Crowe Horwath

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Gas Safety and Reliability Branch Management and Operations Review

Report and Recommendations

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Final Report

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Table of Contents – Report and Recommendations

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Executive Summary

Executive Summary

Natural gas utilities provide service to over 10 million California customers through approximately 90,000 mile of gas distribution lines, and 10,000 miles of gas transmission lines spread across the State. The California Public Utilities Commission's (CPUC) Gas Safety and Reliability Branch (GSRB) regulates California's natural gas utilities and infrastructure. The mission of GSRB is to ensure that California's natural gas pipeline systems are designed, constructed, operated, and maintained according to safety standards set by CPUC and the federal government.

Natural gas pipeline safety in California is regulated through a federal/state partnership. CPUC assumes inspection and enforcement responsibility for California intrastate natural gas facilities. GSRB's eight major roles and responsibilities are as follows:

1. Utility Inspections/Audits[1] – overseeing and enforcing federal and state gas safety regulatory compliance of California's eleven natural gas utilities.
2. Incident Investigations – investigating natural gas accidents and conducting follow-up enforcement.
3. Other Natural Gas-Related Investigations – conducting investigations and follow-up activities on other natural-gas related situations, such as self-reported violations and whistleblower reports.
4. Pipeline Safety Enhancement Plans – evaluating implementation of natural gas utilities plans to ensure the safety of their natural gas transmission systems.
5. Mobile Home Park (MHP) and Propane Programs – overseeing and enforcing federal and state gas safety regulations at over 3,000 MHP and propane facilities statewide.
6. Policy and Program Activities – supporting CPUC's proceedings, investigations, and policy-making related to natural gas safety and infrastructure.
7. Coordination with Federal Regulators – participating in training, reviews, and other regulatory activities with the Pipeline and Hazardous Materials Safety Administration (PHMSA) as part of the federal/state regulatory partnership.
8. Administration and Support – maintaining databases, scheduling inspections, and general program support.

CPUC's Safety and Enforcement Division (SED) conducted an independent management and operations review of the GSRB to identify opportunities for program improvements for GSRB, with the ultimate goal of increasing public safety. The review was first recommended by CPUC's Independent Review Panel (IRP) that was convened following the tragic San Bruno natural gas explosion on September 9, 2010.

SED contracted with Crowe Horwath LLP (Crowe) to conduct this management and operations review. Crowe's approach consisted of four key activities:

- Documenting and analyzing existing workloads, processes, and metrics.
- Obtaining employee and management input and feedback.
- Obtaining external stakeholder input and feedback.
- Identifying leading practices.

The findings and recommendations in this report reflect Crowe's analyses and syntheses of these activities. Our goal in conducting this review was to maintain a forward-looking focus in order to identify opportunities for improvement in GSRB's management and operations. This project provided an opportunity to evaluate the changes that have been implemented, the path that GSRB is currently on, and to identify recommendations for improvement.

[1] The terms "utility inspection" and "audit" are interchangeable. PHMSA uses "inspection" to describe site visits to gas utilities to verify compliance with pipeline regulations while CPUC has traditionally used the term "audit".

GSRB is operating in a challenging environment, both technically and politically. The San Bruno natural gas explosion and fire of September 9, 2010, forever raised the profile of natural gas regulation in California. CPUC's natural gas regulatory program has come under increased scrutiny through significant media attention, the IRP report, the National Transportation and Safety Board (NTSB) report on San Bruno, federal PHMSA oversight, and the California State Legislature. Each of these reviews and evaluations has identified CPUC/GSRB shortcomings and generated numerous recommendations.

In our research, we identified twelve challenge or opportunity areas for GSRB, as shown in **Exhibit E-1,** below. This report provides 33 recommendations to address the twelve challenges/opportunities. **Exhibit E-2,** on the next page, identifies the recommendations and provides the numbers of the associated challenges/ opportunities that they address. The overarching goal of all 33 recommendations is to improve natural gas pipeline safety in California. There is an added benefit of improved GSRB performance; by improving their PHMSA program evaluation score, GSRB could receive up to $1million more per year in federal grant funding. This funding, in turn, could help support GSRB improvement initiatives. The majority of recommendations are focused on improving utility inspections, which are a core GSRB responsibility.

Exhibit E-1
GSRB Challenges/Opportunities

	Challenge/Opportunity
1	Frequent management changes, shifting priorities, and reactive responses to internal and external recommendations post-San Bruno led to a loss of focus, lack of clear direction, loss of trust in leadership, and unacceptable work backlogs.
2	Disparate, cumbersome, and inadequate database systems that are challenging to use and not conducive to organized recordkeeping, identifying and responding to higher risk areas, monitoring progress, or tracking performance.
3	Lack of consistency, focus, organization, depth and rigor, adequate recordkeeping, clear expectations, and follow-through in utility inspection practices.
4	Delays in completion of utility inspection reports and lack of follow-through on violations, recommendations, observations, and concerns.
5	Delays in completion of incident investigation reports and lack of follow-through on violations, recommendations, observations, and concerns.
6	Inability to analyze trends, risks, and other safety-related concerns across incidents, utility inspection findings, self-reported violations, and complaints.
7	Assignment of staff to multiple tasks without clear prioritization of activities to those with the greatest impact on safety.
8	Lack of communication.
9	Lack of performance measures, clear expectations, and accountability.
10	Mix of staff experience and training does not provide a balance of regulatory, policy, or industry expertise to best support GSRB activities.
11	Implementation of new citation program is challenging due to concerns on precedent, legal issues, and lack of clarity and specificity in applying penalties.
12	Lack of integration of newly formed Risk Assessment and Enforcement Section.

Exhibit E-2
Recommendations and Associated Challenges

Challenge/ Opportunity	Recommendations
6 7 12	U-1 Incorporate enhanced risk assessment into utility inspection selection
3 4	U-2 Conduct topic-specific standard inspections **(in-progress)**
3 4	U-3 Evaluate approaches to increase the number and thoroughness of inspections **(in-progress)**
2 4 6 9	U-4 Implement utility inspection case management tools
4 6 9	U-5 Incorporate clear performance metrics for utility inspections **(in-progress)**
4 7	U-6 Schedule time for resources to prepare inspection report within 30 days **(in-progress)**
3 4 7 9	U-7 Redefine utility inspection information request expectations
3 4	U-8 Prepare CPUC-specific customized inspection forms
3 4	U-9 Prepare inspection letter and report templates
1 3 6 8 10	U-10 Develop training and tools
3 4 7	U-11 Increase pre-inspection planning
3 4 6	U-12 Conduct pre-inspection field reviews and unannounced field inspections
3 8 9	U-13 Consider assigning a supervisor to focus on utility inspections
3 6	U-14 Utilize integrity issues checklist
3 6	U-15 Conduct enhanced sampling approach for records review
3 8 9	U-16 Increase supervisors' time in the field
2 3 4 11	U-17 Establish and implement a procedure to ensure utility compliance **(in-progress)**

