



APPENDIX A

PG&E’s Measures to Continue to Improve Gas Distribution Recordkeeping and Promote Safety

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Type of Measure	Description of Measure¹
Records Accuracy Improvements	PG&E implemented GD GIS as part of its Pathfinder Project in 2012. GD GIS was deployed across all divisions in August 2015. ²
	Data has been captured from GSRs and integrated into GD GIS, which has enabled PG&E to create an inventory of stubs in a centralized database. ³ This allows PG&E to more efficiently and effectively execute its stub monitoring and removal program, for which PG&E published an updated procedure. ⁴
	PG&E implemented the PAR process for automatically flagging anomalies in data being converted into GD GIS. ⁵
	PG&E created an Asset Registry module within SAP to serve as an inventory of data and maintenance plans for the gas distribution system. PG&E uses SAP to track the transfer of construction as-built records to PG&E’s mapping systems. ⁶
	PG&E implemented Documentum as its primary electronic records repository for unstructured data. Documentum improves records search capabilities and allows for the management of workflows and record lifecycles in a centralized system. ⁷
	PG&E validated gas distribution asset data by comparing distribution asset maps with meter locations included in its customer billing data. ⁸
	In 2014, PG&E began updating SAP with leak repair data captured in electronic A-Forms and validated its gas distribution asset data by comparing these records. ⁹
	PG&E is validating its GD GIS asset data by comparing it with Google Earth maps. ¹⁰
	In 2013, PG&E released an As-Built Drawing Handbook and As-Built Checklist designed to standardize the creation of as-built records, and conducted a series of related trainings. ¹¹
	PG&E is updating its Gas Mapper Manual to cover enhanced practices and procedures, such as GD GIS. It also created training programs for mappers, such as the Mapping Advancement Program and Pathfinder Bootcamp. ¹²
	PG&E instituted a “two person integrity” process that requires mapping jobs completed by a trained mapper to be verified by another trained mapper. ¹³
	In 2013, PG&E’s Mapping Department began publishing and tracking up-to-date performance metrics for as-built jobs. ¹⁴

Type of Measure	Description of Measure
Records Accessibility Improvements	PG&E is scanning and making paper gas service records and distribution as-built records accessible electronically. ¹⁵
	In 2012, PG&E enabled personnel to access L&M tickets and relevant maps, and to record completion of these tickets, on tablets. ¹⁶
	In 2013, PG&E provided crews with mobile access to electronic gas distribution system maps, which allows them to submit mapping correction requests from mobile devices. ¹⁷
	In 2014, PG&E implemented an electronic A-Form, which allows personnel to initiate A-Forms and document leak repair work electronically. ¹⁸
Records Management and Controls	PG&E's Gas Operations launched CAP in October 2013. CAP aids the generation, receipt, and processing of mapping corrections. ¹⁹ PG&E published a procedure outlining the steps for addressing a gas map correction submitted through CAP. ²⁰
	PG&E published policies and standards strengthening the operational protocols for identifying, maintaining, organizing, and retaining records. ²¹
	In 2014, PG&E's Gas Operations established its initial vital records inventory and trained its workforce in records and information management. ²²
	In 2012, PG&E established a Gas Operations Records and Information Management (Gas RIM) team, which has eight full-time employees dedicated to the implementation and oversight of gas records management. ²³
	PG&E's Gas Operations first achieved PAS 55 and ISO 55001 certification in best practice asset management in May 2014, and continues to maintain its certification. ²⁴
	PG&E implemented API Recommended Practice 1173, which provides a framework for pipeline operators to develop and maintain a pipeline safety management system. In November 2015, Lloyd's Register assessed PG&E as being in compliance with the requirements of API 1173. ²⁵
	In 2011, PG&E's Gas Operations established a Quality Management (QM) group to conduct quality assurance reviews of work activities and key processes, validate adherence to new procedures and processes, and identify gaps and areas for improvement. ²⁶ QM group reviews include, for example, reviews of L&M work accuracy and completion, use of the Gas Pipeline Carrier Checklist, and adherence to the GDCC clearance procedures. ²⁷
	PG&E's Internal Audit organization provides expertise on auditing new and existing business processes, and it conducts audits of PG&E's recordkeeping practices and processes to identify areas for improvement. ²⁸

