTS | Walk Transmission Plats & Record Job #s | Add Alternate job numbers to bundle | Walk Distribution Plats & Record Job #s | Create Field Request for each Job # and GSR | QCer does 100% check on assigned segment QC1 |

## Retrieval

| Print field requests and bring to relevant local office | Collect all job numbers requested | Barcode, scan, and track ALL folders taken QC2 | Retrieval field lead does QC check QC3 | Deliver to EMR/ Transfer files to Celerity for Doc typing | Log pulled docs into Tracker Database to ensure completion QC4 |

## Install Job and Delivery Team

| Access ECTS docs associated with job numbers | Download STPR docs and download As builts, mark duplicates, check for bad scans | Make sure all documents have been downloaded and sorted | Checked by install team supervisor for accuracy and completeness QC5 | Do ECTS extraction and prepare package for Build | Build team notifies support team of any needed docs missing QC6 |

QC = Internal support team quality control point-
QA methods applied by PWC recorded separately

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SB_GT&S_0882125

# Pipeline Features List: Build

## PFL Build
- Engineers and GIS technicians review documents and record data into spreadsheet, identifying each feature on the "bubble sheets"

## 100% Check
- Experienced builders perform a 100% review of the data collected during the PFL Build

## Build Support
- Document Researchers support PFL builders and checkers by searching for relevant documentation to fill in any gaps

## Quality Enhancement Tools
- *Data Validation Macro*
  - Evaluates specifications captured in spreadsheet to validate required fields are present, valid data is entered

- *Image Check Macro*
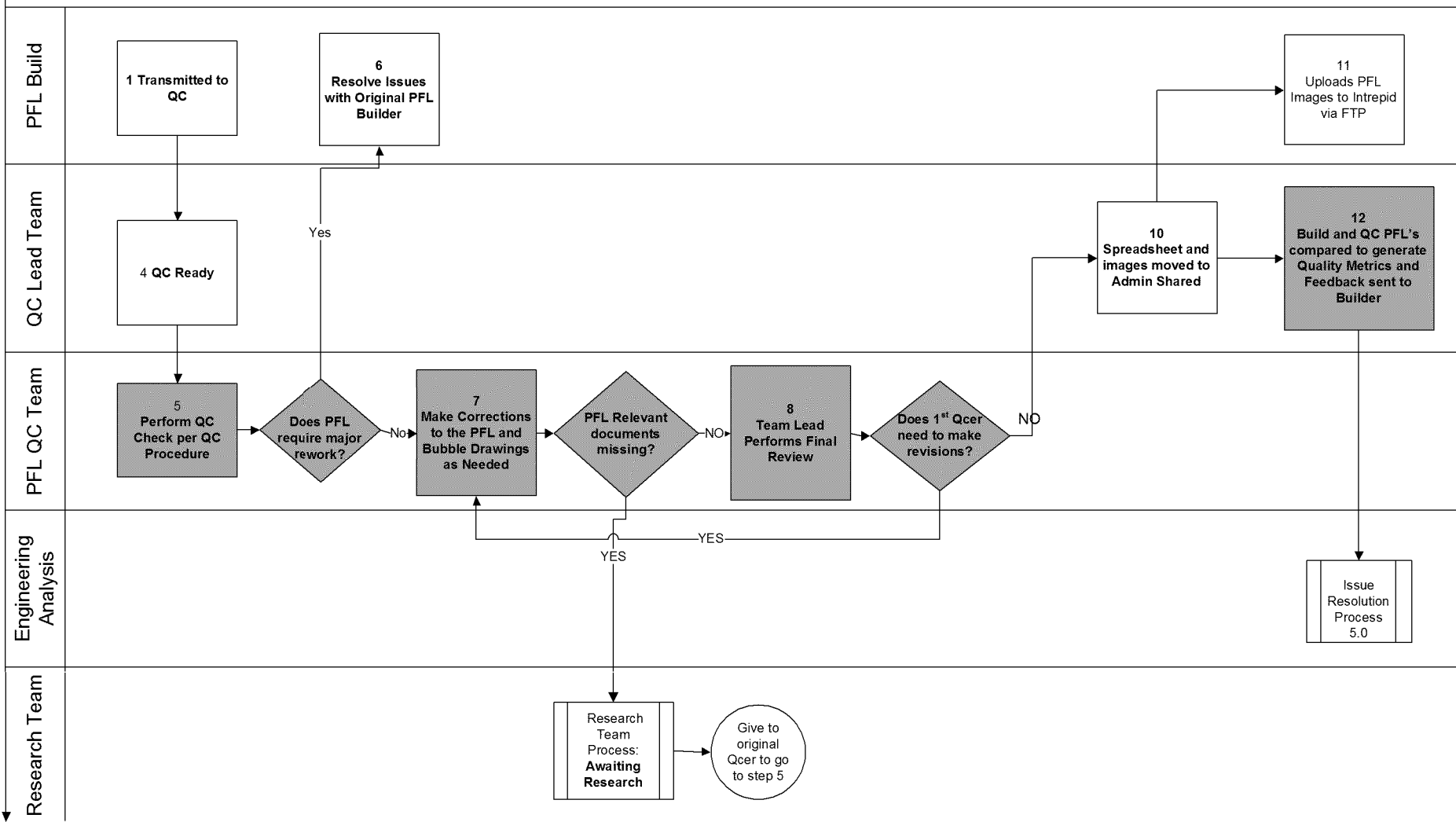  - Reviews contents of transmittal to ensure all images are present (traceability)
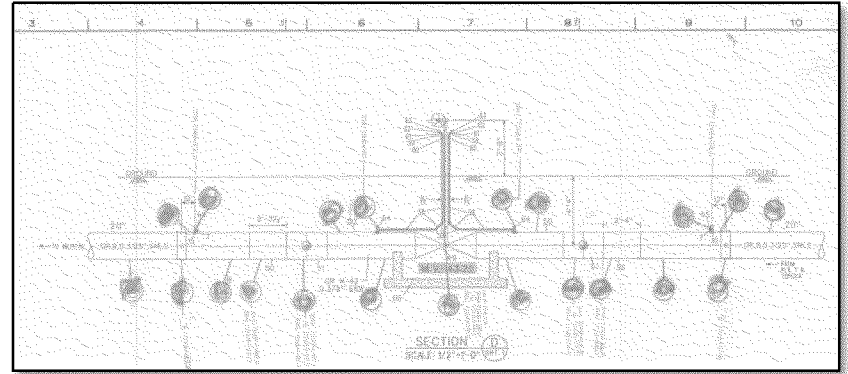


| PFL Spreadsheet for line | | | | | | | | | Mainline |
|---|---|---|---|---|---|---|---|---|---|
| Beg. Station | End Station | GIS Pipe Segment ID | Class Loc. | Job Number | Install Date | Feature Number | Feature | Type | Length |
| 0+00.0 | 0+00.0 | | | | | 1.0 | | | |
| 0+00.0 | 0+00.0 | | | | | 2.0 | | | |
| 0+00.0 | 0+00.0 | | | | | 3.0 | | | |
| 0+00.0 | 0+00.0 | | | | | 4.0 | | | |
| 0+00.0 | 0+00.0 | | | | | 5.0 | | | |
| 0+00.0 | 0+00.0 | | | | | 6.0 | | | |
| 0+00.0 | 0+00.0 | | | | | 7.0 | | | |
| 0+00.0 | 0+00.0 | | | | | 8.0 | | | |

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# PFL Build QC Process Map

## PFL Build QC Process 4.0B

| | |
|---|---|

**PFL Build**

**1 Transmitted to QC**

**6 Resolve Issues with Original PFL Builder**

**11 Uploads PFL Images to Intrepid via FTP**

**QC Lead Team**

**4 QC Ready**

**10 Spreadsheet and images moved to Admin Shared**

**12 Build and QC PFL's compared to generate Quality Metrics and Feedback sent to Builder**

**PFL QC Team**

**5 Perform QC Check per QC Procedure** — No→ **Does PFL require major rework?** —Yes

**7 Make Corrections to the PFL and Bubble Drawings as Needed**

**PFL Relevant documents missing?** —NO→ **8 Team Lead Performs Final Review** → **Does 1st Qcer need to make revisions?** —NO

YES / YES

**Engineering Analysis**

**Issue Resolution Process 5.0**

**Research Team**

**Research Team Process: Awaiting Research** → **Give to original Qcer to go to step 5**

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# PFL Build QC Procedure

## PFL Build QC utilizes a checklist to ensure the following:

* *Traceable*

    - The documents are clearly marked with "bubbles" that indicate the corresponding feature or feature range

    - The most recent versions of documents are included and earlier versions if they provide unique as-built data

* *Verifiable*

    - The most recent jobs were identified and each job was reviewed for as-built documentation

    - The documents were given an appropriate Quality ("Q") Rating

    - Material Specifications were based on the highest quality documentation available (e.g. transport tags, mill test reports, signed delivery receipts)

* *Complete*

    - Ensure that all features are captured as seen on Maps, As-Builts, Gas Service Records (GSRs), etc.

    - Stress Test Pressure Reports (STPRs) for each job and any uprate jobs were found and incorporated



**PFL Checklist for PG&E Build & PG&E QC**

**Instructions:** Complete this checklist during the build, check and QC process to provide consistency and help confirm adequate research and review is performed. Add, verify or correct the entered data and bubbled documents described in each item. Work items in any sequence. This checklist is not an exhaustive list.

| Build | Check | QC | Initial Scope Review |
|---|---|---|---|
| ☐ | ☐ | ☐ | Check Out: Check out and open PFL in SharePoint and using the Properties feature in Excel, enter your name and change status accordingly. |
| N/A | ☐ | ☐ | Major Issues: Briefly review the entire PFL to determine if there are any major issues, such as missing job numbers, STPRs, or specs on recent jobs. [1] |
| N/A | ☐ | ☐ | Return for Revision: If the PFL should be returned to the builder for revision follow Note [2] instructions. |
| ☐ | ☐ | ☐ | GIS Segments: Scope of PFL includes all GIS Segments for the route, and start and end MPs are based on GIS. |
| ☐ | ☐ | ☐ | Feature Numbers: Feature numbers are sequential (gaps okay), and if not starting at MP 0, are based on 100 features per mile. |
| ☐ | ☐ | ☐ | Tie In Notes: Brief tie-in descriptive note for first and last PFL feature, as applicable. [3] |
| ☐ | ☐ | ☐ | Class Locations: (from GasView 2.0) including properly identifying in station, road or bridge configurations. |
| ☐ | ☐ | ☐ | Start and End Point Locations: When end points are not obvious, GIS segment length can be used to establish their location. (Identify significant GIS segment length errors in the *Issues-Errors* tab.) |

**QC Checklist utilized to maintain consistency**
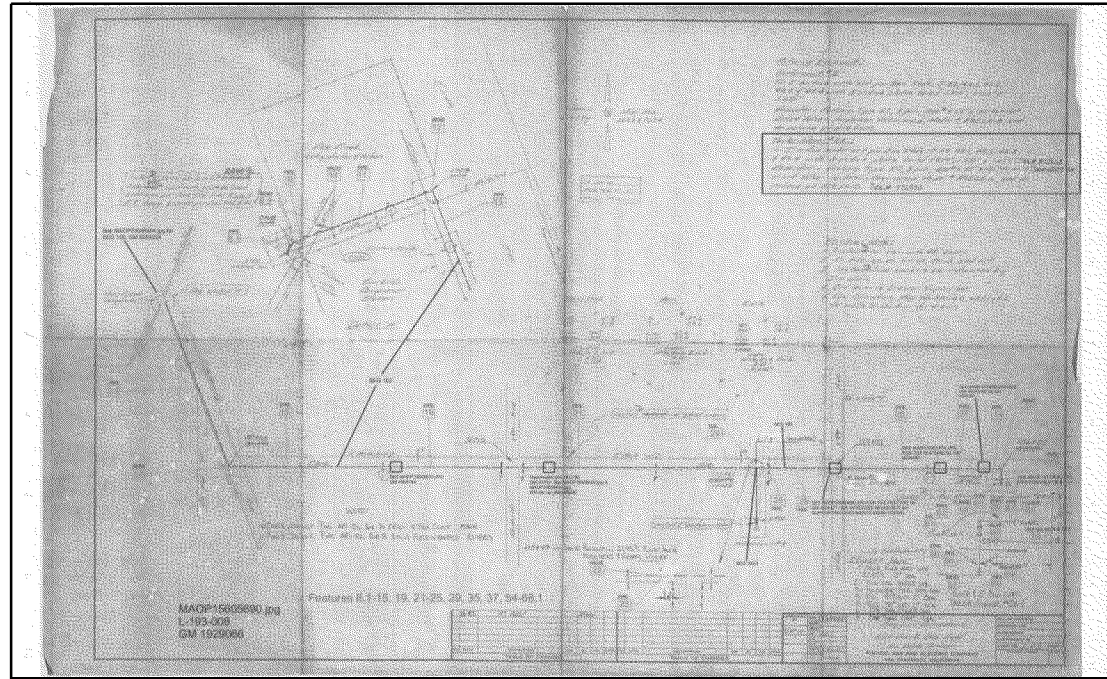


**As-Built Documents are reviewed for Accurate Bubbles**

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# Feedback Processes

- ## Issues-Errors Tab

    - Engineering assessments are outlined and justified

    - Issues identified at any stage are described, assigned and resolved:

| Date | Identified by Process Step | Assigned to Organization | Category | Description of Issue |
|---|---|---|---|---|
| 05/23/12 | Quality Control | PG&E Field Verify | Information | GIS shows BD712 occurring upstream of X6562; their source MP's reflect this as well. Construction drawing MAOP00068818.jpg indicates a reversed configuration. |

| Date | Identified by Process Step | Assigned to Organization | Category | Description of Issue |
|---|---|---|---|---|
| 06/27/12 | Quality Control | PG&E Build | Error_Value | Incorrect job for features 1-10. Do not blindly use the approved by GM number on drawings, especially for station drawings. The BOM callouts on these drawings need to be tied back to a BOM list that shows what job those features were installed on. In this case the drawings GM was 420580 but the BOM callouts for the features listed in the PFL were from GM 165626. This means that these features were installed under 165626. A search in ECTS under this jobs provides the original as-built drawing for these features. |

- ## PFLs Returned for Revision:

    - If a PFL does not meet the Minimum Requirements*, it is returned to the builder for re-work

- ## Bi-Monthly Conference Calls:

    - The QC Team and Build vendors meet to discuss issues identified and any changes made to the process

- ## Weekly "Tailboards":

    - Stand-up meeting / conference call to discuss recent quality issues, updates, general knowledge etc.

- ## Build-QC Rotations: PFL Builders spend up to 6 weeks working within the internal PG&E QC to learn processes and techniques

*Minimum Requirements: Builder must identify all Jobs, As-Built documents, and STPRs and must correctly interpret the configuration of the pipeline features

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# PFL Build QC Metrics

## QUALITY METRICS:

- **Completeness (%)**
  - Are all features present in the PFL?