Challenge/ Opportunity	Recommendations
5 6 7	I-1 Implement a redesigned incident process **(in-progress)**
5	I-2 Create drop down menus with pre-approved language for incident reports
5 6 7 12	I-3 Develop a root cause analysis template
5	I-4 Obtain enforcement authority against excavators for dig-ins
6 7 8	I-5 Evaluate safety hotline/whistleblower CPUC system **(in-progress)**
4 5 7	W-1 Implement specialized staff assignments with rotations
1 10	W-2 Provide additional specialized training
10	W-3 Create and hire staff for two new position categories
2 4 5 6 7 12	T-1 Implement data visualization tools for risk assessment and analysis **(in-progress)**
2 3 4 5 6 7 9	T-2 Implement a management solution, leveraging and extending xRM
2 3 4 5	T-3 Implement a SharePoint site for managing GSRB documents **(in-progress)**
2 3 4	T-4 Evaluate use of tablets for utility and MHP/propane inspections
2 4 5 6 9	T-5 Obtain and deploy mobile leak detection technology
1 4 5 7 8 12	C-1 Implement a communication strategy **(in-progress)**
1 3 8	C-2 Institute change management process
6 7 9 12	R-1 Analyze incidents, violations, and findings to guide utility and field inspections

SED is already taking steps to address the challenges/opportunities identified in Exhibit E-1. CPUC's gas safety program has been expanding and evolving since 2011. CPUC has implemented an acceptable response to the five NTSB recommendations, and three of those recommendations have been successfully closed. CPUC has implemented ten of the 24 recommendations of the IRP, thirteen recommendations are in-progress, and one is not applicable.

During the nine months of our evaluation, GSRB added supervisor positions, restructured to improve supervisor reporting lines, assigned process leaders to major work activities, developed a prioritization system for incidents, significantly reduced the incident backlog, focused engineers on reducing the utility inspection report backlog, and redesigned the approach to utility inspections. Our recommendations are consistent with these in-progress or recently completed changes. Exhibit E-2 identifies the ten recommendations that are "in-progress", i.e. GSRB is already in the process of implementing some or all components of the recommendation. Our recommendations address the following areas (with some overlap between areas and recommendations):

- Utility Inspections ((U) 17 recommendations)
- Incident Investigations ((I) 5 recommendations)
- Work Prioritization, Staffing, and Training ((W) 3 recommendations)
- Technology and Tools ((T) 5 recommendations)
- Communication and Change Management ((C) 2 recommendations)
- Risk Assessment Approach ((R) 1 recommendation).

For each group of recommendations, we have identified between two to nine specific performance metrics. Performance metrics will be critical to track and evaluate the success of the recommended initiatives, their impact on GSRB performance, and on natural gas safety. Monitoring and tracking these performance metrics will be important to the successful implementation of the recommendations, and to demonstrating progress. In addition, the process of measuring, in and of itself, will help focus and prioritize GSRB efforts.

The 33 recommendations identified in this report vary in level of effort and length of time to implement. As described, GSRB has already begun implementing some of the recommendations. Implementing these recommendations will primarily require management and staff time for planning and development.

Some recommendations will require authorization from other entities within CPUC, and/or legislation. Implementing these recommendations will require additional time for planning, development, and approval. For each recommendation, we identify the timeframe to start implementing the recommendation: 1) Quick win (< six months), 2) Short-term (six months to a year), and 3) Long-term (over one year). Our implementation strategy timeline attempts to take into account staffing and supervisor time limitations that could slow the implementation of recommendations. It will be more effective for GSRB to implement a few recommendations at a time, and gradually add new recommendations. Full implementation of these recommendations could take three years. The fact that GSRB has a strong and dedicated staff and management team will be critical as GSRB implements a comprehensive improvement strategy.

Section 1

Introduction and Approach

1. Introduction and Approach

Natural gas utilities provide service to over 10 million California customers through approximately 90,000 miles of gas distribution lines, and 10,000 miles of gas transmission lines spread across the State. The California Public Utilities Commission's (CPUC) Gas Safety and Reliability Branch (GSRB) regulates California's natural gas utilities and their gas distribution/transmission infrastructure. The mission of GSRB is to ensure that California's natural gas pipeline systems are designed, constructed, operated, and maintained according to safety standards set by CPUC and the federal government.

CPUC's Safety and Enforcement Division (SED) conducted an independent management and operations review of the GSRB to identify opportunities for program improvements for GSRB, with the ultimate goal of increasing public safety. The review was first recommended by CPUC's Independent Review Panel (IRP) that was convened following the tragic San Bruno natural gas explosion on September 9, 2010.[1]

Role and Responsibilities of the CPUC Gas Safety and Reliability Branch

California's natural gas pipeline safety is regulated through a federal/state partnership. The United States Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) has exclusive federal authority for regulation of pipeline facilities. PHSMA, in turn, may delegate all or part of the responsibility for intrastate pipeline facilities to states through an annual certification or agreement. CPUC assumes inspection and enforcement responsibility for California intrastate natural gas facilities through PHMSA certification. State agency responsibilities typically include operator inspections, compliance and enforcement, safety programs, accident (incident) investigations, pipeline construction inspections, and record maintenance and reporting.

With PHMSA certification, state agencies may adopt additional or more stringent standards for intrastate pipeline facilities provided these standards are compatible with federal regulations. CPUC has adopted additional rules for utilities that specify requirements beyond federal regulations. CPUC's rules address a number of different areas, including valve locations, pressure testing, reporting, and emergency planning.

CPUC's General Order (GO) 112-E adopts the federal pipeline regulations (U.S. Code of Federal Regulations, Title 49, Part 40 and Parts 190-199) and defines California's additional requirements. CPUC is currently reviewing changes and modifications of GO 112-E that will further strengthen California's pipeline safety regulations. These changes are expected to be finalized and effective in early 2016.

Through the federal/state partnership, PHMSA conducts an annual review of each state program. PHMSA also provides grants-in-aid of not more than 80 percent of a state agency's personnel, equipment, activities and other allowable costs for its pipeline safety program. In recent years, PHMSA grants have accounted for an average of approximately 70 percent of state program funding. The amount of PHMSA funding is adjusted, depending on the state agency's annual review score, with lower scoring states receiving less federal funding. In 2012, CPUC received $1.88 million in federal funding from PHMSA, 64 percent of the PHMSA-approved program costs. This was less than the national average of 73 percent of PHMSA-approved program costs, due to California's score on the annual PHMSA evaluation.