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Gas Distribution Operations	PG&E created grassroots safety teams in different lines of business, including Gas Operations. At their monthly meetings, team members share enterprise-wide safety ideas and concerns from across lines of business.
	Between 2011-2013, PG&E developed the Gas Distribution Control Center (GDCC), a state-of-the art facility that monitors the gas system.
	In 2013, GDCC began using the Supervisory Control and Data Acquisition (SCADA) system to monitor the flow and pressure of gas, and is in the process of installing expanded SCADA points along the gas distribution system. The GDCC also began using the Tactical Analysis Mapping Integration (TAMI) tool.
	In 2014, PG&E implemented the Gas Distribution Clearance Process, which allows centralized monitoring and oversight of work that will affect gas flow in distribution mains.
	In 2014, PG&E created Super Crew, a pilot team that uses improved processes and technology to move non-emergency leaks through a work stream in a shorter time frame. ²⁹
	In 2014, PG&E deployed the Picarro Surveyor, a leak detection device that is approximately 1,000 times more sensitive to natural gas detection than other commercially available leak detection instrument technology. ³⁰
	In 2014, PG&E implemented the Super Gas Ops program, which aligns everyone involved in a Gas Operations construction or maintenance project. This improves work prioritization and creates more visibility into the status of work at every stage. ³¹
Operational Safety Measures	In 2014, PG&E created the Gas Pipeline Carrier Checklist to assist field personnel with identifying potential plastic inserts before starting work. ³²
	PG&E developed the Bolt-On Saddle Punch Tee, a tool that can be used to work on an inserted line without penetrating the plastic pipe. ³³

Type of Measure	Description of Measure
Reducing Risk of Excavation Damage	PG&E published and continuously updates a Damage Prevention Handbook containing all applicable work steps for locating and marking PG&E’s gas and electric facilities. ³⁴
	PG&E created a direct line of progression for its L&M organization and reorganized the operational structure in 2014. PG&E also expanded its L&M training program. ³⁵
	In 2012, PG&E created a stand-alone Operator Qualification (OQ) organization within Gas Operations to ensure worker competence when performing tasks in the field, including L&M employees and contractors. ³⁶
	In 2014, PG&E began using mobile technology and GD GIS to identify situations where personnel need to stand by when third parties are excavating or performing other work adjacent to PG&E’s critical facilities. ³⁷
	Through multiple leadership messages beginning in June 2014, PG&E established an expectation that all employees and contractors stop a job if a recordkeeping inconsistency is discovered. ³⁸
	In 2014, PG&E rolled out targeted public awareness programs with the goal of reducing dig-ins by educating homeowners and contractors regarding safe excavation practices, including the Gold Shovel, Habitual Offender, and DiRT programs. ³⁹
	In March 2015, PG&E developed a Pre-Dig Verification Form for use by its general construction workforce to validate that the site is ready for excavation and that the assets the crew is working on match PG&E’s records. ⁴⁰

¹ See Ex. 5, Attachment W014 (PG&E’s Response to SED Data Request No. 114); *id.*, Attachment W018 (PG&E’s Response to SED Data Request No. 29); *see also* Ex. 4 at 2-5:7 to 2-22:26 (PG&E Reply Testimony, Singh); *id.* at 3-5:15 to 3-23:20 (PG&E Reply Testimony, Higgins); *id.* at 4-6:16 to 4-22:23 (PG&E Reply Testimony, Trevino); *id.* at 5-1:25 to 5-39:13 (PG&E Reply Testimony, Singh).

² Ex. 4 at 2-11:1-33 (PG&E Reply Testimony, Singh); *id.* at 4-7:14-25 (PG&E Reply Testimony, Trevino); *id.* at 5-37:17 to 5-38:3 (PG&E Reply Testimony, Singh). PWA evaluated this as an “innovative practice.” Ex. 1 at 59 tbl.9 (PWA Report).

³ Ex. 4 at 5-7:8-17 (PG&E Reply Testimony, Singh).

⁴ *Id.* at 5-5:21 to 5-7:20 (PG&E Reply Testimony, Singh); *id.* at 5-13:17 to 5-14:5 (PG&E Reply Testimony, Singh); Ex. 7, Attachment W091 (Utility Procedure TD-9500P-16, Deactivation and/or Retirement of Underground Gas Facilities).

⁵ Ex. 4 at 2-19:12-23 (PG&E Reply Testimony, Singh); *id.* at 4-20:16-26 (PG&E Reply Testimony, Trevino). PWA evaluated this as an “innovative practice.” Ex. 1 at 59 tbl.9 (PWA Report).

⁶ Ex. 4 at 2-14:8-29 (PG&E Reply Testimony, Singh); *id.* at 4-7:26-31, 4-11:29 to 4-12:3 (PG&E Reply Testimony, Trevino).