- **Accuracy (%)**
  - Are the specifications for each feature accurate (based on the highest quality record available)?

| Feature Number | Seam Type | Specification / Rating | SMYS | ANSI- WOG Rating |
|---|---|---|---|---|
| 1.0 | Unknown > 4 inch | Grade B | 35,000 | Unknown |
| 2.0 | Unknown > 4 inch | Grade B | 35,000 | Unknown |
| 2.1 | | Unknown | unknown | ANSI 300 # |
| 3.1 | | Unknown | unknown | ANSI 300 # |
| 4.0 | Electric Resistance Weld | API 5LX-X42 | 42,000 | |
| 5.0 | Unknown > 4 inch | Grade B | 35,000 | Unknown |
| 6.0 | Electric Resistance Weld | API 5LX-X42 | 42,000 | |
| 7.0 | Unknown > 4 inch | Grade B | 35,000 | Unknown |
| 8.0 | Electric Resistance Weld | API 5LX-X42 | 42,000 | |
| 9.0 | Unknown > 4 inch | Grade B | 35,000 | Unknown |
| 11.0 | Unknown > 4 inch | Grade B | 35,000 | Unknown |

## APPLICATION:

- **PFL Build Vendors that are efficient and that deliver a high quality product (Completeness and Accuracy) are assigned more work and are permitted to increase staff**

- **On-Site Build Team (individuals) that deliver a high quality product are promoted to 100% Check or Quality Control**

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# PFL Build QC Metrics Results
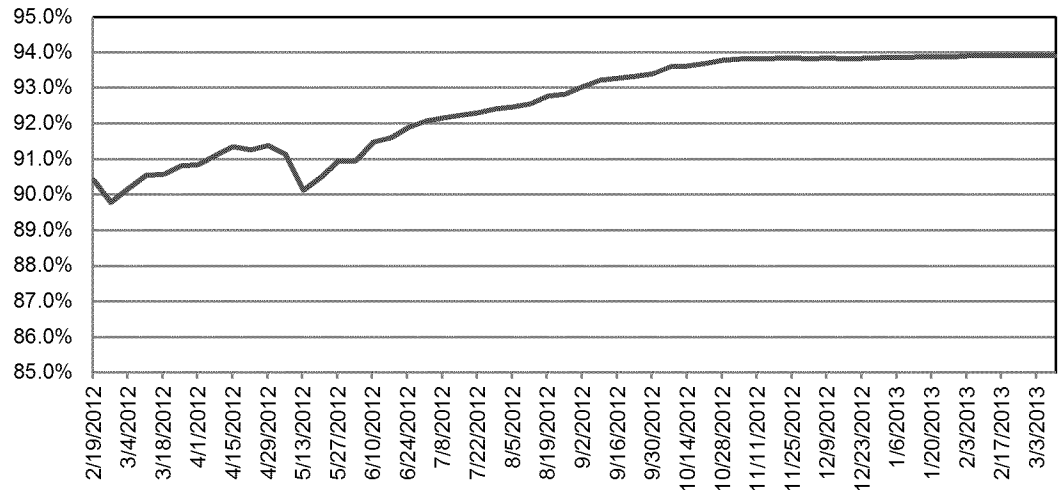
## Cumulative Total Accuracy – All Vendors
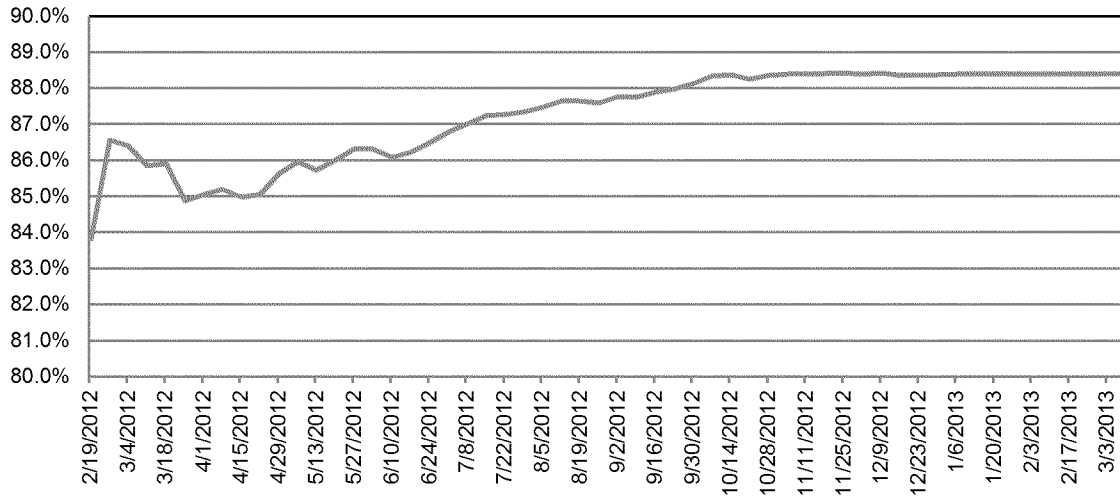


- Quality metrics illustrate the increase in PFL Build quality over time
- Low points represent the impact of process changes

- QC Metrics provided the data used to make the following improvements:

  - Low Quality Vendors are given fewer assignments or off-boarded from the project
  - High Quality Vendors are rewarded with additional work
  - High quality on-site build resources are promoted to Check/QC

## Cumulative Completeness – All Vendors



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## Procedure for Resolution of Unknown Pipe Features (PRUPF)

- Unknown specifications are evaluated using purchase history and historic PG&E standards

## Sound Engineering Judgment

- Pipeline engineers review the PFL Data and use knowledge founded on experience to ensure sound judgment is applied
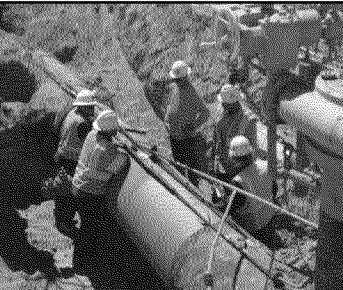
## Excavations

- Features and specifications that cannot be resolved or do not meet the MAOP of record are excavated and direct assessment is performed

## MAOP Calculation

- PFL Data is evaluated in conjunction with assumptions to calculate the MAOP per design

## Engineering Analysis QC

- Experienced engineers perform a QC of the steps performed in the MAOP Validation process

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# Quality Assurance –
# Overview of Control Points

- PwC performs analysis and provides QA Metric reports (next slide)
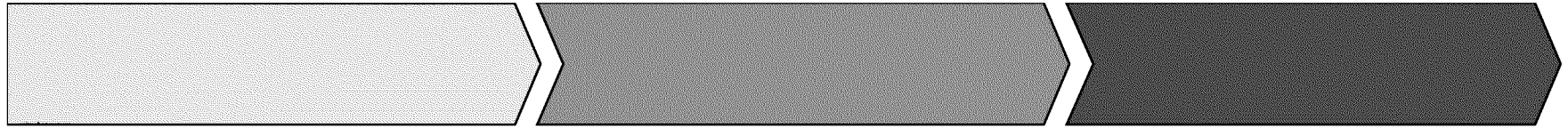- Items are corrected and processes are reviewed for improvement

### Plat Walk (QA)

- – Identify required records on Transmission plat sheet
- – Identify jobs, regulators and taps on distribution plat sheet

### 1 Retrieval Team (QA)

- – Field search, scanning, and upload of requested documents

### 2 Doc Type Team (QA)

- – Review and code 1.8 million documents for PFL-relevance

### Alignment & Delivery

- – Link documents to segments of line in ECTS
- – Remove duplicates and extract documents

### Assign PFL to Build team

- – External vendors
- – Internal PG&E

### Build PFL (QA)

- – External vendors
- – Internal PG&E

### PFL QC

- – Check PFL for accuracy and standardization

### 3 4 Issue Resolution Team (QA)

- – Solve for unknowns
- – Assignment and completion of field verification, excavations, and/or NDE
- – Utilize PRUPF assumed values

### MAOP Report prepared

- – Macros run on report spreadsheet

### MAOP verified (QA)

- – Calculated MAOP reviewed by segment and signed off

### PFL data uploaded to system of record (QA)

- – Current Plan is to upload reports into Intrepid

### Report prepped for CPUC

- – Printed, Pdf'ed , Bates stamp and produced on DVDs for delivery

### Report QC/QA

- – Completed report checked for accuracy and standardization
- – Checked all segments covered in report

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# FIELD RETRIEVAL QC CHECKLIST

**Field Request ID_____**          **Bundle ID_____**

**Field Office _____**

**Team Lead (LAN ID)_____**          **QC Date_____**

## CHAIN OF CUSTODY:

Signed and dated *Chain of Custody Agreement* upon arrival and prior to field office departure

Uploaded scanned documents to specified network location (YYYYMMDD_LOCATION_LANID_COC.jpg)

## IMPORT SPREADSHEET:

Checked for Drag and Drop Errors

Verified Doc-Types

Removed Non-PFL Images
  - Delete all Non-PFL images from both Import Spreadsheet and U: Drive folder

Checked Image Quality
  - If print is not readable, re-scan the image(s); adjust resolution if necessary

# ECTS:

## Verified Retrieval Notes are Accurate in Line Evaluation Sheet

- For T&R Line Item Requests

  All needed images are linked and corresponding MAOP #s are listed in Retrieval Comments.

  All linked images satisfy the line item request of interest

- For Other Line Item Requests

  All retrieved images are listed by doc type, corresponding count of images, and total count of images are listed in Retrieval Comments.

  Discrepancies between line evaluation sheet request and documents retrieved are noted in Retrieval Comments (e.g., job # on Uploads Spreadsheet differs from job # on line item, some doc types requested not being found)

## Balanced Number of Images

- Total number of images and corresponding Doc-types listed on Field Request match what will be sent through the upload process

## Changed Field Request Status

- No Initial Request line items on Field Request
- Field Request status set to "Retrieval Complete"

## Changed Bundles Status

- All Field Requests are "Retrieval Complete" or "Retrieval Checked" status
- Bundle status set to "Retrieval Complete"

I verify that I have performed a complete and comprehensive search for the requested PFL-related documentation and have checked the quality of the work performed to the minimum standards outlined above

# Signature: _____

# COMMENTS:

# PFL Checklist for PG&E Build & PG&E QC

## Route: _____

**Instructions:** Complete this checklist during the build, check and QC process to provide consistency and help confirm adequate research and review is performed. Add, verify or correct the entered data and bubbled documents described in each item. Work items in any sequence. This checklist is not an exhaustive list. Please submit any comments to Alex Hudgins (A1HW).

| Build | Check | QC | |
|---|---|---|---|
| | | | **Initial Scope Review** |
| ❏ | ❏ | ❏ | **Check Out:** Check out and open PFL in SharePoint and using the Properties feature in Excel, enter your name and change status accordingly. |
| N/A | ❏ | ❏ | **Major Issues:** Using the separate *Builder Final Quality Checklist* as a guide, review the entire PFL to determine if there are any major issues, e.g., missing job numbers from GIS or missing STPRs & specs on recent jobs. [1] |
| N/A | ❏ | ❏ | **Return for Revision:** If the PFL should be returned to the builder for revision follow Note [2] instructions. |
| ❏ | ❏ | ❏ | **GIS Segments:** Scope of PFL includes all GIS Segments for the route, and start and end MPs are based on GIS. |
| ❏ | ❏ | ❏ | **Feature Numbers:** Feature numbers are sequential (gaps okay), and if not starting at MP 0, are based on 100 features per mile. |
| ❏ | ❏ | ❏ | **Tie in Notes:** Brief tie-in descriptive note for first and last PFL feature, as applicable. [3] |
| ❏ | ❏ | ❏ | **Class Locations:** (from GIS) including properly identifying in station, road or bridge configurations. |
| ❏ | ❏ | ❏ | **Start and End Point Locations:** When end points are not obvious, GIS segment lengths can be used to establish their location. (Identify significant GIS segment length errors in the *Issues-Errors* tab.) |
| | | | **PFL References** |
| ❏ | ❏ | ❏ | **TPlats:** TPlat index sheets (ELS DWG 385100) are reviewed for applicability and any available TPlats are reviewed and incorporated when they provide unique information. |
| ❏ | ❏ | ❏ | **DPlats:** DPlats, when available, are reviewed for job numbers, taps and overall pipeline configuration. |
| ❏ | ❏ | ❏ | **OP Maps:** OP Maps or Diagrams are reviewed and incorporated when they provide useful information. |
| ❏ | ❏ | ❏ | **Legibility:** Documents to be bubbled are legible or from the best legible source. [4] |
| ❏ | ❏ | ❏ | **Bubbling:** Bubbled documents include at least one orange bubble with feature or range of features anywhere on the document and also include route and filename in green in the lower right corner. Documents larger than 8 1/2" x 11" also include the feature or feature range in the lower right corner, in orange. [5] |
| ❏ | ❏ | ❏ | **Best Version:** The latest version of drawings and BOMs from ECTS and ELS/EDMS are used, unless earlier versions provide unique as-built data. |
| ❏ | ❏ | ❏ | **ELS Format:** ELS/EDMS filenames include sheet number when applicable without extensions (e.g., 123456s7). |
| ❏ | ❏ | ❏ | **ECTS Format:** Documents with created filenames are already in ECTS or use the appropriate naming convention, such as bubbled DPlats, OP Maps or Diagrams. |
| ❏ | ❏ | ❏ | **OP Map Format:** OP Map or Diagram drawing numbers include sheet number when applicable (e.g., 123456-7). District Regulator OP Diagrams without 6 or 7 digit drawing numbers use filename (w/o ext.). |
| ❏ | ❏ | ❏ | **DPlat Format:** DPlat numbers (e.g., 3208-A07) or Wall Map numbers (e.g., 3208) are correctly formatted. |
| | | | **Traceability** |
| ❏ | ❏ | ❏ | **Concise Notes:** Descriptions in the *Notes / Comments* column, when included, are concise and provide unique information about the features that are not captured elsewhere in the PFL. |
| ❏ | ❏ | ❏ | **Required Notes:** Descriptions in the *Notes / Comments* column identify if engineering assessments are made, the feature length is scaled or if material specs are obtained from non-obvious sources, such as STPR and material code. |
| ❏ | ❏ | ❏ | **Job History:** The most recent job numbers are used and each job checked for as-built documents. One exception is when a newer job lowers a pipeline; the job number that installed the pipeline should be used. |
| ❏ | ❏ | ❏ | **STPRs:** Available STPRs for each job and any uprate jobs were found and incorporated. [6] |
| ❏ | ❏ | ❏ | **GSRs & VMRs:** Available documents from the GSR Database and T&R Log were found and incorporated. [7] |
| ❏ | ❏ | ❏ | **Best Q Documents:** Highest quality documents are used for material specifications (e.g., transport tags, mill test reports, signed delivery receipts, etc.). |
| ❏ | ❏ | ❏ | **MAOP:** Current MAOP value is obtained from drawing 086868 (Rev 21) or from the OP Maps or Diagrams. [8] |
| ❏ | ❏ | ❏ | **References:** Entered data in each row are fully supported by bubbled documents identified in the same row. |
| ❏ | ❏ | ❏ | **Highlighting:** Cells are highlighted yellow for unknown data if the cell can only take numerical input. This is only necessary in the conditional formatting area (gray area). |
| ❏ | ❏ | ❏ | **Branch Lines:** Tees, taps and branching PCFs include branch names or indicate *Connection* or *In Station* in the *Branch Line Number* column. Also, created branch names for any unnamed shorts are properly formatted. |

| Build | Check | QC | |
|---|---|---|---|
| | | | **Issues-Errors Tab** |
| ❏ | ❏ | ❏ | **Assessments:** Engineering assessments made during build are described and supported by sound reasoning or justification. |
| ❏ | ❏ | ❏ | **Safety:** Potentially unsafe conditions or regulation code compliance issues are identified. |
| ❏ | ❏ | ❏ | **GIS Errors:** Significant GIS errors are identified. |
| ❏ | ❏ | ❏ | **Issues Assigned:** Issues are assigned to the appropriate organization. |
| N/A | ❏ | ❏ | **Builder Feedback:** Errors and general feedback are discussed with the builder, or for external builders are clearly documented and assigned to the builder. Be clear and factual with all comments and feedback. |
| N/A | ❏ | ❏ | **Resolve Issues:** Review, confirm and try to resolve all issues. Resolved issues are documented in the far right column, and any unresolved issues are assigned to the next process organization (*PG&E QC* or *PG&E Field Verify*). Do not delete issues, and use red or red bold font to distinguish changes made to existing issues or resolutions. |
| N/A | ❏ | ❏ | **New Issues:** Add any new issues or discrepancies found, and identify any material specs based on Q4 or worse documents. |
| | | | **Spreadsheet Integrity** |
| ❏ | ❏ | ❏ | **External Links:** Check for and eliminate any external links in the spreadsheet. Information in the lower right corner of the File tab will indicate if there are external links. |
| ❏ | ❏ | ❏ | **Stationing:** Check consistency of stationing equations and correct by replicating down from an upper row, as required. |
| ❏ | ❏ | ❏ | **MAOP Calculations:** Check that the *Basic MAOP Calculations* fields have equations for each feature row. If any results are in red, revisit the feature's class designation and MAOP critical data (gray area) for accuracy. |
| ❏ | ❏ | ❏ | **Delete Unused Rows:** Delete unused rows after the last feature. |
| ❏ | ❏ | ❏ | **Validation Macro:** Prior to PFL submittal, perform a final Validation macro check and review all red boxes and confirm that yellow highlighting is used properly. Save the file without clearing the validation formatting. |
| | | | **PFL Closeout** |
| ❏ | ❏ | ❏ | **Reassemble Folder:** Organize hard copies and confirm bubbled documents are saved and properly named in the appropriate U:\PFL folder. With the exception of DPlats, OP Maps and Diagrams, unbubbled versions of documents with created names that are not in ECTS must also be saved in the PFL folder (for ECTS upload). |
| ❏ | ❏ | ❏ | **Check In:** Change the SharePoint status accordingly, check in the PFL and hand in the hard copy folder. |