Most GSRB activities are directly related to implementing Title 49 and GO-112 E. PHMSA provides a majority of GSRB funding, and could provide up to $1 million in additional funding if GSRB scored higher on the annual PHMSA program evaluation. GSRB also conducts additional activities specific to CPUC

[1] IRP Recommendation 6.2.4.4: "Undertake an independent management audit of the USRB [now GSRB] organization, including a staffing and skills assessment, to determine the future training requirements and technical qualifications to provide effective risk-based regulatory oversight of pipeline safety and integrity management, focused on outcomes rather than process."

policies and requirements, such as participation and support of General Rate Cases (GRCs), proceedings, decisions, rulemaking, and responding to legislative proposals. When time and resources are limited, balancing and prioritizing PHMSA and CPUC-related responsibilities is challenging.

Ultimately, both PHMSA and CPUC are committed to enforcing pipeline safety regulations. However, at the Commission level, there is not necessarily a clear understanding of the relationship between GSRB and PHMSA, and within GSRB, there is not always a clear recognition of Commission-level needs and requirements.

Exhibit 1-1, below, provides a high level organizational chart of GSRB within CPUC's Safety and Enforcement Division. GSRB staff consist primarily of Utility Engineers (UE) and Senior Utility Engineer Specialists (Sr. UES) (referred to collectively as engineers). UEs and Sr. UES report to either a Program and Project Supervisor (PPS) or Senior UE Supervisor (Sr. Sup). A Program Manager oversees the entire branch, and reports to an SED Deputy Director. GSRB has offices in San Francisco, Sacramento, and Los Angeles. There are a total of 35 staff and supervisor positions authorized within GSRB. The Risk Assessment and Enforcement Section (RAS) was created in 2011, and supports GSRB activities.

Exhibit 1-1
Organizational Chart of the CPUC Gas Safety and Reliability Branch

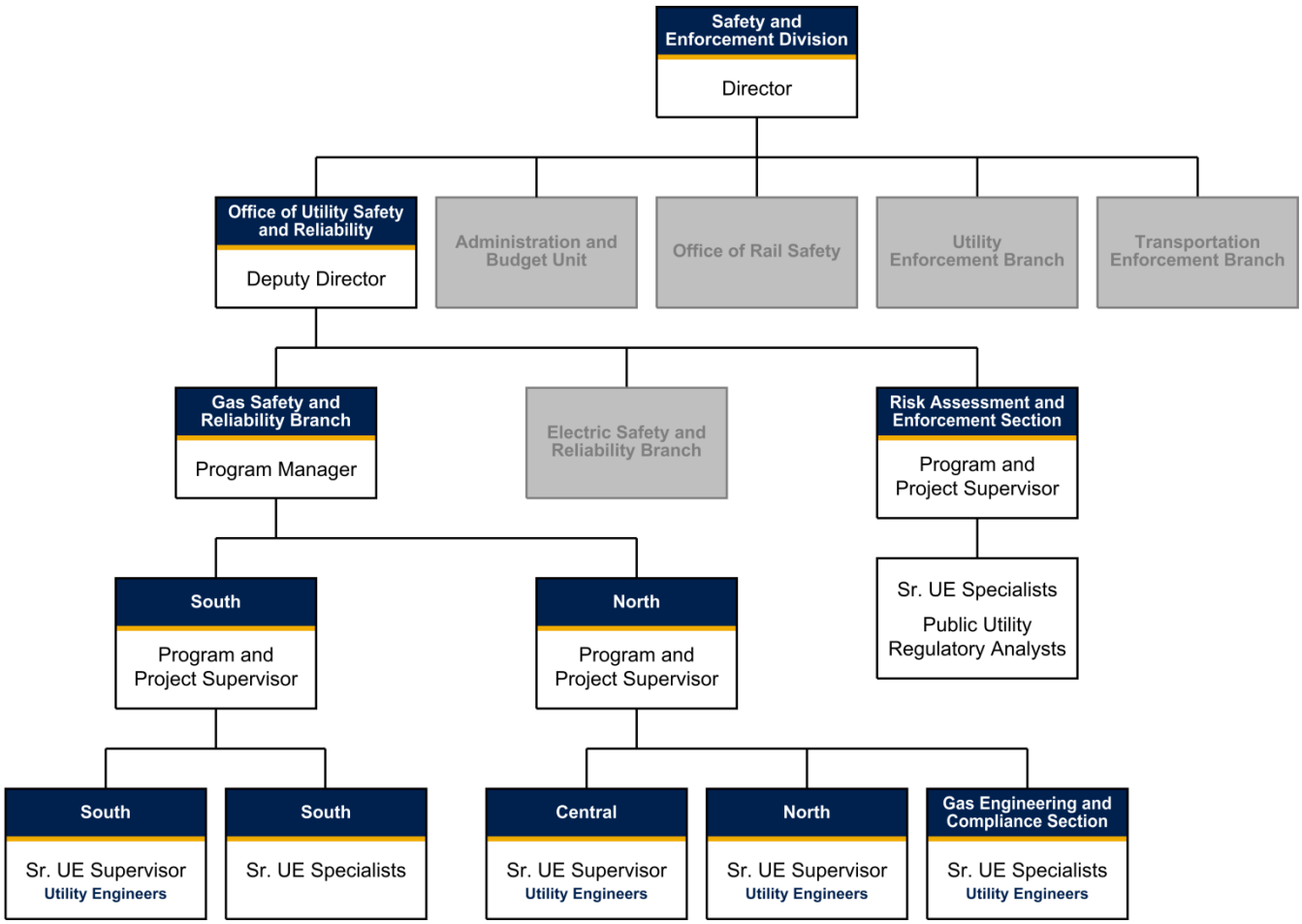
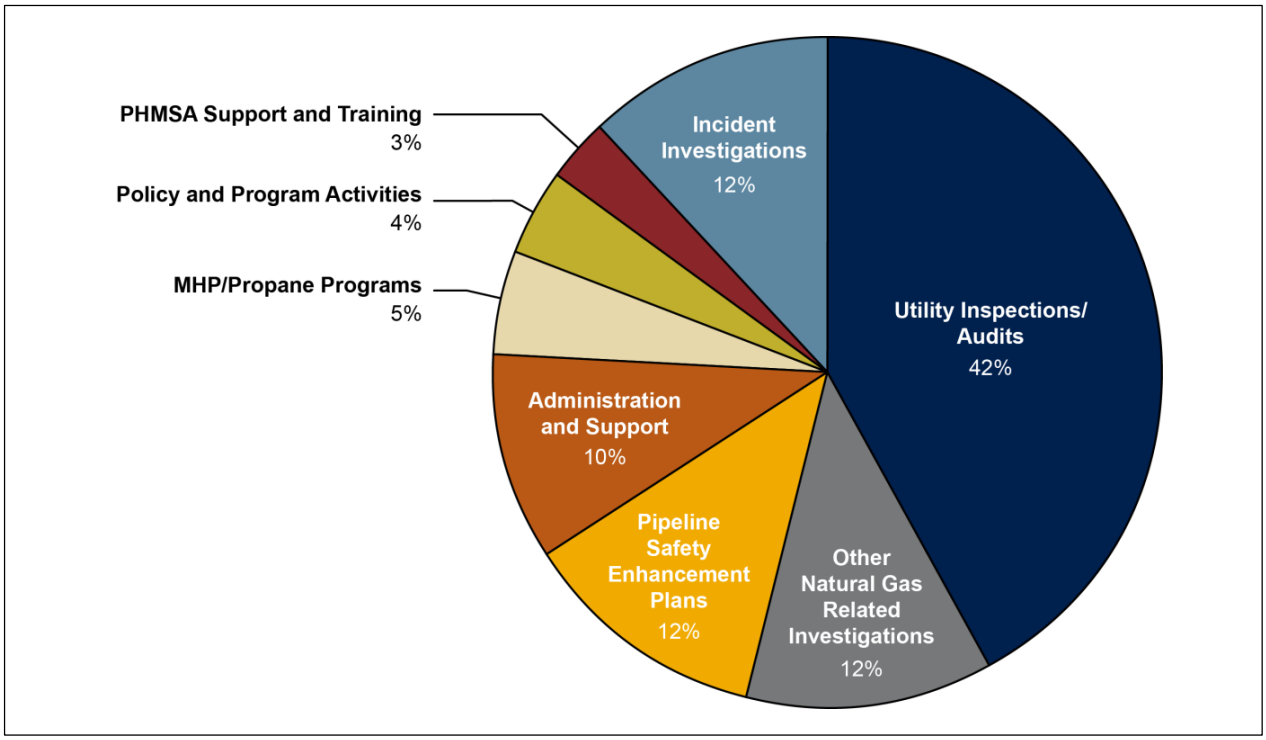