⁷ *Id.* at 2-14:32 to 2-15:23 (PG&E Reply Testimony, Singh).

⁸ *Id.* at 2-20:21 to 2-21:3 (PG&E Reply Testimony, Singh); *id.* at 4-20:16 to 4-21:27 (PG&E Reply Testimony, Trevino). PWA evaluated this as a “best practice.” Ex. 1 at 61 tbl.9 (PWA Report).

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- ⁹ Ex. 4 at 2-20:3-13 (PG&E Reply Testimony, Singh); *id.* at 4-15:16 to 4-16:17 (PG&E Reply Testimony, Trevino); *id.* at 5-11:17-24 (PG&E Reply Testimony, Singh). PWA evaluated this as an “innovative practice.” Ex. 1 at 61 tbl.9 (PWA Report).
- ¹⁰ Ex. 4 at 2-20:21 to 2-21:3 (PG&E Reply Testimony, Singh); *id.* at 4-20:16 to 4-21:27 (PG&E Reply Testimony, Trevino).
- ¹¹ *Id.* at 4-9:3-14 (PG&E Reply Testimony, Trevino); *id.* at 5-12:20 to 5-13:9 (PG&E Reply Testimony, Singh); Ex. 5, Attachment W017 (TD-4461P-20-F01, Checklist for Distribution Mains and Services As-Built Packages); Ex. 7, Attachment W080 (TD-4461M, Rev. 0, As-Built Drawing Handbook).
- ¹² Ex. 4 at 4-8:24 to 4-9:2, 4-10:13 to 4-11:27 (PG&E Reply Testimony, Trevino).
- ¹³ *Id.* at 4-8:2-13 (PG&E Reply Testimony, Trevino).
- ¹⁴ *Id.* at 4-16:23 to 4-17:4 (PG&E Reply Testimony, Trevino). PWA evaluated this as an “innovative practice.” Ex. 1 at 60 tbl.9 (PWA Report).
- ¹⁵ Plat maps were converted into GD GIS, paper GSRs have been scanned and are being entered into GD GIS, and historic as-builts have been scanned and will be made available electronically. Ex. 4 at 2-11:1-11 (PG&E Reply Testimony, Singh). PWA evaluated this as a “best practice.” Ex. 1 at 63 tbl.9 (PWA Report).
- ¹⁶ Ex. 4 at 3-12:11 to 3-13:12 (PG&E Reply Testimony, Higgins); *id.* at 2-22:11-26 (PG&E Reply Testimony, Singh). PWA evaluated this as a “best practice.” Ex. 1 at 62 tbl.9 (PWA Report).
- ¹⁷ Ex. 4 at 2-13:10 to 2-14:6, 2-15:24 to 2-16:17 (PG&E Reply Testimony, Singh); *id.* at 3-12:11 to 3-13:12 (PG&E Reply Testimony, Higgins). PWA evaluated this as a “best practice.” Ex. 1 at 62 tbl.9 (PWA Report).
- ¹⁸ Ex. 4 at 2-22:11-26 (PG&E Reply Testimony, Singh); *id.* at 3-6:27 to 3-7:21 (PG&E Reply Testimony, Higgins). PWA evaluated this as an “innovative practice.” Ex. 1 at 61-62 tbl.9 (PWA Report).
- ¹⁹ Ex. 4 at 4-5:22 to 4-6:15 (PG&E Reply Testimony, Trevino); *id.* at 5-22:22-28 (PG&E Reply Testimony, Singh). PWA evaluated this as an “innovative practice.” Ex. 1 at 63 tbl.9 (PWA Report).
- ²⁰ Ex. 4 at 5-25:14-26 (PG&E Reply Testimony, Singh); Ex. 6, Attachment W029 (Utility Procedure TD-4460P-11, Rev. 0, Gas Map Corrections).
- ²¹ *Id.* at 2-2:16-27, 2-5:17 to 2-6:2 (PG&E Reply Testimony, Singh); Ex. 5, Attachment W008 (Utility Policy TD-01, Rev. 1, Gas Asset Management); *id.*, Attachment W010 (Utility Standard TD-4016S, Rev. 1, Gas Operations Records and Information Management); *id.* at Attachment W011 (Utility Standard TD-4017S, Rev. 0, Gas Operations Vital Records Management).
- ²² Ex. 4 at 2-6:3 to 2-7:2 (PG&E Reply Testimony, Singh).
- ²³ *Id.* at 2-7:3-27 (PG&E Reply Testimony, Singh). A Gas RIM Coordinator Network of approximately 120 employees across 152 field offices support the Gas RIM Team. *Id.*
- ²⁴ *Id.* at 1-21:5 to 1-23:4 (PG&E Reply Testimony, Howe); *id.* at 2-8: 12-25 (PG&E Reply Testimony, Singh). PWA evaluated this as an “innovative practice.” Ex. 1 at 64 tbl.9 (PWA Report).
- ²⁵ 1/19/16 Tr. at 34:25 to 35:15 (SED/PWA); 1/20/16 Tr. at 183:26 to 184:13 (PG&E/Howe); Ex. 4 at 1-18:10 to 1-19:15 (PG&E Reply Testimony, Howe); Ex. 12 (Lloyd’s Register Pipeline Safety Management System Certificate of Compliance).
- ²⁶ Ex. 4 at 5-32:5-23 (PG&E Reply Testimony, Singh). PWA evaluated this as a “best practice.” Ex. 1 at 64-65 tbl.9 (PWA Report).
- ²⁷ Ex. 4 at 3-16:31 to 3-17:22 (PG&E Reply Testimony, Higgins); *id.* at 5-34:1-18 (PG&E Reply Testimony, Singh).
- ²⁸ *Id.* at 3-22:22 to 3-23:5 (PG&E Reply Testimony, Higgins); *id.* at 5-34:28 to 5-35:17 (PG&E Reply Testimony, Singh).
- ²⁹ *Id.* at 3-5:25 to 3-7:21 (PG&E Reply Testimony, Higgins).
- ³⁰ *Id.* at 3-5:30 to 3-6:26 (PG&E Reply Testimony, Higgins).