**Notes:**

[1] A PFL must cover every feature and segment within the boundaries of the assignment, regardless of whether or not another PFL contains that feature or segment. A PFL for contiguous GIS segments must not contain any gaps or skipped features. The *Builder Final Quality Checklist* doesn't get checked-off but should be performed in its entirety. Refer to the QC Continued Education slides for examples of its use.

[2] At any point during the Checking or QC review, if the PFL should be returned for revision, (1) confirm the reasons with your Team Lead, (2) identify all major issues and explain necessary corrections in the *Issues-Errors* tab, and (3) change the status to *Returned for Revision*, check in the PFL and return the folder to the builder, or if in QC, hand in the PFL folder to Alex.

[3] When reviewing adjacent PFLs include a comment to help tie the PFLs together, such as *this feature lines up with feature x of PFL y* (where x and y are the applicable feature number and PFL name). If an issue/error is noticed in an adjacent PFL, email a brief description of the issue/error to Alex Hudgins (A1HW).

[4] If the original image is dark, faint or has excessive edge space, consider using common photo editing software to improve contrast and color, or to crop out edge space. Be sure to use high res images in ECTS.

[5] All bubbles, notes and footer annotations shall have sufficient thickness and contrast to be clearly visible when plotted or viewed at reduced resolution. Refer to guideline AKM-MAOP-402G *Electronic Bubble Sheet Editing* for specific details.

[6] STPR searches should include a review of the newer hydrotest logs (see U:\Admin Shared\Tools\4 Reference Material [Reference]). If STPRs were not found for jobs installed after 1980, check historic research requests and submit a request if none found.

[7] The GSR Database and T&R Log (for VMRs and Reg Data Sheets) can be accessed from U:\Admin Shared\Tools\3 Data Sources [Data] or the PFL Builders website.

[8] Drawing 086868 is the preferred source for current MAOP, followed by formally issued OP Maps and Diagrams, then the latest DREG OP Diagram. The issued OP Maps and Diagrams have 6 or 7 digit drawing numbers and are found using the GIS Tool Bar buttons. STPRs, or other job related construction documents are not valid for current MAOP.

PFL Engineering QC Process

1. Check-out file from MAOP Portal and open PFL file.

2. Get a general overview of the PFL

    a. Open the "Summary Report" tab and scan MAOP, minimum test pressure, and minimum pressures for pipe, valves, fittings, etc.
        i. Compare MAOP per R to 086868.
            1) If MAOP per R is less than the MAOP shown in Drawing 086868, open the "MAOP Final Report" tab to confirm the superscript "B" is indicated next to the MAOP of R. If this footnote is not shown, discuss with FVE.
            2) If the PFL line segment is not in 086868, open the "Pipe Data" tab to check for any FVE comments. If the FVE did not indicate the source(s) they used to determine MAOP per R, send an E-mail/speak to FVE and ask for a written explanation of documents used to substantiate MAOP per R.
            3) In some cases, PFL Build includes a copy of the operating diagram which indicates the MAOP per R.

    b. Open the "Pipe Data" tab (if not already open)
        i. Activate the column header filter for sorting.
        ii. Scan the PFL Header Data sections for information and/or missing information, especially the "Notes/Comments" column in the "Mainline MP" section.
        iii. Pay special attention to the Job Number and STPR data.
            1) If there was a pressure test and the duration was at least 4 hours, ensure the Fabricated Assembly field in the FVE section is marked "Yes" for the affected features if the features meet the code requirement.
            2) Ensure that the pressure test is accounted for properly in the calculation of MAOP per Test.
        iv. Customize the PFL to suit viewing preferences.

3. Open the "MAOP Final Report" tab.

    a. Activate the column header filter for sorting.

    b. Ensure all features (except taps, field bends, and appurtenances) are shown.

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PFL Engineering QC Process

c. Confirm that the additional features selected by the FVE for removal from the MAOP Report (rows of cells filled with red shading), if any, are correctly identified.

d. Ensure all valves, flanges, and PCF features have ratings and "N/A" shown in the correct fields.

e. Look for any yellow MAOP values under the "Feature MAOP" column.
   i. If found, this indicates the calculated MAOP is less than the MAOP of R for the affected feature.
      1) Consult the original FVE that worked on the PFL/MAOP Report for clarification. Confirm the FVE has exhausted all research avenues
         a) Research Support Team has completed request(s) and PLE (pipeline engineer) has been contacted for information and allowed at least 48 hours to respond.

f. Confirm that the MAOP Engineering Manager has been consulted if a pressure reduction is recommended on the section of line covered by the PFL.
   i. After discussion with the Manager and confirmation by the FVE that all research is complete and the MAOP must still be reduced
      1) Initiate the pressure reduction process by emailing the MAOP Validation Engineer a summary of the pressure reduction, including all the necessary attachments as described in the PR Process flow chart.
         a) Upon concurrence, the MAOP Validation Engineer will forward the request to the PR Team. The PR Team in GOI will follow the S4125 process to seek approval of the PR.
         b) Once the PR is approved, the QC Engineer will change the MAOP of R to the new MAOP and update the text in the Column ("Is the MAOP of R a Pressure Reduction?") to "Yes."
         c) The QC Engineer will include an explanation of the pressure reduction in first FVE Comment cell and in the file comments when checking-in the PFL back into the portal.

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g. For any features where the MAOP is limited by the test pressure or the design pressure per 49 CFR part 192.611 (footnote "A"), select the "Pipe Data" tab and review the STPR data to confirm:

    i. Test is at least 4 hours for an above-ground test or at least 8 hours for segments tested in place.

    ii. Strength Test Factor is correct for the class location and the year of the test.

    iii. In the case of a change in class, the test duration must be a minimum of 8 hours and the appropriate multiplier applied to the test pressure (i.e. Class 2 = 0.8, Class 3 = 0.667, Class 4 = 0.555).

h. Sort features by year installed subgrouping by pipes, valves, fittings, etc., for each year.

    i. Verify feature assumptions are correct (account for 10-year shift, as necessary). Use Tables 2-11, as well as Appendix E to verify assumptions. Make sure Appendix E-based assumptions are logical.

        1) Ensure sleeves have correct assumptions.

        2) Ensure caps are properly shown (i.e. not shown as "Other").

        3) Ensure all fittings (bends, tees, and reducers) have either a complete Barlow calculation or a fitting rating and "Unknown" as seam type.

        4) Ensure reducer OD1/OD2 and WT1/WT2 are in the direction of PFL build and consistent.

        5) If errors are discovered, go to the "Pipe Data" tab and follow these steps while keeping a separate log of updates/changes made in the Pipe Data tab. Otherwise, go to Step 4 below.

            a) Correct any flawed assumptions where HRD is indicated in the FVE column.

                i. All QC changes are made in **bold red** and the cell filled with orange color. Add comments to FVE Comments column in **bold red** and fill the cell with orange color.

                ii. Keep a log of changes made for entry later.

                iii. Do not delete the FVE's original comment. If the FVE comment is incorrect or not applicable, change the font to show a

PFL Engineering QC Process

~~strikethrough~~ of the incorrect portion of their comment.

b) If the FVE used SEJ for an assumption and it is determined to be unsupported, update the data (including the rationale) following the change convention above. If there are questions or additional work/research is needed, E-mail/speak to the FVE.

c) Verify that any other overwritten items (red text in the FVE Section of the Pipe Data tab) have a corresponding comment in the "FVE Comments" column and rationale updated, if necessary. If not, add appropriate comments for assumptions made using the above convention.

d) When all assumptions are validated, double-check the FVE comments added by the engineer(s) to make sure they are clear, concise, and defendable. Edit or clarify as needed using ~~strikethrough~~, **bold red**, or orange fill as needed.

4. Unhide and open the "MAOP Report" tab to confirm that the changes made to the Pipe Data tab, if any, are reflected correctly with no discrepancies. Follow the same procedure for data review as used for the MAOP Final Report tab (Section 3.g.). There should be no yellow shading on the report. However, if QC changes have resulted in yellow shading (i.e. application of the 10-year shift has resulted in a lower feature MAOP), repeat the procedure for issues resolution (Section 3.d).

5. Save, update status to "Engineering QC Complete", and check-in the PFL file to the MAOP Portal being sure to enter your logged changes into the Comments Box.

6. Save a copy of the file to your hard drive.

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# MAOP Phase III QA Plan

January 2012

**MAOP Validation Project (Phase II) QA Overview**

## I.  MAOP Validation Project Overview

The MAOP (Ma ximum Allowable Operating Pressure) Validation Project's primary purpose is to verify the Maximum Allowable Operating Pressure for PG&E's Class 3 and 4, and class 1 and 2 (HCA) gas transmission pipeline.

### a.  Product Overview

The output for the MAOP Validation Project is a Pipeline Features List (PFL) which will be used to establish and report a maximum Allowable Operating Pressure (MAOP) for PG&E gas transmission pipeline segments.

### b.  Process Overview

The process to develop the PFL will utilize both PG&E employees and contractor personnel, and will consist of 4 main efforts (See diagram below):

Each stage is described in more detail (descriptions and process maps) in the following stage process maps:

- **Document Preparation** - Documents necessary for the building of a PFL and the establishment of MAOP will be collected, scanned into an image, and uploaded into PG&E's Workflow management system (ECTS).

- **PFL Preparation** - Documents in ECTS will be assembled into PFL build "clusters" or "bundles" based on their relevance and applicability to certain gas transmission pipeline segments

- **PFL Build -** PFL "clusters" or "bundles" will be the framework for the PFL build. Pipeline features will be reviewed in the appropriate documentation in order to record the information required to establish MAOP.

- **MAOP Verification** – Completed PFL will be reviewed by Field Verification Engineer for calculation accuracy and

- **CPUC Report Preparation** – MAOP Report will be prepped for submission to the CPUC.

- **Data upload into Intrepid** – Once PFL build and MAOP calculation have been completed, data gathered will migrate to the Intrepid System.

MAOP Validation Project QA Plan          Publication Date:  01/10/2012    Rev: 1.1

The MAOP verification project consists of 3 main groups of activities:

| Prepare Pipeline Features List (PFL) Folder | Build PFL | Validate MAOP |
|---|---|---|

## Plat Walk

- Identify reference jobs on Transmission plat sheet
- Identify jobs, regulators and taps on distribution  plat sheet

## Retrieval Team

- Field search, scanning, and upload of requested documents

## Doc Type Team

- Review and code 1.8 million documents for PFL-relevance

## Alignment & Delivery

- Link documents to segments of line in ECTS
- Remove duplicates and extract documents

## Assign PFL to Build team

- External vendors
- Internal PG&E

## Build PFL

- External vendors
- Internal PG&E

## PFL QC

- Check  PFL for accuracy and standardization

## Issue Resolution Team

- Solve for unknowns
- Assignment and completion of field verification, excavations, and/or NDE
- Utilize PRUPF assumed values

## MAOP Report prepared

- Macros run on report spreadsheet

## PFL data uploaded to system of record

- Current Plan is to upload reports into Intrepid

## MAOP verified

- Calculated MAOP reviewed by segment and signed off

## Report prepped for CPUC

- Printed, Pdf'ed , Bates stamp and produced on DVDs for delivery

## Report QC/QA

- Completed report checked for accuracy and standardization
- Checked all segments covered in report

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## II. Project QA Objectives and Scope

### a. Purpose

i. The purpose of this Project-Specific Quality Plan (the Plan) is to define the quality management system for the MAOP Validation Project in order to provide insight into whether the processes and procedures produce products that conform to the requirements specified.

ii. This Plan is the principal quality document for the Project and is based on the Project requirements, Industry specific and PG&E governing documents (as applicable). The plan is modelled after ISO's 9001:2008.

iii. The Plan covers the full Scope of Work related to MAOP Project and the Project quality organization and the specific responsibilities and authorities of personnel who will implement the plan.

iv. The Plan is a Project Management document, which demonstrates that the Project has identified the Project objectives, confirmed its quality commitment and established a system of procedures to accomplish these ends. It assigns duties, delegates authority, and sets up suitable testing, inspection and assessment programs to verify that the required standard of performance is being achieved.

### b. Quality Objectives

i. To perform Work that produces products compliant the MAOP Validation Project standards established. To achieve these objectives, The Project will implement:

- Project procedures to ensure that key Project Work processes and their quality requirements are clearly defined, well documented and fully integrated.

- Quality Assurance Assessments to verify adequate and effective performance of the project activities.