Exhibit 1-2
Average Percentage of GSRB Engineer Time by Activity on an Annual Basis[a]



[a] The average percentages were calculated based on an assessment of time and number of staff required for each GSRB staff activity during a calendar year for GSRB's current staff of 24 engineers. The utility inspection time is based on the 2015 inspection schedule. The number of incidents, and various types of investigations are based on data from the last year.

Exhibit 1-2, above, illustrates the approximate percent of GSRB engineer time allocated to eight major categories of activities. Currently, all engineers conduct essentially all activities, although only more experienced engineers may be assigned to support Commission proceedings or other specialized activities. As shown, 54 percent of engineer time is spent on utility inspections[2] and incident investigations. Exhibit 1-2 does not incorporate Program Manager and Supervisor time. Managers and supervisors responsibilities include: reviewing all staff inspection and investigation reports, supervising and evaluating staff, developing utility inspection schedules, addressing policy and program issues, working with PHMSA, working with the Commission, budgeting, work prioritization, and program administration. Below, we briefly describe GSRB's eight major roles and responsibilities:

1. Utility Inspections/Audits

GSRB oversees and enforces federal and state gas safety regulatory compliance of eleven natural gas storage, distribution, and/or transmission utilities. The four largest utilities are Pacific Gas and Electric (PG&E), Southern California Gas (SCG), San Diego Gas and Electric (SDG), and Southwest Gas (SWG). SCG and SDG are subsidiaries of Sempra Energy. PG&E and Sempra are among the largest utilities in the country. The eleven gas utilities are subdivided into 71 different utility inspection units. Inspection frequencies vary, from a minimum of every three years, to "as needed." Inspections cover prescribed

[2] The terms "utility inspection" and "audit" are interchangeable. PHMSA uses "inspection" to describe site visits to gas utilities to verify compliance with pipeline regulations while CPUC has traditionally used the term "audit".

topics such as distribution systems, operation and maintenance plans, public awareness plans, emergency response plans, operator qualification plans, integrity management programs, control room management, and damage prevention.

Inspections (also referred to as audits) are typically conducted by a team of two to four GSRB engineers. Each utility inspection takes approximately one week, and typically include a combination of interviews, records reviews, and field inspections. There are specific PHMSA forms that identify evaluation topics for each type of inspection. The inspection team informs the utility of preliminary findings in an exit meeting, so that critical issues identified at the inspection can be addressed immediately. The inspection team also prepares a formal inspection report. The inspection report includes documentation of violations, recommendations, observations, and concerns. The utility is given 30 days to respond to the inspection report. **Exhibit 1-3,** on the next page, provides the total number of violations identified by GSRB during utility inspections, by utility, during the time period between 2006 and 2013. Exhibit 1-3 illustrates that there is wide variation in violations identified between utilities and years, with significantly more violations identified in 2013 than in prior years.

Depending on the level of violations and utility response, GSRB may issue penalties or warnings through SED's citation process. Serious violations may be addressed through a Commission proceeding (Order Instituting Investigation, OII). **Exhibit 1-4,** on page 1-6, provides an overview of the GSRB's enforcement options. GSRB has recently revised their utility inspection procedures, and plans to conduct 120 utility inspections in 2015, a significant increase over the 20 to 40 inspections conducted annually in recent years.