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- ³¹ *Id.* at 3-7:23 to 3-8:19 (PG&E Reply Testimony, Higgins).
- ³² Ex. 4 at 3-4:14 to 3-5:8 (PG&E Reply Testimony, Higgins); *id.* at 3-28:14 to 3-29:13 (PG&E Reply Testimony, Higgins) *id.* at 5-8:21 to 5-9:22 (PG&E Reply Testimony, Singh); Ex. 5, Attachment W015 (Notification of Abnormal or Emergency Operating Conditions, Rev. 1, Gas Operations JSSA & Tailboard Briefing). PWA identified this as an “effective backstop” measure. Ex. 1 at 65 tbl.9 (PWA Report).
- ³³ Ex. 4 at 5-10:12 to 5-11:15 (PG&E Reply Testimony, Singh). PWA identified this as a “very useful backstop” measure. Ex. 1 at 68:9-13 (PWA Report).
- ³⁴ *Id.* at 3-12:11 to 3-13:12 (PG&E Reply Testimony, Higgins). Ex. 5, Attachment W022 (TD-5811M, Rev. 1, Damage Prevention Handbook). PWA evaluated this as an “innovative practice.” Ex. 1 at 65 tbl.9 (PWA Report).
- ³⁵ Ex. 4 at 3-11:2 to 3-12:9; 3-15:22 to 3-16:30 (PG&E Reply Testimony, Higgins).
- ³⁶ *Id.* at 3-16:12-30 (PG&E Reply Testimony, Higgins).
- ³⁷ Ex. 4 at 3-12:11 to 3-13:12 (PG&E Reply Testimony, Higgins). PWA evaluated this as a “best practice.” Ex. 1 at 63 tbl.9 (PWA Report).
- ³⁸ Ex. 4 at 3-3:5 to 3-5:8 (PG&E Reply Testimony, Higgins). PWA evaluated this as an “innovative practice.” Ex. 1 at 66-67 tbl.9 (PWA Report).
- ³⁹ Ex. 4 at 3-20:5 to 3-21:27 (PG&E Reply Testimony, Higgins). PWA evaluated the Gold Shovel and Habitual Offender programs as “best practice.” Ex. 1 at 66 tbl.9 (PWA Report); Ex. 6, Attachment W036 (Utility Procedure TD-5805P-02, Rev. 0, Gold Shovel Standard Damage Prevention Program Administration); *id.*, Attachment W037 (Utility Procedure TD-5805P-01, Rev. 0, Habitual Offender Damage Prevention Program Administration).
- ⁴⁰ Ex. 4 at 3-21:28 to 3-22:19 (PG&E Reply Testimony, Higgins). Ex. 6, Attachment W038 (Pre-Dig Verification Form, Rev. 4); Ex. 10, Attachment W039 (PG&E Errata to Pre-Dig Verification Form, Rev. 5).