### c. Scope of Quality activities

i. Project Quality Assurance oversight will cover all Product definition documents, Project process documents, Process Quality Control (QC) activities, for the following Project activities:

- Document Preparation

- PFL Preparation

- PFL Build

- MAOP Verification

- CPUC Report Preparation

- Data Upload to Intrepid

ii. Quality Assurance (QA) is an independent function on the Project and has no in-line Project duties. QA is therefore free to assess and examine all areas of the Project, to highlight all identified non-compliances and to ensure that agreed corrective actions are taken.

    iii.  Quality Control (QC) consists of procedures built into each of the sub-processes within the project.

    iv.  The QA Plan will present the plan and approach for QA. The QC plan for each sub process will be planned and executed by the appropriate sub process team, and be reviewed by QA.

    v.  Project Quality activities will apply to external vendors and contractors working on MAOP Validation Project activities.

d.  Definitions

    i.  **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. "Defective" is appropriate or use when a unit of product/service is evaluated in terms of usage (as contrasted to conformance to specifications).

    ii.  **Defects:** 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).

    iii.  **Scheduled Assessment / Assessment:** Scheduled QA assessments consist of both sample testing product and process assessment. They are scheduled at the appropriate cadence to ensure a representative sample is pulled from the population. Scheduled assessments could be at different times for each sub process, depending on the unique requirements of each sub process.

    iv.  **Ad Hoc Assessment / Assessment:** Ad Hoc QA assessment requests come from MAOP Verification Project management and could consist of either sample testing or process assessment.

    v.  **PFL (Pipeline Features List):** A Pipeline Features List ("PFL") consolidates the current pipe features (ex: pipe, valve, bend, reducer, tee, sleeve, tap, flange, PCF) into a common worksheet along with feature specifications (ex: pipe size, class, wall thickness, yield strength, seam, rating) using various original design drawings and as-built information. PFLs are intended to include the required information to calculate the Maximum Allowable Operating Pressure ("MAOP") of a segment of a pipeline. Furthermore, the PFLs in conjunction with the Marked-Up Drawings can provide traceable access to the verified and complete PG&E records of the transmission pipeline per the directive of the CPUC.

## III. Quality Overview

a.  QA Approach

The approach to Quality Assurance for the Project consists of the following high level activities:

    i.  Assess whether the Project uses formally defined and documented processes

    ii.  Assess whether those processes are designed and implemented using documented product specifications, and that those specifications flow from an appropriate governing standard

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    iii.   Apply Quality Assurance oversight by performing scheduled Quality Assurance assessments of Project processes, procedures, QC activities, and results in order to assess the existence of and compliance with the documented processes, procedures, and QC activities

    iv.  Assess the effectiveness of the procedures and Controls in producing the desired results

    v.  Perform QA assessments of specific Project activities as requested by Project leadership

    vi.  Report to Project Leadership the results of the QA assessments/assessments, including recommendations for improvements

b. Quality Organization

    i.  Quality manager

- The Project quality management system is developed, implemented and maintained by the Quality Assurance Manager (QA Manager) who reports directly to the Project Director.

- Quality Assurance Manager has the authority and responsibility to ensure, as the Management representative (as defined in ISO 9001:2008) that the requirements of the Project quality system are established, implemented and maintained.

- Quality Assurance Manager is independent of all other managers on the Project and has no in-line Project duties. He is therefore free to assess and examine all areas of the Project, to highlight identified non-compliances and to ensure that agreed corrective actions are taken.

    ii.  The QA Manager will be responsible for establishing and monitoring Project quality in the following areas:

- Work performed on the Project by supporting departments related to MAOP Validation Project activities

- Basic and Detailed Engineering activities related to PFL Preparation and build

    iii.  The QA Manager will be indirectly responsible for the quality of the following groups:

- Document prep Sub-contractors through their own QA Managers

- PFL Build Contractors through their own QA Managers

    iv.  The main responsibilities of the QA Manager include:

- Preparing the Project Quality Plan and quality related procedures.

- Overseeing internal and external quality assessments, and ensuring that all corrective actions are followed-up and closed-out.

- Liaising as required with the vendor QA representatives on Project quality matters.

- Liaising with the Project Director and other managers on quality related matters.

- Assessing the quality system documentation of contractors and suppliers.

- Developing and maintaining Internal Quality Assessment schedules.

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- Developing and maintaining External Quality Assessment Schedules for assessments on selected contractors, sub-contractors and suppliers etc.

- Reviewing trend results for quality problems and initiating root cause preventive action, including monitoring quality assessment reports, nonconformance reports, material delivery deficiency reports, etc. for quality trends. Following-up identified quality problems and agreeing the necessary preventive actions with the managers concerned.

- Controlling and coordinating quality records, including establishing the requirements for filing and backing-up of quality records; and agreeing with contractors on the retention and handover requirements for quality records.

## MAOP Organizational Structure below:
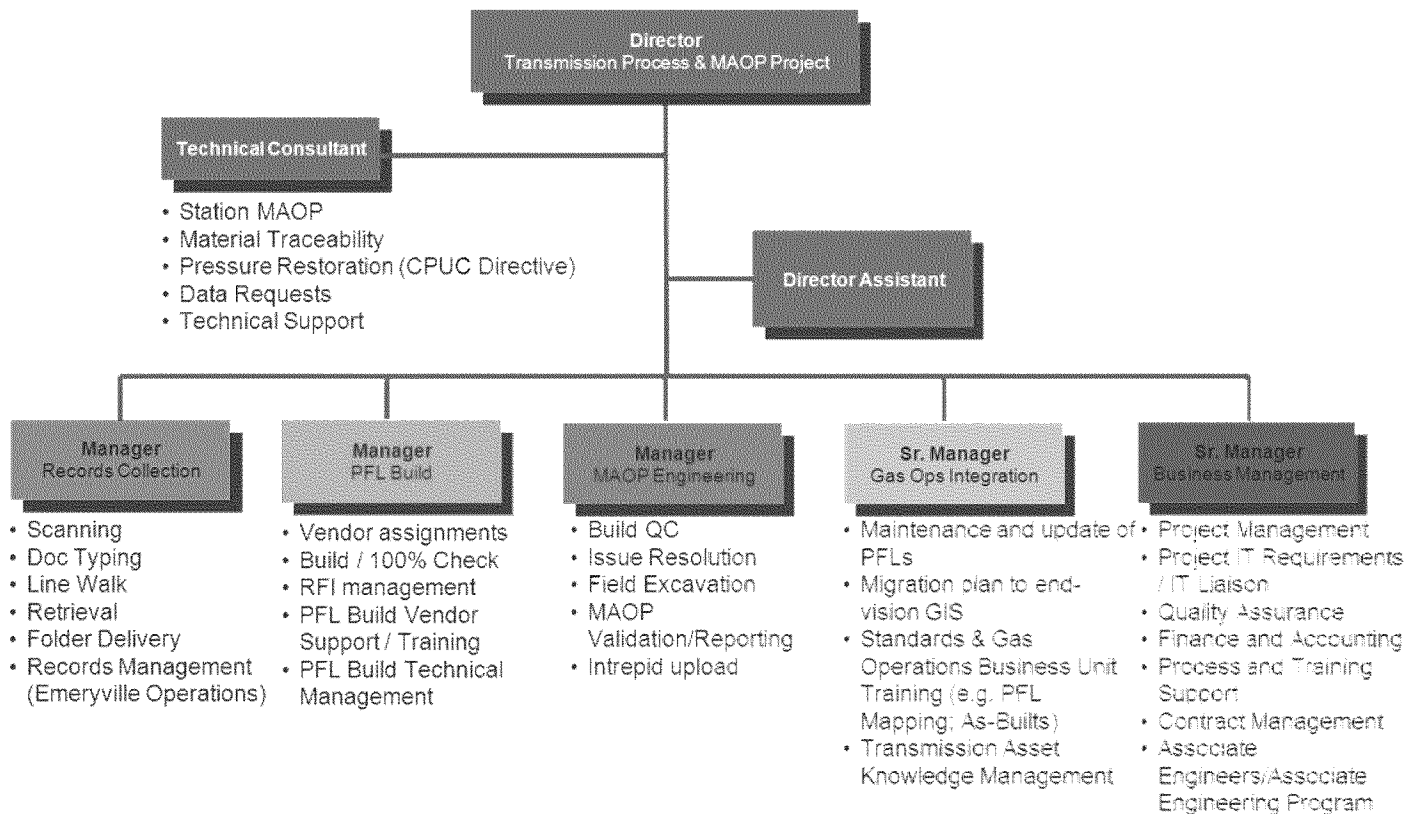
## QA Organization Structure
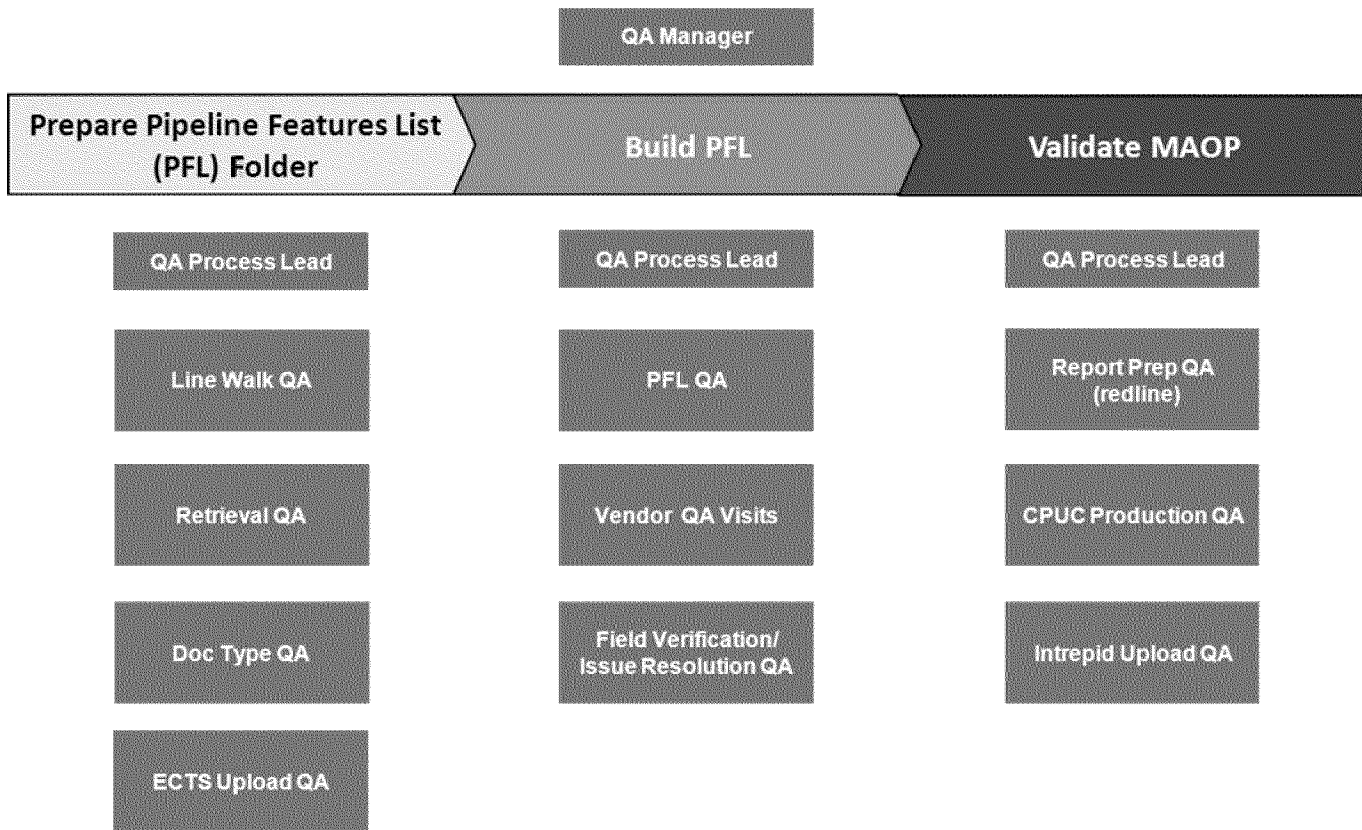


## Specifications and Standards

i. The MAOP Validation Project's Quality Management Plan contains elements of applicable ISO 9001:2008 standards.

ii. 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.

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

```
┌─────────────────────────────────┐
│      Project Deliverable         │
│     QUALITY REQUIREMENTS         │
└─────────────────────────────────┘
                │
┌─────────────────────────────────┐
│         ISO 9001:2008            │
│         REQUIREMENTS             │
└─────────────────────────────────┘
                │
┌─────────────────────────────────┐
│      (COMPANY) CORPORATE         │
│  MANAGEMENT SYSTEM (as req)      │
└─────────────────────────────────┘
                │
┌─────────────────────────────────┐
│    Project QUALITY PLAN          │
│    (QUALITY ASSURANCE)           │
└─────────────────────────────────┘
                │
┌─────────────────────────────────┐
│     Project Procedures           │
│     (QUALITY CONTROL)            │
└─────────────────────────────────┘
                │
┌─────────────────────────────────┐
│        Project Tasks             │
│     (WORK INSTRUCTIONS)          │
└─────────────────────────────────┘
```
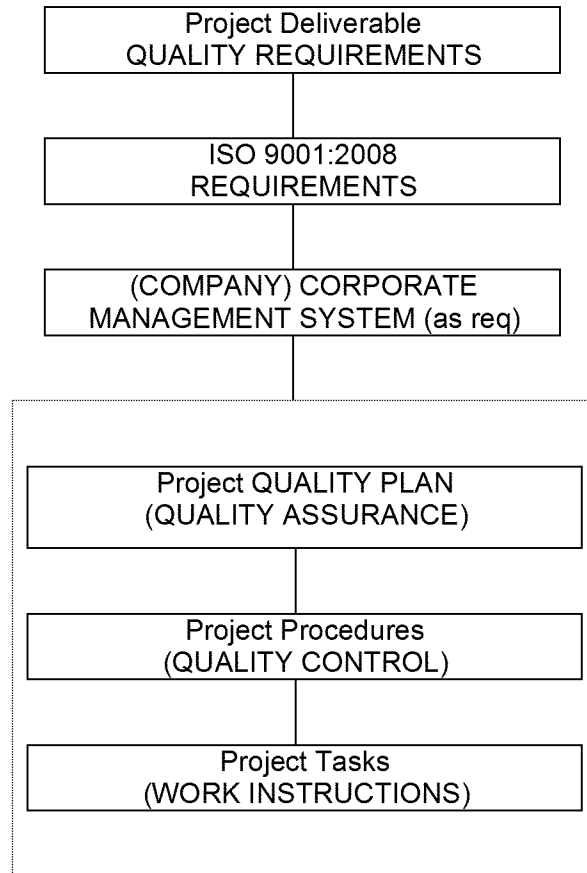
c.  Assessment Approach

The QA assessment approach will consist of the following general activities. More specific procedures will be documented in the appropriate functional area testing section.

i.   The Project Quality Assurance Manager will prepare, issue, and maintain a Project QA assessment schedule covering internal assessments of quality systems to include all aspects of work in accordance with this document.

ii.  The QA assessments will be performed by or under the direction of the Project Quality Assurance Manager at various stages throughout the duration of the Project, in accordance with the schedule. He will be assisted by others as necessary.

iii. The QA assessments will cover Project interfaces, Project controls, including testing and quality records.

iv.  External assessment schedules will be prepared and performed to assess the effectiveness of the quality systems of external contractors and subcontractors.

v.   The results of the assessments will be documented in Assessment Reports and corrective action requests (CARs) will be raised, as appropriate, to require implementation of necessary remedial and/or corrective and preventive actions.

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vi. Assessment reports will be usually submitted within one week of completing the activity, followed by their respective closeout details when completed.

d. Statistical techniques and sampling

i. (Note: this procedure was developed and written for PG&E's MAOP process using ANSI Z1.4 as a guide. It does not intend to implement the ASNI Z1.4 system which includes tightened, normal, and reduced sampling plans and rules for switching.) To select a statistically valid sampling plan, first, the objective of the inspection should be determined based on past performance, other controls that are in place, potential failure modes. Then the Acceptable Quality Level (AQL) of the sampling plan should be documented to demonstrate that the sampling plan meets this objective. Further, since different sampling plans may be statistically valid at different times during the life of a process, all sampling plans should be periodically reviewed. The sampling plan should answer the question: "Is the protection provided by the sample appropriate based on past performance and current controls?"

ii. Definitions:

Inspection by Attributes - Inspection by attributes is one whereby either the unit of product is classified simply as defective or non-defective or the number of defects in the unit of product is counted, with respect to a given set or set or requirements.