2. Incident Investigations

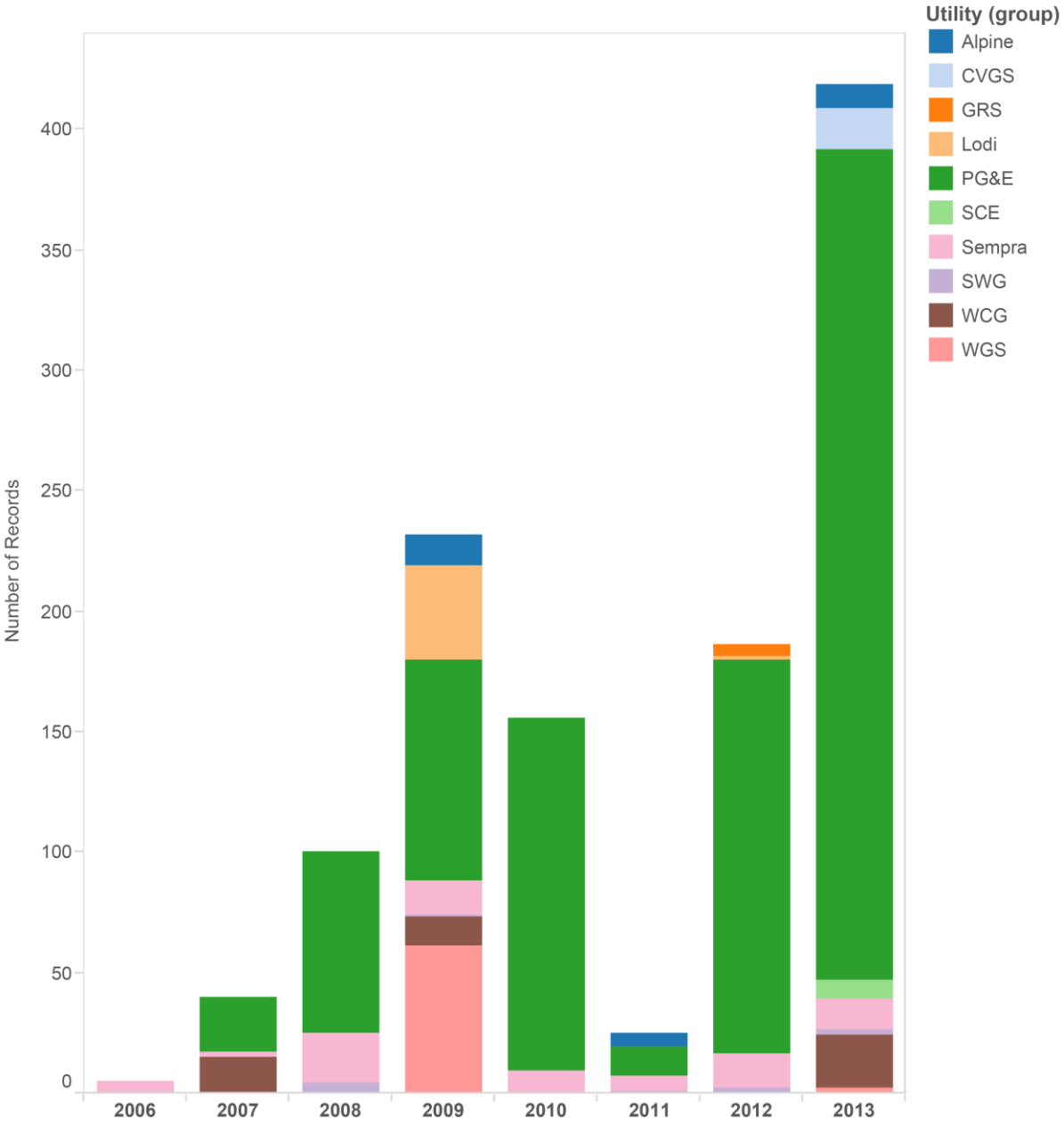
Utilities are required to report gas accidents (incidents) that meet specific criteria within a few hours of their occurrence. California's definition of an incident is broader than the federal definition. In general, an incident is an event that results in a release of natural gas, which then leads to some degree of financial damage, media attention, service shutdown, safety impact, and/or other significant effect, and in extreme cases personal injury or death. Once a utility reports an incident to GSRB, a supervisor assigns the incident to an engineer. The assigned engineer conducts an incident investigation.

The extent of the investigation will depend on the severity of the incident. A minor incident in which the utility did not contribute to the cause of the incident may result in relatively quick investigation and report. A major incident investigation, such as those involving fire, death, or personal injury, and in which the utility actions or lack thereof may have contributed to the incident, could take several months, or longer. **Exhibit 1-5**, on page 1-6, identifies the number of incidents reported to GSRB, by cause, between 2005 and May 29, 2014, when we obtained GSRB's incident data. As shown, "dig-in" events, which are the result of an excavation hitting a pipe, are the cause of a majority of pipeline incidents.[3]

Depending on the findings of the investigation, GSRB may issue a citation to fine the utility, or recommend enforcement through a Commission OII. There are typically about 150 reportable incidents per year. Approximately two-thirds of these incidents are minor, and/or are not the result of utility actions. The remaining incidents involved some degree of utility violation and a more involved investigation.

[3] The number of dig-ins could be greater, as not all dig-in incidents are not reported to CPUC by the utilities.

Exhibit 1-3
Number of Violations Identified During Utility Inspections by Year and Utility (2006 to 2013)

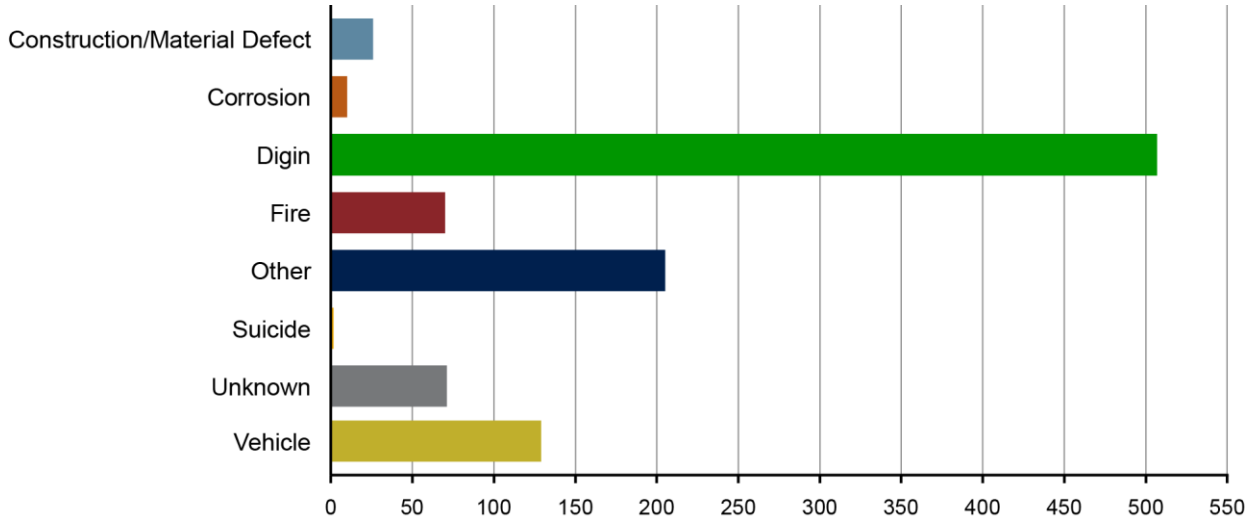


Utility Acronyms: Alpine = Alpine Natural Gas; CVGS = Central Valley Gas Storage; GRS = Gill Ranch Gas Storage; Lodi = Lodi Gas Storage; PG&E = Pacific Gas and Electric; SCE = Southern California Edison;; Sempra = Sempra Energy (includes San Diego Gas and Electric and Southern California Gas Company); SWG = Southwest Gas; WCG = West Coast Gas; WGS = Wild Goose Storage.

Exhibit 1-4
GSRB Enforcement Alternatives

Alternative	Description
Order Instituting Investigation (OII)	Commission level proceeding. An OII is a formal investigation to determine whether a utility violated provisions of the CPUC code, general orders, decisions, or other applicable rules or requirements. The Commission may impose penalties if violations are found.
Citation	Staff has authority to draft and issue citations for violation of GO 112-E and federal pipeline regulations, as directed in Resolution ALJ-274. The financial penalty can range up to $50,000 per day of violation. GSRB has developed a Standard Operating Procedure for the citation program.
Notice of Violation	Notice of Violations (NOV) of specific state or federal code. Depending on the type, number, frequency, or other factors, violations may be corrected by the utility without imposition of a citation or OII, or referred for further CPUC action.
Recommendations	Identified in utility inspection report, addressing areas of improvement that are not citable violations.
Observations	Identified in utility inspection report, requesting clarification and explanation of utility practices and procedures that the utility could not clearly explain to the satisfaction of the inspection team during the inspection.
Concerns	Identified in utility inspection report, addressing issues that are not citable violations, but could result in an unsafe condition or undermine the effectiveness of a specific utility program or procedure.

Exhibit 1-5
Number of Incidents by Cause (2005 to May 29, 2014)



3. Other Natural Gas-Related Investigations

GSRB conducts a number of other types of investigations. The investigation process is similar to that described for incidents, with the degree of investigation and follow-up dependent on the severity of the situation. These investigations can be triggered by different events:

- **Self-identified violations (SIV)** – utilities are required to report self-identified violations to CPUC. This requirement is part of CPUC's citation program. In recent years, utilities have reported approximately 50 SIVs per year. Most SIVs are administratively closed because the violation was procedural, and/or has already been resolved. However, in the approximately 20 percent of cases where the SIV was the result of willful negligence, had not been corrected, posed a significant safety threat, resulted in a large overpressure, or resulted in pipe failure or damage, GSRB conducts an investigation.
- **Whistleblower reports** – CPUC has a whistleblower hotline. GSRB typically receives about 15 whistleblower reports per year. All whistleblower reports are assigned to an engineer for follow-up and investigation.
- **Complaints** – GSRB may receive customer complaints through CPUC hotlines or other sources. All complaints are assigned to an engineer for follow-up. Some complaints may be easily resolved by communicating with the utility and/or customer, while others may require more involved investigation and follow-up.
- **Special investigations** – GSRB engineers may be asked by Commissioners or other entities to conduct specific investigations of a utility or utility practices. GSRB typically conducts one special investigation per year. These are generally more involved, and require extended staff time. An example of a special investigation is a recent PG&E encroachment case.
- **Safety related conditions** – utilities are required to report to GSRB when they have not reduced pressure and repaired transmission lines known to have certain safety related conditions (dents, corrosion) within ten days. GSRB investigates those cases where the utility has not repaired the condition. GSRB investigates approximately 60 such events per year.

4. Pipeline Safety Enhancement Plans (PSEP)

In 2011, CPUC ordered the four major utilities (PG&E, Southern California Gas, San Diego Gas and Electric, and Southwest Gas) to develop and submit individual Pipeline Safety Enhancement Plans (PSEPs) to ensure the safety of their natural gas transmission systems. The plans address four areas: 1) pipeline modernization; 2) valve automation; 3) pipeline records integration; and, 4) interim safety enhancement. GSRB has evaluated each utility's plans, which identify and prioritize specific construction and maintenance activities in the four areas. Each GSRB engineer is assigned to observe and evaluate five to ten utility PSEP projects per year. These field inspections typically involve observing the replacement or testing of valves, pipes, or regulators. Starting in 2015, PSEP inspections will be incorporated into the utility inspection program, rather than managed as a separate program.

5. Mobile Home Park (MHP) and Propane Programs

In addition to natural gas utilities, GSRB's federally assigned jurisdiction covers natural gas distribution at mobile home parks and propane distributors. GSRB is required to inspect MHP and propane facilities at least once every seven years. There are approximately 2,500 MHPs and 650 propane distributors under GSRB's jurisdiction, requiring over 400 inspections per year in total. MHPs and propane distributors are required to submit annual reports. GSRB also provides an annual education seminar for MHP and propane operators. Starting in 2015, GSRB is conducting a pilot project to shift 10 percent of MHPs to direct utility service. The intent of this pilot program is to upgrade utility distribution systems. MHP and propane inspections and reporting require GSRB engineer field and travel time spent on a relatively low-risk activity. The MHP pilot could reduce this time burden on GSRB, allowing engineers to focus more time on direct utility inspections or other higher value activities.

6. Policy and Program Activities

GSRB operates within the broader structure of CPUC. CPUC is one of the State's oldest agencies, regulating electricity, gas, telecommunications, water, rail transit, passenger transportation companies, and household goods carriers. The overall objective of CPUC is "ensuring customers have safe, reliable utility service at reasonable rates, protecting against fraud, and promoting the health of California's economy, which depends on the infrastructure the utilities and the PUC provide." CPUC is governed by a five-member Commission, and supported by a staff of approximately 1,000.

The Commission is the decision-making body for utility actions that affect rates, complaints alleging a violation of CPUC rules, and policymaking proceedings. Commission decision-making is conducted through proceedings, each managed by an Administrative Law Judge (ALJ) and a Commissioner. Through proceedings, the Commission acts as a judicial, legislative, quasi-judicial, and/or quasi-legislative manner.

There are three major types of Commission proceedings, all of which may involve GSRB:

- **General Rate Cases (GRC)** – Utilities submit an application for rate changes for their transmission, storage, or distribution facilities every two to three years. The application initiates a GRC proceeding. A GRC proceeding is typically one year long, and includes public meetings, workshops, hearings, testimony, comment periods, filings, and advisory reports. CPUC has an Office of Ratepayer Advocates (ORA) that supports consumers through the proceeding. CPUC is formally incorporating a risk-based decision-making framework into GRCs. While GSRB has played a supporting advisory role in natural gas utility GRCs, the formal inclusion of the risk-based approach to evaluate safety and reliability improvements will require increased involvement from GSRB engineers. Typically, GSRB assigns one or two Sr. UES's to support a GRC. The Risk Assessment and Enforcement Section (RAS), within SED, is also involved in the GRCs, as is the Energy Division's Natural Gas Section.
- **Orders Instituting Investigations (OII)** – GSRB can recommend that the Commission open an OII into utility practices that allegedly violate a rule or statute. For example, on November 20, 2014, the Commission opened an OII and Order to Show Cause to formally investigate whether PG&E violated rules related to safety-related recordkeeping for natural gas distribution pipelines. The OII was triggered by several incidents occurring over the last few years that involved similar recordkeeping problems. This OII is in addition to a citation penalty issued by GSRB staff.
- **Rulemaking or Policy Making** – The Commission establishes a policy or rulemaking proceeding in order to set state policy affecting a regulated industry. Policy or rulemaking proceedings can be initiated by the Commission, or in response to new legislation. The Commission initiated the rulemaking proceeding R.11-02-019 in February 2011 to strengthen rules related to natural gas safety. This rulemaking has resulted in a number of decisions and policies, including requiring utilities to prepare PSEPs, expanding emergency coordination between utilities and local governments, and elevating safety considerations in rate setting. Thus far, there have been 28 rulings, 34 decisions or proposed decisions, and over 600 documents associated with this proceeding. The R.11-02-019 proceeding is considering changes and modifications to GO 112E. SED staff prepared a document with initial changes. This document is being reviewed and finalized. The proceeding is expected to be completed by early 2016. GSRB typically supports one or two rulemaking or policy making proceedings per year, but has been supporting R.11-02-019 for almost four years.