Acceptable Quality Level - 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.

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. "Defective" is appropriate or use when a unit of product/service is evaluated in terms of usage (as contrasted to conformance to specifications). For the MAOP Project, "defective" product is classified as a "failure."

Defects - 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). For the MAOP Project, a defect is called an "error".

iii. The purpose of each inspection should be clearly defined. Consider use of the following to determine the sample size selected:

Select samples for testing using attributes (vs. variables). The intent is to select a representative sample size that gives confidence that the results represent the overall population of PFLs. This method will be based on a 95% confidence of 2% errors with +/- 2% precision, which effectively means that the expected compliance rate is 98% with an uncertainty range of +/- 2%. The table below shows sample sizes required to achieve a 95% confidence for 2000 units. If a QA test discovers an error rate > than 2%, a recommendation could be to increase the sample size tested to correspond with the observed error rate in order to verify that the observed error rate can be expected throughout the entire population.

## 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 |

$$n = \frac{\dfrac{z^2 P(1-P)}{d^2}}{1 + \dfrac{1}{N}\left(\dfrac{z^2 P(1-P)}{d^2} - 1\right)}$$

The current QA compliance standard is assessed versus the established statistical parameters, which are 95% confidence level of 98% compliance with a precision of 96% (+/-2%). These parameters lead to the following acceptance criteria:

$$\text{Error rate} = \frac{\# \text{Errors}}{\text{Sample Size} \times \text{Attributes}} \times 100$$

e. Metrics and Reporting

   i. The purpose of collecting metrics is to analyse the results in order to pinpoint areas to focus root cause analysis and corrective actions.

   ii. Metrics will be captured by each of the individual QA teams representing each step of the process. Metrics will be presented and reviewed on a weekly basis, and archived on the following SharePoint site:
   http://wss/sites/GasProgramAndPerfMgmt/Shared%20Documents/Forms/AllItems.aspx?RootF
   older=%2fsites%2fGasProgramAndPerfMgmt%2fShared%20Documents%2fSan%20Bruno%2
   0Incident%20PMO%2fGT%20Data%20Validation%20Project%2fQA%5fQC%2fPhase%20II%
   20PFL%20Build%2f25%20Test%20Metrics%20Dashboard&FolderCTID=&View=%7b82923F
   F0%2dA62E%2d43C0%2d981B%2d80024F56BC50%7d

f. Corrective Actions

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   i.  Results of the QA assessments (both process and sample testing) are to be communicated to the process owner. The process owner and QA representative will agree on a plan and timeline for corrective action.

   ii.  Corrective Actions will be logged in the appropriate tracker with owner and resolution date, and QA representative will record when corrective action is complete. Corrective action logs will be maintained in the QA SharePoint folder for each QA process.

g.  Change Control

   i.  Changes to processes as a result of QA assessments should follow the change control procedures for the MAOP project, located on the following SharePoint site:

http://wss/sites/GasProgramAndPerfMgmt/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2fsites%2fGasProgramAndPerfMgmt%2fShared%20Documents%2fSan%20Bruno%20Incident%20PMO%2fGT%20Data%20Validation%20Project%2fMAOP%20Validation%20Operating%20Manual%20Source%20Documents%2fProcess%20Maps%2f02%2dDrafts&FolderCTID=&View=%7b82923FF0%2dA62E%2d43C0%2d981B%2d80024F56BC50%7d

h.  External Contractor QA

   i.  Suggested Vendor QA Requirements

- Contractors shall be required to implement the requirements of this section to the extent it is applicable to their scope of work. PG&E shall be the final judge as to which parts are applicable and which are not.

- Contractors shall nominate a member of management staff to act as the Quality Representative. The Quality Representative shall be provided with adequate resources and shall be delegated the necessary authority to enable the quality of work on the Contract to be managed effectively.

- The Contractor Quality System is to be capable of demonstrating that all the requirements of the Contract and all relevant standards, regulations etc are being met.

- The Contractor shall manage all Inspection and Testing activities in such a way as to be able to demonstrate that all specified requirements have been met. All defective products are to be resolved before final acceptance.

- PG&E MAOP Validation project representative will monitor the implementation of the Contractors QA / QC program by assessing procedures, work instructions, method statements etc, and by assessing whether Quality oversight and control exists for all significant activities. PG&E MAOP Validation project representative(s) will identify those activities they wish to witness and will assess adequate presence of activity documentation. PG&E MAOP Validation project QA group will perform scheduled quality assessments on the Contractors QC and inspection activities as directed by MAOP Project Management.

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- PG&E MAOP Validation project representative and any authorized third parties shall have the right to conduct assessments, inspections and tests of all Contract works that are being executed by the Contractor, his consultants, subcontractors, suppliers and sub-tiers thereof, and to observe the execution of these activities by others.

- The Contractor, his consultants, subcontractors, suppliers and sub-tiers thereof shall make available for assessment all records necessary to demonstrate that the Contract works have been executed in accordance with the Contract. They shall also provide PG&E MAOP Validation project representative with documents that demonstrate that the Contract works are progressing in accordance with specified requirements. These are to be provided in a timely manner as the work progresses.

ii. Contractor Quality plan

- Contractors shall prepare a specific Project Quality Plan (PQP) which addresses all activities relevant to the Work and shall demonstrate how all work performed by Contractor will conform to the contract specified requirements. The Contractor's Quality Plan shall include the controls to be applied by subcontractors, suppliers and sub-tiers thereof, both directly and by identifying the Quality System documentation that subcontractors, suppliers and sub-tiers thereof are required to produce to meet the Contractor's requirements.

- The plan shall define the documented quality system to be applied by Contractor throughout the Work, and make reference to all of the Contractor's relevant procedures and manuals.

- The Plan shall address the interfaces between PG&E MAOP Validation project and Contractor and other relevant organizational entities. The Plan shall include an organization chart showing Contractor's corporate and Project organization responsible for managing, performing and verifying the Work. The organization chart shall be supported with a reporting and functional description of Contractor's project organization and identification of the quality and environmental related responsibilities of key positions.

- The plan shall be updated as necessary throughout the contract, to reflect any changes to Contractor's documented quality system. Contract Quality Plans shall, as a minimum:
    o Cover the relevant phases of the Contract (as applicable)
    o Incorporate or reference necessary quality control procedures
    o Describe the relationships and activities of the Contractor and any Subcontractors suppliers and consultants including provision of organization charts

iii. Processes and procedures

- Supporting the Quality Plan shall be Quality Processes/Procedures (QPs) for the works. The responsibility for review and approval of QPs is with the

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Contractor. The primary activities addressed by QPs and to be implemented by
the Contractor are to include:

- o document control including preparation, checking, approval, updating,
  receipt and control of incoming documents, distribution, storage and
  maintenance of records;
- o design control including verification, approval and acceptance by
  others;
- o performance of quality verification reviews
- o monitoring the activities of any consultants, subcontractors, suppliers
  and sub-tiers thereof, to ensure their compliance with the Contract;
- o administration of non-conformity and reporting to the Project Director;
- o Production of weekly reports of quality issues including non-
  conformity records and KPIs as deemed appropriate.

- The Contractor, and through him, his consultants, subcontractors and suppliers etc,
  engaged in designing and supplying or any other service connected with the works,
  shall develop and maintain procedures for carrying out checks, reviews and
  verification activities appropriate for the services they provide. These procedures
  shall be subject to the review and acceptance of the PG&E Engineering Lead.

- The Contract Quality Plan shall include or reference the controls to be applied
  by subcontractors, suppliers and sub-tiers thereof, both directly and by
  identifying the Quality System documentation that Subcontractors, suppliers
  and sub-tiers thereof are required to produce. The Contractor shall ensure that
  subcontractors, suppliers and sub-tiers thereof agree to and implement the
  applicable controls specified in the Contract Quality Plan and the identified
  Quality System documentation.

iv. Assessments

- The Contractor shall submit with his Quality Plan a schedule of his internal and
  external consultant, subcontractor and supplier assessments that are to be
  conducted by his personnel. The schedule, scope and method of the assessments
  are such as to enable the Contractor to verify that all aspects of the works are
  being conducted in accordance with contractual requirements.

- The Contractor shall allow PG&E MAOP Validation Project representative and
  authorized third parties to observe/participate in these assessments and to conduct
  additional independent assessments, as they consider appropriate to provide
  assurance that the works are being conducted in accordance with contractual
  requirements. The Contractor shall provide the facilities and access necessary for
  these assessments to be carried out effectively. The Contractor shall place similar
  requirements on his consultants, Subcontractors, and suppliers.

- All project related assessments performed by the Contractor, his consultants,
  subcontractors, suppliers and sub-tiers thereof, shall be reported and copied to
  PG&E MAOP Validation Project Director, who will review and analyze for serious
  findings and trends. The Contractor will close-out all assessment findings in a
  timely manner and instigate measures to prevent a recurrence. PG&E MAOP

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Validation Project Director will monitor the closure of Contractor assessment findings through assessment, surveillance and review activities to demonstrate that the works are progressing in accordance with specified requirements.

v. Organization and resources

- The Contractor shall develop his own, and his, major subcontractors', consultants' and suppliers' their own, organization charts. The charts shall show the reporting structure of the key personnel on the Project. The charts shall identify all personnel responsible for Safety Critical Work and key activities.

- The Contractor shall demonstrate that adequate resources are provided to fulfill the requirements for quality and environmental management, inspection & testing and certification as detailed in the Contract. This shall include demonstrating that personnel possess the necessary qualifications and competencies required to carry out specific tasks.

- The Contractor shall provide regular and appropriate training to all personnel in the operation of the Quality System and as necessary to ensure their competence to do their work and shall maintain records of all such training.

vi. Recommendations for Acceptance criteria for PFL

- PG&E MAOP Validation Project will issue PFL acceptance criteria that will describe in detail the requirements with regard to assembly, compilation and content of final turnover documentation.

- Requests for Information (RFIs) shall be used by the Contractor to formally request from the Engineer information, clarification or agreement to a proposed action.

- Each PFL attribute requiring a concession or design change shall be referred to PG&E MAOP Validation Project by the Contractor for appropriate resolution.

- The Contractor shall be responsible for demonstrating that specified requirements have been met.  This includes the implementation of effective controls to ensure that the checking, review, inspection and testing of the Contract works are completed.

- PG&E MAOP Validation Project shall manage the effectiveness of the Contractor's certification system through:
  - surveillance,
  - witnessing appropriate key activities,
  - review of certification and records,
  - monitoring and participation in the Contractor's assessment schedule,
  - Independent assessment.

vii. Contractor / Vendor Qualification

- Each vendor / external contractor shall demonstrate the ability to meet the following set of predetermined parameters through a "trial" demonstration period. The details

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of the qualification activities shall be documented and the results recorded for each vendor performing PFL build activities.

## IV. Project Sub process

i. The QA Plan for each of the Project Sub processes will be listed as separate appendices

- PGE_MAOP_01_PFL_Prep_QA_Procedure.docx
- PGE_MAOP_02_Retrieval_QA_Procedure.docx
- PGE_MAOP_03_Doc_Type_QA_Procedure.docx
- PGE_MAOP_04_PFL_Build_QA_Procedure.docx
- PGE_MAOP_05_IR_FVE_QA_Procedure.docx
- PGE_MAOP_06_Report_QA.docx

# MAOP Phase III QA Procedure

## Document (PFL) Preparation

17 November 2011
version 1.5

# REVISION CONTROL SHEET

| Version | Date | Status | Modified | Comments |
|---------|------|--------|----------|----------|
| 1.0 | Nov. 17, 2011 | | Omar Rahman | Drafted PFL Prep testing procedure |
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| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# Table of Contents

# I. PFL Preparation Sub-Process Overview

## 1. Docume nt Preparation QA Activities High-level Overview

The document preparation sub-process includes the following QA activities that will be reviewed accordingly for the MAOP Phase 2 efforts. This section is a high-level overview of the different QA activities. The detail procedures for these QA activities will be defined further in the subsequent sections.

| Document Preparation Activities | Definition of the product | Definition of Defective product | Specifications and Reference Documents |
|---|---|---|---|
| 1. **PFL Prep** | Once documents are categorized, they are associated to specific jobs. The job files are then bundled together by specified line numbers and mile points. The resulting package is called a Bundle. A given Bundle must contain all relevant plat sheets and job numbers required for build. | Defective product for PFL prep would include the following criteria: 1) Fail = For plat sheets (both d-plat and t-plat) that are missing from the Bundle but required for the Build. 2) Fail = For Job Numbers that are missing from the Bundle but required for the Build. | N/A |

# II. PFL Prep

## 1. Stage Des cription

PFL Prep is the process by which documents are associated to job numbers, job numbers are organized into bundles, and bundles are delivered to the build team for use in building the Pipeline Features Lists (PFLs).

Stage Deliverable Definition:

The deliverable from the PFL Prep process is a bundle. A bundle is a package of documents pertaining to various line segments and SHORTS.

Documents in a bundle are organized by their corresponding job number and include; plat sheets, drawings, STPRs, BOMs, etc. At a minimum, bundles must contain all relevant plat sheets and job numbers for the lines and SHORTS that they represent. Once the bundle is complete, it is delivered to the PFL build team.

## 2. QA Dat a Collection & Sampling Details

The population of bundles are stored in the ECTS system. The sample size of bundles that will be reviewed will correspond to a 95% confidence level and 2% error rate. If the total population of bundles is not known in advance to use for sampling determination, sample at least 10% of bundles completed on a weekly basis, until the error rate falls to an acceptable level (determined by management).

## 3. QA T esting Process

The purpose of Quality Assurance oversight of the prep process is to give management confidence that the process is being executed as designed, and to provide an independent set of data to use in determining an acceptable level of errors for the process.

Testing Procedures: There are two tests that are done for PFL Prep. The first test is to ensure that all of the required plat sheets are included in the bundle. The second test is to ensure that all of the required job numbers are included in the bundle. Below is a high-level description of each QA process:

*Plat Sheet QA*

1) Login to ECTS and randomly select a completed bundle.
2) Open the bundle and verify that the plat walk and job number review has been completed and QC reviewed.
3) Record the line numbers, mile points, and SHORTS represented by the bundle in the QA log.
4) Open GIS Gas View and search for the appropriate line numbers, mile points, and SHORTS. Record all of the corresponding d-plats in the QA log.
5) Make a note of all transmission lines that are either in the vicinity of or taps directly off of the lines and SHORTS being reviewed. Record the transmission line numbers in the QA log.
6) Search ECTS for all documents associated to the bundle and all job docs within the PFL mileage for the required d-plats and t-plats identified in step 4 and step 5.
7) Compare the plat sheets identified on the QA log with the plat sheets in ECTS and note the gaps. These are the potential fails.
8) Perform a secondary QA for all potential fails with a supervisor from the PFL Prep team.

*Job Number QA*

1) Open all of the identified plat sheets one-by-one and walk the appropriate lines and SHORTS.
2) Record all of the job numbers that correspond to the lines and SHORTS in the QA log.
3) Search ECTS for all job numbers linked to the bundle.
4) Compare the job numbers identified on the QA log with the job numbers in ECTS and note the gaps. These are the potential fails.
5) Perform a secondary QA for all potential fails with a supervisor from the PFL Prep team.