In addition to various support tasks related to Commission proceedings, GSRB staff conduct legislative analyses for any proposed bills that affect natural gas safety. The timeline for bill analyses is relatively limited, and GSRB typically provides analyses for five to six bills per year. The number of natural gas related bills has increased since the San Bruno explosion. GSRB staff may also spend time in implementing new requirements specified in legislation, such as Assembly Bill 705 safety plans.

7. PHMSA Support and Training

GSRB is required to conduct a number of activities in support of the federal/state partnership of pipeline safety regulation. GSRB engineers are mandated to complete training courses at the PHMSA training center in Oklahoma City. There are seven weeks of compulsory classes for initial training, and additional classes are required for more specialized inspection activities (i.e. integrity management plans).

PHMSA also expects GSRB engineers and/or supervisors to participate in industry committees. Each year, as part of the cooperative agreement between PHMSA and the State, GSRB submits a grant application and progress report to PHMSA. PHMSA conducts several on-site audits of GSRB (three separate site visits in 2014), and prepares an evaluation of GSRB. GSRB is responsible for addressing any shortfalls identified in the evaluation.

8. Administration and Support

There are a number of administrative activities that GSRB conducts to support the overall program. Currently, GSRB utilizes seven different Access databases to store data and manage utility inspections, incidents, MHP inspections, and propane inspections. GSRB also maintains a damage database for incidents caused by excavation, and tracks and monitors program data. Engineers and/or supervisors also schedule and coordinate logistics for the utility, MPH, and propane inspections.

Risk Assessment and Enforcement Section (RAS)

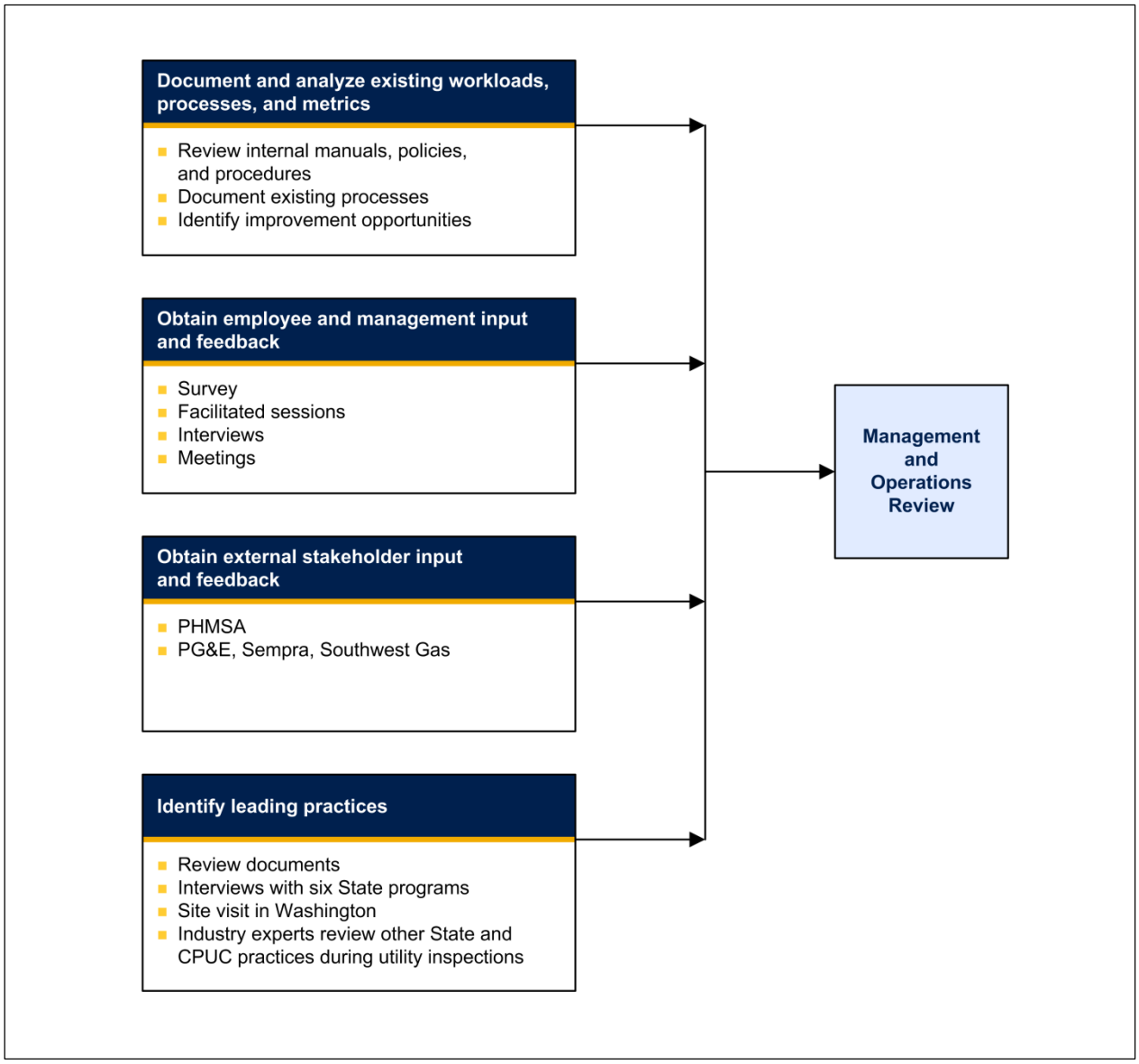
CPUC created the Risk Assessment Section, within SED, following an IRP recommendation to "significantly upgrade [CPUC's] expertise in the analytical skills necessary for state-of-the-art quality risk management work." RAS has evolved since it was first created in 2011. After a period of exploring different activities and tasks that were broadly supportive of a risk-based regulatory approach, the group has narrowed their focus to supporting the incorporation of risk assessment in natural gas utility general rate cases. Most recently, RAS and GSRB staff teamed to prepare a report on PG&E's risk assessment and risk management approach in their Gas Transmission and Storage GRC application.

Study Methodology

SED contracted with Crowe Horwath LLP (Crowe) to conduct this management and operations review in April 2014. In conducting this assessment of GSRB's organization, activities, and administration, Crowe undertook a wide variety of research tasks. **Exhibit 1-6,** on the next page, illustrates the four major tasks Crowe conducted during our management and operations review. Key activities included:

- Reviewing CPUC and outside source documents, reports, processes, and procedures related to natural gas regulation and natural gas safety.
- Analyzing GSRB budgets, staffing, and workload.
- Conducting an on-line survey of 37 GSRB and Risk Assessment Section staff and management.
- Conducting facilitated sessions with GSRB staff in San Francisco, Los Angeles, and Sacramento to obtain input and recommendations related to utility inspections, incidents, and communication.
- Interviewing SED and GSRB management teams.
- Interviewing representatives PHMSA.
- Interviewing pipeline safety directors from six states.
- Interviewing regulatory/compliance staff from PG&E, Sempra, and Southwest Gas.
- Conducting a site visit to the Washington Utilities and Transportation Commission Pipeline Safety Program.
- Observing utility pipeline inspections in two other states.