# 4. Docume ntation of Results & Archiving

QA results for the PFL Prep process are detailed in an excel workbook and stored in the QA/QC folder in SharePoint. There are two worksheets in the excel workbook, one that corresponds to the plat sheet QA (see image 6 below) and one that corresponds to the job number QA (see image 7 below).

*Image 6*

| PG&E MAOP Phase 3 QA | | | | | | Total Pass | 331 | | |
| PFL Prep QA Completeness | | | | | | Total Fail | 7 | | |

| Data Set Number | QA Test Date | QA Reviewer | PFL Bundle ID | D-Walk/ T-Walk Complete Date | Doc Type | Image | Pass / Fail | Secondary QA (Y/N) | Failure Classification |
|---|---|---|---|---|---|---|---|---|---|
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | yol2583a6.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | yol2522j6.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | yol2522j7.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2466f6.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2526C4.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2526C5.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2526C6.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2526B6.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2526B7.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2526A7.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2526A8.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2465j8.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2466j1.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2466i1.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2466i2.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2466h2.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2466h3.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | YOL2524h3.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | yol2524f5.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | yol2582B6.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | 2525D1.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | yol2583a3.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | | Fail | Yes | Missing Plat Sheet |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | D-Plat | | Fail | Yes | Missing Plat Sheet |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | T-Plat | 385100sB119.tif | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | T-Plat | 580631s1 frame4.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | T-Plat | 580631s1 frame5.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | T-Plat | 580631s1 frame6.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | T-Plat | 580631s1 frame7.pdf | Pass | No | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | T-Plat | 580631s1 frame8.pdf | Pass | No | |

*Image 7*

| PG&E MAOP Phase 3 QA | | | | | Total Pass | 547 | | | |
| PFL Prep QA Completeness | | | | | Total Fail | 5 | | | |

| Data Set Number | QA Test Date | QA Reviewer | PFL Cluster ID | D-Walk/ T-Walk Complete Date | Job # | Pass / Fail | Secondary QA (Y/N) | Failure Classification | QA Notes |
|---|---|---|---|---|---|---|---|---|---|
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 67599 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 57456 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 7045145 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 4583A | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 458911 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 5N99219 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 4222D | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 4776A | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 73031 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 4540043 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 4893467 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 458911 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 60393 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 100363 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 101741 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 410930 | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 4050F | Pass | No | | |
| PPC001 | 11/1/2011 | Omar Rahman | B30008 | 10/24/2011 | 169927 | Pass | No | | |

# 5. Trend Analysis & Continuous Improvement

Testing exceptions will be compiled and analyzed to determine any pervasive process errors as well as where in the process they are being made. Based on this analysis, corrective action will be taken to address any identified process break downs.

Additionally, QA results will be compiled weekly in summary metrics and reported on. This will provide assurance that the PFL Prep process is running smoothly and within a specified error rate. The nature of and frequency of errors will be briefed with management, and a determination of the acceptable level of error or variation in the final product should be discussed with process owners and management. Corrective actions should be targeted to drive the error rate to an acceptable level as determined by management. Image 8 and Image 9 represent examples of the summary metrics.

*Image 8*

*Image 9*



Plat Sheet QA Summary

| | PPC001 | PPC002 | PPC003 | PPC004 | PPC005 | PPC006 | PPC007 |
|---|---|---|---|---|---|---|---|
| Fail | 3 | 2 | 1 | | | 1 | |
| Pass | 29 | 37 | 10 | 26 | 41 | 25 | 34 |



% of Plat Sheet Errors
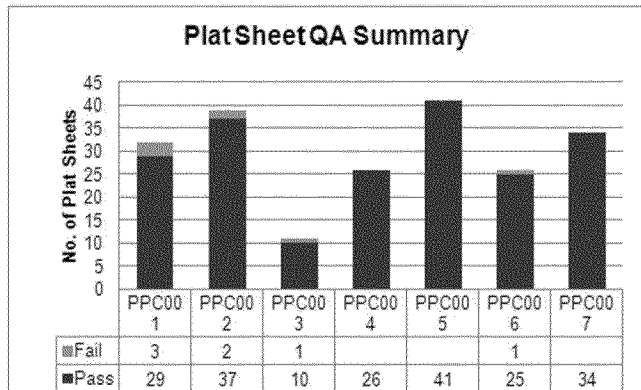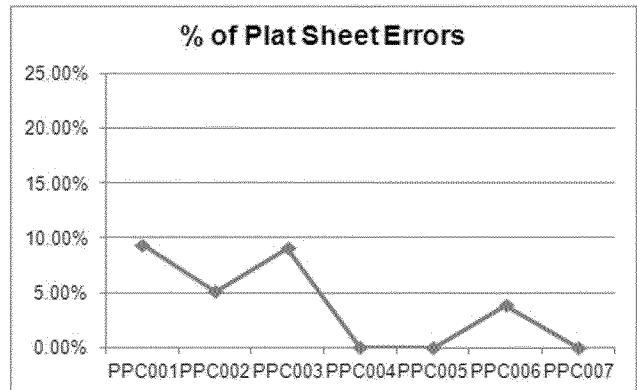
# MAOP Phase III QA Procedure

Retrieval

11 April 2012
version 1.3

# REVISION CONTROL SHEET

| Version | Date | Status | Modified | Comments |
|---|---|---|---|---|
| 1.1 | November 18, 2011 | | Austin Clark | Included QA procedures that were reviewed / approved by Valda Sanders, Scott Toback, and Rich Martinez |
| 1.2 | April 11, 2012 | DRAFT | Chris Montaño | Detail Retrieval QA to include processes that are currently in use. |
| 1.3 | April 12, 2012 | DRAFT | Chris Montaño | Detail new Retrieval process developed with Austin Clark and Scott Toback. |
| | | | | |
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# Table of Contents

# I.   Phase III Retrieval Sub-Process Overview

## 1. Phase III Retrieval QA Activities High-level Overview

The Phase III Retrieval sub-process includes the following QA activities that will be reviewed accordingly for the MAOP Phase 3 efforts.  This section is a high-level overview of the different QA activities within the Retrieval process. The detailed procedures for these QA activities will be defined further in subsequent sections.

| Retrieval Activities | Definition of the product | Definition of Defective product | Specifications and Reference Documents |
|---|---|---|---|
| 1. **Emeryville Retrieval** | The "Emeryville Retrieval" process consists of identifying jobs that reside in the Emeryville warehouse using the Filemaker system, and then searching for those identified jobs in the warehouse.  QA activities will be performed on the Emeryville Retrieval process and will assess the accuracy of the process. | A defective product in the Emeryville Retrieval process would include the following:<br><br>Jobs that physically reside in the Emeryville warehouse yet have inaccurate or incomplete data in the Filemaker system (e.g. no indication in Filemaker that job is located in Emeryville). | Reference documents include:<br><br>+ Retrieval Process map for Phase 1 and 2 |
| 2. **Field Retrieval** | The "Field Retrieval" process consists of identifying jobs that do not reside in the Emeryville warehouse, and then searching for those identified jobs in PG&E field offices.  QA activities will be performed on the Field Retrieval process and will assess the consistency and accuracy of the process. | A defective product in the Field Retrieval process would include the following:<br><br>Field Retrieval teams that do not consistently follow / complete the defined field retrieval approach, protocols, and documentation.<br><br>A defined Field Retrieval approach that does not effectively find requested job files (i.e. too many "unfound" job files in the field) | Reference documents include:<br><br>+ Retrieval Process map for Phase 1 and 2 |
| 3. **Transmittal** | The "Transmittal" process consists of tracking images / job files discovered at the field office, transporting those documents to the central scanning facility in Emeryville, and receiving those images / job files.  This process will utilize a "chain of custody" solution to track the location of specific job files.  QA activities will be performed on the Transmittal process, with focus on the chain of custody solution, and will assess the accuracy of this process. | A defective product in the Transmittal process would include the following:<br><br>Any difference in the image / job file count at the field office vs. the image / job file count at the central scanning facility for a particular package of job files. | Reference documents include:<br><br>+ Retrieval Process map for Phase 1 and 2 |

| 4. **Scanning** | The "Scanning" process consists of creating readable and accurate digital images of the job files that are either retrieved from the field or pulled from the Emeryville warehouse. QA activities will focus on assessing the existing QC process for image scan quality. | A defective product in the Scanning process would include the following:<br><br>An ineffective scan quality internal QC process manifested by unacceptable error rates in scan quality. Scan quality errors would be defined as an image that is missing pages, missing data on pages, or un-readable. | Reference documents include:<br><br>+ Retrieval Process map for Phase 1 and 2 |
|---|---|---|---|

## 2. Docume nt Preparation Reporting and Archiving

All document preparation QA results will be available on SharePoint. Below is a link to the SharePoint site.

*Note*: Each QA activity will have its own folder where the results will be stored.

http://wss/sites/GasProgramAndPerfMgmt/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2fsites%2fGasProgramAndPerfMgmt%2fShared%20Documents%2fSan%20Bruno%20Incident%20PMO%2fGT%20Data%20Validation%20Project%2fQA%5fQC%2fPhase%20II%20PFL%20Build%2f30%20QA%20%2dDocument%20Preparation&FolderCTID=&View=%7bA976F191%2dDBF6%2d499D%2d9AD6%2d934F04648538%7d

# II.  Emeryville Retrieval

## 1. Stage Des cription

The "Emeryville Retrieval" process consists of identifying jobs that reside in the Emeryville warehouse using the Filemaker system, and then searching for those identified jobs in the warehouse.

## 2. QA Dat a Collection & Sampling Details

The population consists of all hardcopy job files that currently reside in the Emeryville warehouse. The scientific sample size will be calculated based on defined precision, error rate, and confidence level (precision rate = +-2% = 4% precision rate, expected error rate = 2%, confidence level = 95%).

## 3. QA T esting Process

Below is a description of the QA testing procedures:

- Perform a statistical sample test of the entire population of physical job files stored at the Emeryville warehouse
- Randomly sample Job File boxes and document shelf #, box #, bar coded JF # (e.g. JFN12345), and the Job File number from the site (e.g. WO 1234, GM 1432) located on the job file tab or inside the job file
- Search Filemaker system using the site job file # (e.g. WO 1234)
- Validate accuracy of all data elements collected from warehouse

- ➢ Error is defined as a job file with any incorrect information in the Filemaker system.
- ➢ A Failure occurs when an error in the Filemaker incorrectly reports the location of a job file.

# 4. Docume ntation of Results & Archiving

Document the Test Results on the "Emeryville Retrieval - QA Testing Results" Excel spreadsheet.

| Testing Date | Sample # | Job # | ECTS Record ID # | Box # | Number of hard copy documents in job Folder (1) | Number of hard copy job folder documents found in ECTS file (2) | Number of hard copy job folder documents not found in ECTS file (3) | Pass or Fail | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 4/19/2011 | 1 | 4226270 | 849568 | GTC060 | 22 | 22 | 0 | Pass | |
| 4/19/2011 | 2 | 7018397 | 849569 | GTC060 | 12 | 12 | 0 | Pass | |
| 4/19/2011 | 3 | 4676D | 806995 | GTC060 | 5 | 5 | 0 | Pass | |
| 4/19/2011 | 4 | 138191 | 849563 | GTC060 | 8 | 8 | 0 | Pass | |
| 4/19/2011 | 5 | 6098884 | 629383 | GTC079 | 15 | 15 | 0 | Pass | |

# 5. T rend Analysis & Continuous Improvement

Testing exceptions will be compiled and analyzed to determine any process error trends and to enable root cause analysis. Based on this analysis, corrective action will be taken to address any identified process breakdowns.

# III.  Field Retrieval

## 1. Stage Des cription

The "Field Retrieval" process consists of identifying jobs that do not reside in the Emeryville warehouse, and then searching for those identified jobs in PG&E field offices.

## 2. QA Dat a Collection & Sampling Details

The QA process will collect and examine the documentation, processes, protocols, and level of detail utilized by the field teams.  The QA process will also consist of independently meeting with field office supervisors / mappers to assess the accuracy and consistency of the retrieval approach.  The QA process will be performed across the field teams, office types, and throughout different field office regions.

## 3. QA T esting Process

Below is a description of the QA testing procedures:

Test retrieval field team procedures during retrieval visits to sites.  Assess consistency of documentation, level of detail, and protocol used during retrieval process. Independently meet with mapping site supervisors / mappers and assess accuracy of job file retrieval approach.  Perform testing across all field teams, office types, and regions. QA measures the accuracy, completeness, and consistency, in both the _processes_ followed by Retrieval Teams and the _results_ they produce in documents retrieved.

Retrieval QA Metrics:
1. **Pass** – Procedures and processes followed and documents were accurately marked 'Not Found', 'NA' or Retrieved by Retrieval Team.
2. **Error** – Inconsistency in applying the retrieval procedures and processes, however, does not result in reduced information for the completeness of the PFL Build process. (if we call out an error, we need to clearly document it)
   e.g. Document was incorrectly labelled 'Not Found' or 'NA' by Retrieval Team but no document requested was missed by the Retrieval Team.
3. **Fail** – Inconsistency in applying the retrieval processes that result in reduced information for the completeness of the PFL Build process.
   e.g. Document was incorrectly marked 'Not Found' or 'NA' by Retrieval Team and consequently not retrieved.

| Item | Description | When | Responsible |
|---|---|---|---|
| **1. Identify Field Office and Test Set** | 1. Obtain the Retrieval Schedule for the next week.<br>2. Use field retrieval schedule to identify a field office and team for the _weekly_ Field Retrieval QA visit.<br>3. Use ECTS to select a sample of closed Job Requests for the selected field office that were determined to be "Not-Found" (NF). Select from the most recent document Field Retrieval visit. If there are not a reasonable number of NFs to test, select additional NFs from the previous visit. (note: this is not a statistically-driven sample population.)<br>4. Selection of field office, team, and closed Job Requests to test should be as random as possible. Given limited number of active retrieval sites, randomization was upon all documents retrieved from a given office within a 2 to 3 month window.<br>5. Notify Retrieval Lead of selected site.<br>6. Send an email to mapping lead and let them know that you will be on-site and would like to meet with them independently of the Field Retrieval Team. | Friday prior to week visit will take place. | 1. Field Retrieval-QA Lead<br>  1.1. PG&E Retrieval Supervisor<br>  1.2. Field Retrieval-QA<br>  1.3. Retrieval Lead<br>  1.4. Retrieval Scheduler |
| **2. On-Site Retrieval QA (apart from Retrieval Team)** | 1. Independently meet with mapping lead.<br>  1.1. Confirm all locations to search for documents.<br>  1.2. Inquire about any secondary sites on premises where Job Documents may be stored.<br>  1.3. Ask if the previous team met with mapping lead (or someone else) to review all NFs.<br>  1.4. Ask if the current team has inquired with them for help in finding NFs or set up a meeting with them.<br>  1.5. Give mapping lead a list of NFs that you are validating.- ask for assistance locating the NFs.<br>2. Conduct search for NFs.<br>3. Validate NFs on Plats/GIS.<br>4. Record each NF as "Pass", "Fail", "Error". (see definitions at the beginning of Process) | Day of visit | 1. Field Retrieval-QA |

| Item | Description | When | Responsible |
|---|---|---|---|
| 3. **On-Site Process QA (with Retrieval Team)** | 1. Observe Retrieval Processes.<br>  1.1. Ask Retrieval Team to narrate their process as they look for several Job Documents Requests.<br>  1.2. Seek to impact Field Retrieval team workflow as little as possible.<br>2. Process QA Notes:<br>  2.1. Observe Field Retrieval team processes for both NFs and documents that are retrieved.<br>  2.2. Retrieval Team verifies that the retrieved documents match requested documents.<br>  2.3. Retrieval Team verifies the record number of a current NF document using either GIS or Plat.<br>  2.4. Retrieval Team searches any secondary sites identified by mapping lead.<br>  2.5. Retrieval Team searches one Job Folder before and after the Job Folder for a current NF Job Request.<br>  2.6. Retrieval Team has reviewed (or scheduled a meeting to review) NFs with mapping lead or other mapping staff.<br>  2.7. GSRs and/or Preliminary Jobs:<br>    2.7.1. Secondary search performed for NF GSR by team lead.<br>    2.7.2. Retrieval Team searches one GSR Folder before and after the GSR Folder for a current NF GSR Request.<br>    2.7.3. GRS and/or Preliminary Job are Added to Chain of Custody Letter<br>    2.7.4. Scanned on-site<br>    2.7.5. Returned to original location.<br>  2.8. Bar code for Files and Boxes are scanned into project tracker. | Day of visit | 1. Field Retrieval-QA<br>2. Field Retrieval Team |
| 4. **After Visit** | 1. Check to see if Retrieval Checklist was completed (after field visit is closed out by Field Retrieval team,)<br>2. Check to see if Document Requests marked NA were documented in the appropriate ECTS retrieval field. | Next Day | 1. Field Retrieval-QA |

| Item | Description | When | Responsible |
|------|-------------|------|-------------|
| **5.** **Communications** | 1. Calculate metrics on:<br>  1.1. Errors<br>  1.2. Fails<br>2. Write up findings<br>3. Write up recommendations<br>4. Update slide and send to Field Retrieval-QA Lead for review.<br>5. Discuss metrics with Retrieval team and Retrieval Team Lead and Revise (if necessary)<br>6. Conduct detailed analysis on errors/fails/inconsistencies<br>7. Report out. | Next Day (if possible) | 1. Field Retrieval-QA<br>2. Retrieval Lead<br>3. Retrieval Team |

# 4. Docume ntation of Results & Archiving

Document the Test Results on the "Field Retrieval - QA Testing Results" Excel spreadsheet.

| Testing Date | Sample # | Job # | ECTS Record ID # | Box # | 1 Number of hard copy documents in job Folder | 2 Number of hard copy job folder documents found in ECTS file | 3 Number of hard copy job folder documents not found in ECTS file | Pass or Fail | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 4/19/2011 | 1 | 4226270 | 849568 | GTC060 | 22 | 22 | 0 | Pass | |
| 4/19/2011 | 2 | 7018397 | 849569 | GTC060 | 12 | 12 | 0 | Pass | |
| 4/19/2011 | 3 | 4676D | 806995 | GTC060 | 5 | 5 | 0 | Pass | |
| 4/19/2011 | 4 | 138191 | 849563 | GTC060 | 8 | 8 | 0 | Pass | |
| 4/19/2011 | 5 | 6098884 | 629383 | GTC079 | 15 | 15 | 0 | Pass | |

# 5. T rend Analysis & Continuous Improvement

Testing exceptions will be compiled and analyzed to determine any process error trends and to enable root cause analysis. Based on this analysis, corrective action will be taken to address any identified process breakdowns.

# IV. Transmittal

## 1. Stage Des cription

The "Transmittal" process consists of tracking images / job files located at the field office, transporting those documents to the central scanning facility in Emeryville, and receiving those images / job files.  This process will utilize a "chain of custody" solution to track the location of specific job files. (note: this step does not cover the upload into ECTS Process)

## 2. QA Dat a Collection & Sampling Details

The QA process will collect job file counts from the field office based on the chain of custody solution, as well as job file counts at the central scanning facility for the same package of job files.  Since the chain of custody solution has not yet been implemented, the QA data collection is not completely defined.

## 3. QA T esting Process

Below is a description of the QA testing procedures:

- Document image count of job files discovered in the field through field tracking mechanism
- Document image count of job files received in the central scanning facility
- Document the return of images back to field office (as required)
- Validate accuracy of image counts and report any deviations

- ➢ Failure is defined as any difference in image counts between docs removed from field office vs. docs in central scanning location.

## 4. Docume ntation of Results & Archiving

Document the Test Results on the "Transmittal - QA Testing Results" Excel spreadsheet.

| | | | | | 1 | 2 | 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| Testing Date | Sample # | Job # | ECTS Record ID # | Box # | Number of hard copy documents in job Folder | Number of hard copy job folder documents found in ECTS file | Number of hard copy job folder documents not found in ECTS file | Pass or Fail | Notes |
| 4/19/2011 | 1 | 4226270 | 849568 | GTC060 | 22 | 22 | 0 | Pass | |
| 4/19/2011 | 2 | 7018397 | 849569 | GTC060 | 12 | 12 | 0 | Pass | |
| 4/19/2011 | 3 | 4676D | 806995 | GTC060 | 5 | 5 | 0 | Pass | |
| 4/19/2011 | 4 | 138191 | 849563 | GTC060 | 8 | 8 | 0 | Pass | |
| 4/19/2011 | 5 | 6098884 | 629383 | GTC079 | 15 | 15 | 0 | Pass | |

## 5. Trend Analysis & Continuous Improvement

Testing exceptions will be compiled and analyzed to determine any process error trends and to enable root cause analysis. Based on this analysis, corrective action will be taken to address any identified process breakdowns.

# V.  Scanning

## 1. Stage Description

The "Scanning" process consists of creating readable and accurate digital images of the job files that are either retrieved from the field or pulled from the Emeryville warehouse.

## 2. QA Data Collection & Sampling Details

The QA process will collect and examine the documentation, processes, protocols, and level of detail utilized by the internal QC team at the central scanning facility.  The QA process will assess the effectiveness of the existing internal QC process.

As necessary, perform a statistical sample test based on the daily population of scanned job files.  The sample size will be calculated based on defined precision, error rate, and confidence level (precision rate = +-2% = 4% precision rate, error rate = 2%, confidence level = 95%).

## 3. QA Testing Process
Below is a description of the QA testing procedures:

- Test accuracy of scanned images by comparing original hard copy job file to scanned image
- Confirm image accuracy by comparing 2 unique values on each page (original and scanned image)

- ➤ Failure is defined as a missing page or degraded quality of scan (e.g. cannot view all data on page)
- ➤ Incorrect page order is considered an inconsistency

## 4. Documentation of Results & Archiving

Document the Test Results on the "Scanning - QA Testing Results" Excel spreadsheet.

| | | | | | 1 | 2 | 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| Testing Date | Sample # | Job # | ECTS Record ID # | Box # | Number of hard copy documents in job Folder | Number of hard copy job folder documents found in ECTS file | Number of hard copy job folder documents not found in ECTS file | Pass or Fail | Notes |
| 4/19/2011 | 1 | 4226270 | 849568 | GTC060 | 22 | 22 | 0 | Pass | |
| 4/19/2011 | 2 | 7018397 | 849569 | GTC060 | 12 | 12 | 0 | Pass | |
| 4/19/2011 | 3 | 4676D | 806995 | GTC060 | 5 | 5 | 0 | Pass | |
| 4/19/2011 | 4 | 138191 | 849563 | GTC060 | 8 | 8 | 0 | Pass | |
| 4/19/2011 | 5 | 6098884 | 629383 | GTC079 | 15 | 15 | 0 | Pass | |

## 5. Trend Analysis & Continuous Improvement

Testing exceptions will be compiled and analyzed to determine any process error trends and to enable root cause analysis. Based on this analysis, corrective action will be taken to address any identified process breakdowns.

# VI. Overall Retrieval Process Success rate

## 1. Description

On a periodic basis (monthly or fortnightly) assess the overall retrieval success rate by comparing the list of documents requested for retrieval successfully located to the list requested for retrieval. Determine which step in the above process could be a contributor to errors / gaps, and determine if corrective action has an impact on the overall accuracy and consistency of the retrieval process.

# MAOP Phase III QA/QC Procedure

## Document Preparation

01 November 2011
version 1.4

## REVISION CONTROL SHEET

| Version | Date | Status | Modified | Comments |
|---------|------|--------|----------|----------|
| 1.1 | June 21, 2011 | | Rahima Butler | Updated Doc Typing Process Section (III) and updated formatting changes. |
| 1.2 | June 21, 2011 | | Yashoda Clark | Added doc type testing procedure narrative to supplement existing flowchart. |
| 1.3 | Oct. 21, 2011 | | Rafael Aquino | Updated Doc Typing Process Section (III) |
| 1.4 | Nov. 1, 2011 | | Rafael Aquino | Added Concordance Process Map in Doc Typing Process Section (III) |
| | | | | |
| | | | | |
| | | | | |

# Table of Contents

# I.    Document Preparation Sub-Process Overview

## 1. Docume nt Preparation QA Activities High-level Overview

The document preparation sub-process includes the following QA activities that will be reviewed accordingly for the MAOP Phase 2 efforts.  This section is a high-level overview of the different QA activities.  The detail procedures for these QA activities will be defined further in the subsequent sections.

| Document Preparation Activities | Definition of the product | Definition of Defective product | Specifications and Reference Documents |
|---|---|---|---|
| **1.   Doc Typing** | All job document images that are imported into the ECTS tool go through the doc typing process. These document images are categorized based on their specific document type. <br><br> Documents which are required for the PFL Build process are classified as "Primary," "Secondary," or Aid." <br><br> Documents that are not relevant for PFL build are classified as "Non-PFL." <br><br> Doc typing occurs currently in ECTS and in Concordance (Celerity's doc typing database). | Defective product for doc typing would include the following criteria: <br> 1) Inconsistency = For images doc typed as a PFL Build image and categorized in an incorrect doc type category <br> 2) Fail = For images doc typed as a Non-PFL Build Image (Non-PFL, Miscellaneous, or Soils/Trenching Information) but should have been doc typed as one of the specific PFL Build doc types | Reference documents include: <br><br> + Doc Typing Reference Document <br><br> + Doc Typing Job Aid |

## 2. Docume nt Preparation Reporting and Archiving

All document preparation QA results will be available on SharePoint.  Below is a link to the SharePoint site.

**Note**: Each QA activity will have its own folder where the results will be stored.

http://wss/sites/GasProgramAndPerfMgmt/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2fsites%2fGasProgramAndPerfMgmt%2fShared%20Documents%2fSan%20Bruno%20Incident%20PMO%2fGT%20Data%20Validation%20Project%2fQA%5fQC%2fPhase%20II%20PFL%20Build%2f30%20QA%20%2dDocument%20Preparation&FolderCTID=&View=%7bA976F191%2dDBF6%2d499D%2d9AD6%2d934F04648538%7d

# II.  Doc Typing

## 1. Stage Description: ECTS QA Framework

All job document images that are imported into the ECTS tool go through the doc typing process.  These document images are categorized based on their specific document type. All job document images are either doc typed in ECTS or doc typed in an external system and then imported into ECTS.

The "ECTS QA" stage covers a sampling of the documents from the following sources:

- Images doc typed in ECTS (including images uploaded from the U: drive)

- Images doc typed in Concordance and subsequently imported into ECTS.

Document images are categorized based on their specific document type.  The document types have been classified as primary (P), secondary (S), and aid (A) documents which are required for the PFL Build process. All documents that are not relevant for PFL build are classified as "Non-PFL" (NP).  See "Image 1" for the high-level doc typing procedures in ECTS and "Image 2" for the high-level procedures in Concordance; as well as at which point in the processes QA activities will occur. See Image 3 for the full list of document types.

Stage Deliverable Definition:

All doc typing categories and definitions are detailed in the Doc Typing Manual and Job Aid.   These documents were used as the guideline for the QA activities. (current version located at the Sharepoint site: http://wss/sites/GasProgramAndPerfMgmt/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2fsites %2fGasProgramAndPerfMgmt%2fShared%20Documents%2fSan%20Bruno%20Incident%20PMO%2fGT%20 Data%20Validation%20Project%2fQA%5fQC%2fPhase%20II%20PFL%20Build%2f30%20QA%20%2dDoc% 20Type%2f50%20Doc%20Typing%20Job%20Aids%20and%20Reference%20Guides&FolderCTID=&View= %7b82923FF0%2dA62E%2d43C0%2d981B%2d80024F56BC50%7d

Image 1
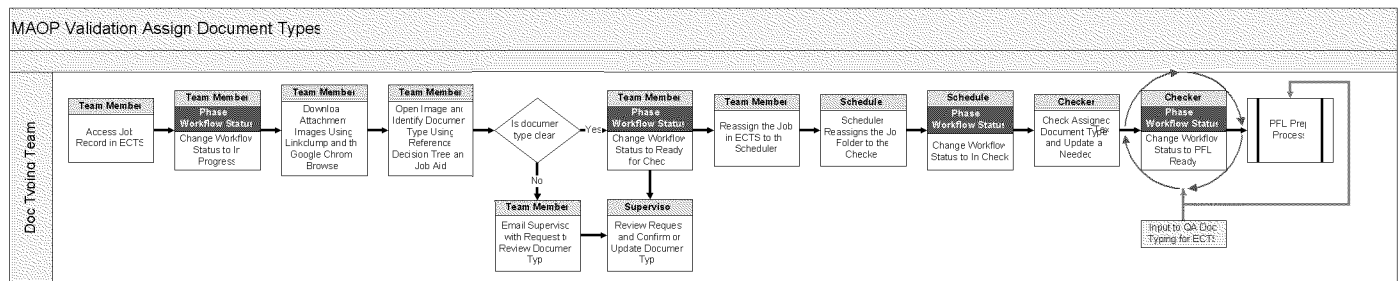


Image 2
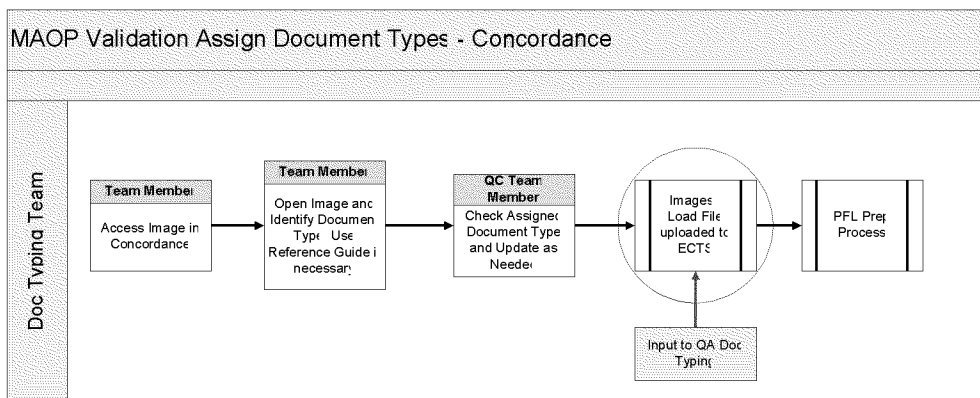
*Image 3*

| Document Type | PFL Prep | P, S OR A | QA Frequency (D/PS) |
|---|---|---|---|
| Drawing-Distribution Plat | Yes | S | PS |
| Drawing-Transmission Plat | Yes | S | PS |
| Drawing-Other | Yes | S | PS |
| Drawing-Index | Yes | A | PS |
| Engineering Materials Memo (EMM) | Yes | S | PS |
| Invoice-Gas | Yes | S | PS |
| Material Requisition-Gas | Yes | S | PS |
| Mill Test | Yes | S | PS |
| Specifications | Yes | S | PS |
| Transport Tag-Gas | Yes | S | PS |
| Inspection/Test: Other | Yes | S | PS |
| Operating Pressure Chart | Yes | P | PS |
| Operating Pressure Log | Yes | P | PS |
| STPR | Yes | P | PS |
| STPR Chart | Yes | P | PS |
| STPR Log | Yes | P | PS |
| STPR Sketch | Yes | P | PS |
| Weld Map | Yes | S | PS |
| Journal Voucher-Gas | Yes | S | PS |
| Soils/Trenching Information | Yes | N/A | PS |
| Miscellaneous | Yes | N/A | D |
| Non-PFL | No | N/A | D |
| Drawing-Construction | Yes | P | D |
| Drawing-Detail | Yes | P | D |
| Drawing-Plan & Profile Sheet | Yes | P | D |
| Drawing-Vicinity | Yes | A | D |
| Detail Sheet | Yes | A | D |
| Face Sheet | Yes | A | D |
| Bill of Material | Yes | P | D |
| A-Form & Leak Test/Report | Yes | P | D |
| H-Form | Yes | P | D |
| Hydrostatic Test Plan | Yes | P | D |
| MAOP Document | Yes | P | D |
| Uprate Procedure | Yes | P | D |
| XRay Document (includes summary and detail) | Yes | A | D |
| Gas Service Record | Yes | P | D |
| Regulator Data Sheet | Yes | P | D |
| Valve Maintenance Record | Yes | P | D |

## 2. QA Data Collection & Sampling Details

Samples will be taken from each data set (provided by PG&E's ISTS team by "PFL Ready Date") based on a 95% confidence level and a 2% error rate.

## 3. QA Testing Process

- QA Input: IT Batch process executed nightly to produce excel spreadsheets of all document doc typed for the day. This input is used to derive the sample size for the QA activities.

- Test Procedure Overview:

    1. Prepare the data set for testing:

    2. Extract images to be tested into test log

3. Verify that the doc type assigned to the image in ECTS is the actual doc type represented (i.e. if the image is categorized as "Drawing- Construction", ensure that it is actually "Drawing- Construction" and not mislabelled as a different category

   i. If the assigned doc type matches the actual doc type, the image is recorded as "Pass"

   ii. If the assigned doc type is categorized as Primary (P), Secondary (S), or Aid (A) and the assigned doc type does not match the actual doc type, record as "Inconsistency" and record correct values in test log (i.e. If a 'Hydrostatic Test Plan' (P) is incorrectly assigned as a 'Specification' (S), record as inconsistency and record 'Specification' and 'S' in the test log).

   iii. If the assigned doc type is categorized as "Non- PFL" or "NP" (This includes Non- PFL, Miscellaneous, and Soils/Trenching Information) and actually is within the Primary (P), Secondary (S), or Aid (A) classifications, record as "Fail" and identify and record correct values in test log (i.e. If a 'Journal Voucher- Gas'"(S) image is incorrectly assigned as a "Miscellaneous" (NP) image, record as 'Fail' and record 'Journal Voucher- Gas' and 'S' in the test log).

   iv. If there is uncertainty whether the assigned document type matches the actual doc type, record as "Secondary QA" for subsequent subject matter expert review.

4. Develop metrics to capture relevant trends from the QA Test Results.

5. Perform corrective actions for Doc Types showing negative trends.

See "Image 4" below for the doc typing QA high-level procedure.

*Image 4*

SB_GT&S_0882183
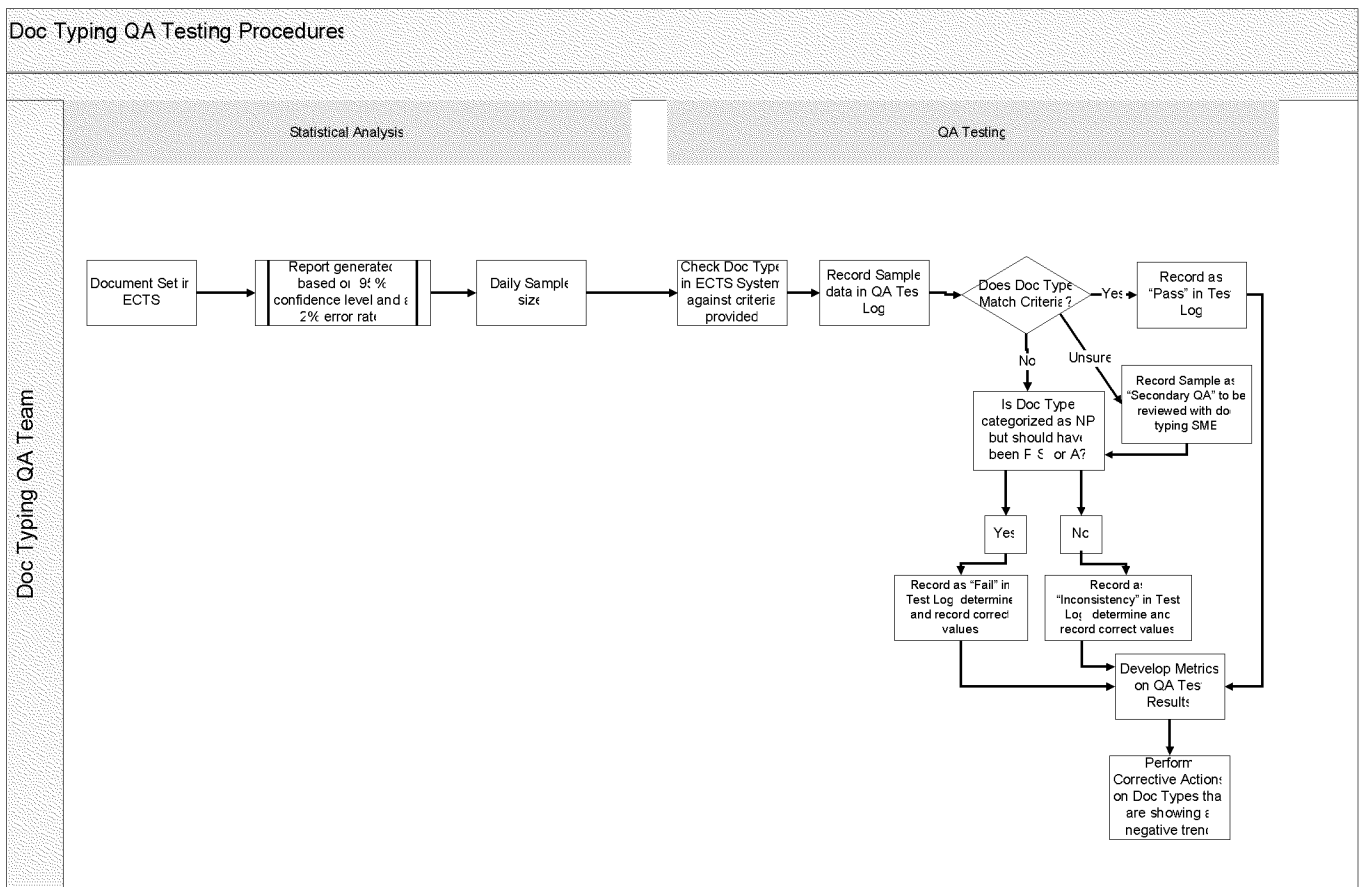
# 4. Docume ntation of Results & Archiving

Document the Test Results on the "Doc Typing results" are detailed on the excel spreadsheet below in image 5 and archived on the QA/QC folder "40 Doc Typing Results" in SharePoint.

*Image 5*

| Data Set Number | Date Tested | Reviewer | Source | PFL Ready Set User | PFL Ready Date | Doc Type | Record ID # | QA Frequency (D/PS) | Priority (P,S,A or NP) | Pass / Fail / Inconsistency / Secondary Q | Secondary QA (Y/N) | If Fail or Inconsistency - Correct Priority Classification (P,S,A or NP) | If Fail or Inconsistency - Correct Value | QA Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DT01 | 4/28/2011 | Dean West | ECTS | TYNER N(NXTB) | 04/18/2011 | A-Forms | 41547 | D | P | Pass | | | | |
| DT01 | 4/28/2011 | Dean West | ECTS | ARANGO H(HXAN) | 04/18/2011 | A-Forms | 80702 | D | P | Pass | | | | |
| DT01 | 4/28/2011 | Dean West | ECTS | YEE G(GLY1) | 04/18/2011 | A-Forms | 585245 | D | P | Pass | | | | |
| DT01 | 4/28/2011 | Dean West | ECTS | VIGHI N(NLV1) | 04/18/2011 | A-Forms | 1024787 | D | P | Pass | | | | |

# 5. T rend Analysis & Continuous Improvement

Testing exceptions will be compiled and analyzed to determine any pervasive process errors as well as where in the process they are being made. Based on this analysis, corrective action will be taken to address any identified process break downs. At the conclusion of QA on each sample set, the preliminary results will be shared with the appropriate Doc typing group that performed the work. The two groups will agree on the errors, investigate root cause, and discuss and implement any changes to the process, training, and reference documentation. Once validated and communicated to the Doc Typing team, the results will be posted to the proper Sharepoint site and briefed to the MAOP Project team.

# 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:

o Determining that the value is N/A, rather than unknown.

o Interpreting information on a document already referenced on the PFL.

o Finding a new document (not previously referenced on the PFL) and using data.

o Using the PRUPF tables to assign a value which represents a conservative historical minimum.

o Using Sound Engineering Judgment (SEJ)

o 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:

o Interpreting information on a document already referenced on the PFL.

o Finding a new document (not previously referenced on the PFL) and using data.

o Using PRUPF tables or appendices to assign a value which represents a conservative historical minimum.

o 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:

o 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.

o 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.

o 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=%7
bF1B22174%2d7BB3%2d4221%2dA760%2d7D195C604679%7d

# Appendix 1: Specification Ranking and QA/QC Tolerances

**Records Verification and MAOP Validation Project**
PFL Build QA/QC Tolerances

| | Item | Property Ranking | Pass Criteria |
|---|---|---|---|
| **Overall PFL** | 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<br>Sleeve (gas carrying with no independent length): 0.1 from begin<br>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<br>Required: Valve | Exact |
| | Pipe Spec | Required: Pipe | Exact |
| | SMYS | Critical: all except valve | Exact |
| | MFTR | Important | Exact |
| | Seam Type | Critical: Pipe, Bend<br>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 |
| Relief Valve | Name | Useful | Exact |
| | 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 | |

# MAOP Phase III QA Procedure

*MAOP Validation Report:*

31 August 2011
version 1.4 Draft

## REVISION CONTROL SHEET

| Version | Date | Status | Modified By | Comments |
|---------|------|--------|-------------|----------|
| 1.1 | 7/20/2011 | Complete | Yashoda Clark | Made changes to entire procedure based on new testing methodology established after conversations with Joe Medina's team, Jane Carlock, and Eddie Edmondson. |
| 1.2 | 7/25/2011 | Complete | Yashoda Clark | |
| 1.3 | 9/19/2011 | In Progress | Cindy Yu | Updated for Sept 10th filing |
| 1.4 | 12/16/2011 | In Progress | Rafael Aquino | Updated section 3.1 for checks pertaining to P5&7 |
| | | | | |
| | | | | |
| | | | | |

# QA of MAOP Validation Report

## 1. Stage Des cription

This process is to validate that the data fields in the used for MAOP calculation in the "MAOP Validation Report" are accurate and complete. The Issue Resolution Team collects a QC Complete PFL spreadsheet from the MAOP Portal and begins analyzing the data/calculation to solve for any unknowns and other relevant variables.

The goal for this testing process is to focus on the validation of the inputs from the QC Complete PFL spreadsheet against what appears in the MAOP Validation Report. The testing procedure is described in detail below.

## 2. QA Dat a Collection & Sampling Details

The September 10th 2011 Filing (Priority 3&4) population consists of 302 miles of gas pipeline which we anticipate will translate into ~720 MAOP reports (including ~500 "Shorts"). 100% check of all MAOP Reports will be conducted.

## 3. QA T esting

### 3.1 Overview

QA Testing will validate that the data from the Pipe Data spreadsheet has been correctly and uniformly transferred to the MAOP Final Report. Below are the details of the QA checks that will be performed:

**First Check- QC Rationale Check** *(performed on all versions of PFL spreadsheet):*

The first check consists of the steps detailed below. If all the validation steps are completed against the FVE section of the Pipe Data spreadsheet from the Data section of the same spreadsheet, the Rationale Check is recorded as a "Pass." Below are guidelines on the Rationale Check.

1. *MAOP Rationale Validation* - the fields for Feature number, OD, WT, SMYS, Seam Type, are validated in the following manner.

    a. If there is a difference when comparing two values between the Data section and the FVE section of the Pipe Data spreadsheet (i.e. there are blank cells that are populated in the FVE section, or if there are any other discrepancies), the rationale field is validated as well as the "Comments" column in the FVE section for an explanation. If no appropriate comment or Rationale is noted, this will be in the MAOP Portal as "QA Issues," will need to be re-evaluated by the engineering team, and re-processed

    b. If the comment explaining a change references a Drawing there is no need for a Rationale

    c. Seam Type changes from a value to "N/A" for all Fittings do not require a Comment or Rationale

**Second Check- "STPR" and "Install Date" Check** *(performed only on versions prior to version 21 of PFL spreadsheet):*

1. *STPR Range* – If the STPR range (including test pressure year) on the Strength Test section of the Pipe Data spreadsheet is not correctly applied to the corresponding beginning/end milepoints on the MAOP Validation Report, this will be in the MAOP Portal as "QA Issues," will need to be re-evaluated by the engineering team, and re-processed.

2. *Install Date* – If the Install Date for each feature on the Data section or FVE section of the Pipe Data Spreadsheet does not align with the Install Date on the MAOP Validation Report, status will be logged in the MAOP Portal as "QA Issues" and will need to be re-evaluated by the engineering team, and re-processed. Note: if no values exist, the installed year date should be "Unknown" on the MAOP Validation report.

**Third Check- MAOP Summary Report Check** *(performed only on version 21 of PFL spreadsheet that were built using enhanced Unknowns Macro):*

1. Suggested values for feature specifications are calculated for the "Unknowns" and "Blanks" under WT, SMYS and Seam Type. If the suggested value is not copied and pasted for the Blanks and Unknowns in the FVE section of the Pipe Data spreadsheet, this will be logged in the MAOP Portal as "QA Issues," will need to be re-evaluated by the engineering team, and re-processed.

## 3.2 MAOP Validation Report Fields NOT in scope

| Field on MAOP Validation Report | Reason For Not Including in Scope |
|---|---|
| Fitting Rating | Calculated field |
| Joint Efficiency Factor | Calculated field |
| MAOP Per Design | Calculated field |
| MAOP Per Test | Calculated field |
| MAOP Per R | Calculated field |
| Class | N/A |
| %SMYS Per R | Calculated field |
| Operating in Class | Calculated field |
| MAOP Limit Factor | Calculated field |
| Feature MAOP | Calculated field |

# 1. Trend Analysis & Continuous Improvement

Testing exceptions will be compiled and analyzed to determine if any systematic errors are occurring. PFLs that have "QA Issues" as status will be measured to track where errors are occurring. Based on this analysis, corrective action will be taken to address any issues.