Exhibit 1-6
Crowe Management and Operations Review Methodology



The findings and recommendations in this report reflect Crowe's analyses and syntheses of the above research activities. Our goal in conducting this review was to maintain a forward-looking focus in order to identify opportunities for improvement in GSRB's management and operations. This project provided an opportunity to evaluate the changes that have been implemented, the path that GSRB is currently on, and to identify recommendations for improvement.

Section 2

GSRB Challenges, Opportunities, and Progress To-Date

2. GSRB Challenges, Opportunities, and Progress To Date

The GSRB is operating in a challenging environment, both technically and politically. The expectation of the public is that natural gas services are seamless, invisible, and economical. The public does not generally think about the complex and aging infrastructure that heats our water, homes, and offices, powers factories, and supports numerous industrial practices. Unless, that is, something goes wrong. The consequences of natural gas pipeline incidents are serious. Since 2005, incidents in California have caused 14 fatalities, 58 injuries, and over $430 million in damages. A significant portion of these impacts are due to San Bruno; however, there have been several other serious incidents in the State over the last ten years. Natural gas pipeline safety has been a growing concern at the national level as well. In a ten year period (2005 to 2014) there have been 118 fatalities, 550 injuries, and over $2 billion in damages due to pipeline incidents across the country.

The San Bruno natural gas explosion and fire of September 9, 2010, forever raised the profile of natural gas regulation in California. CPUC's natural gas regulatory program has come under increased scrutiny through significant media attention, the IRP report, the National Transportation and Safety Board (NTSB) report on San Bruno, federal Pipeline and Hazardous Materials Safety Administration (PHMSA) oversight, and the California State Legislature. Each of these reviews and evaluations has identified CPUC/GSRB shortcomings and generated numerous recommendations.

In our research, we identified twelve challenge or opportunity areas for GSRB:

1. Frequent management changes, shifting priorities, and reactive responses to internal and external recommendations post-San Bruno led to a loss of focus, lack of clear direction, loss of trust in leadership, and unacceptable work backlogs.
2. Disparate, cumbersome, and inadequate database systems that are challenging to use and not conducive to organized recordkeeping, identifying and responding to higher risk areas, monitoring progress, or tracking performance.
3. Lack of consistency, focus, organization, depth and rigor, adequate recordkeeping, clear expectations, and follow-through in utility inspection practices.
4. Delays in completion of utility inspection reports and lack of follow-through on violations, recommendations, observations, and concerns.
5. Delays in completion of incident investigation reports and lack of follow-through on violations, recommendations, observations, and concerns.
6. Inability to analyze trends, risks, and other safety-related concerns across incidents, utility inspection findings, self-reported violations, and complaints.
7. Assignment of staff to multiple tasks without clear prioritization of activities to those with the greatest impact on safety.
8. Lack of communication.
9. Lack of performance measures, clear expectations, and accountability.
10. Mix of staff experience and training does not provide a balance of regulatory, policy, or industry expertise to best support GSRB activities.
11. Implementation of new citation program is challenging due to concerns on precedent, legal issues, and lack of clarity and specificity in applying penalties.
12. Lack of integration of newly formed Risk Assessment and Enforcement Section.

We briefly describe each of these areas, below. The 33 recommendations provided in Section 3 address these challenge or opportunity areas. This section also provides an overview of the improvements GSRB has implemented, to date.

1. Frequent management changes, shifting priorities, and reactive responses to internal and external recommendations post-San Bruno led to a loss of focus, lack of clear direction, loss of trust in leadership, and unacceptable work backlogs.

GSRB has undergone tremendous change and evolution in the last four years. Much of this change has been reactive, and without a clear vision of the direction for the organization. There have been a number of organizational restructurings, leadership changes, management changes, significant new hiring, and implementation of countless new directives. GSRB must respond to the demands of five different Commissioners, the Executive Director, PHMSA, the State Legislature, and SED management. Each entity may have different interests and needs from GSRB. CPUC has been in a reactive mode in implementing many of the recommendations put forth following San Bruno. Through this period of flux and new directives, the regulatory responsibilities of GSRB have increased, as has the challenge of meeting those responsibilities. In the three years following San Bruno, many of GSRB's regular activities were put on hold, leading to backlogs in completing audit and incident reports.

CPUC also faces inconsistencies in Commission backing. This was one of the key areas that Washington State identified as a strength of their highly regarded natural gas pipeline safety program. While the Commission has been supportive of significant expansion of GSRB in the last several years, the highly publicized email communications between Commissioners, Commissioners' staff, and PG&E executives does not send a message of support to GSRB engineers working in the field. Newly appointed Commission President Michael Picker has said that he wants CPUC to more aggressively investigate safety violations and evolve into a stronger and faster enforcer of rules governing California's energy and transportation industries.

2. Disparate, cumbersome, and inadequate database systems that are challenging to use and not conducive to organized recordkeeping, identifying and responding to higher risk areas, monitoring progress, or tracking performance.

GSRB is utilizing eight different customized Access databases created in the early 1990s to store data, reports, schedules, activity dates, violations, and other activities. There are separate North and South databases, housed on different servers, for audits, incidents, and MPHs, as well as propane and damage databases. Very few GSRB engineers are proficient in running queries and reports. Because the databases are not integrated, management cannot readily monitor, track progress and performance, or analyze and compare problem areas. The databases are not configured to house many of the associated documents or support work flow. Closely related to the database issues, PHMSA criticized GSRB for not having well organized or accessible records, and having different recordkeeping systems in the North and South offices. The Safety and Enforcement Division (SED) has identified the need for technology improvements and has a project underway to develop new systems. The project is moving slowly through the State IT procurement process.

3. Lack of consistency, focus, organization, depth and rigor, adequate recordkeeping, and clear expectations in utility inspection[1] practices.

GSRB regulates two of the largest natural gas utilities in the United States (PG&E and Sempra). While the utilities are broken down into smaller inspection units, the miles of distribution and transmission pipeline, number of services, and pipeline miles located in populated High Consequence Areas (HCAs) is

[1] The terms "utility inspection" and "audit" are interchangeable. PHMSA uses "inspection" to describe site visits to gas utilities to verify compliance with pipeline regulations while CPUC has traditionally used the term "audit".

large. In their reviews of GSRB, PHMSA has been critical of the scope, thoroughness, rigor, consistency, and documentation of utility inspections. Inspectors are inconsistent in their use of PHMSA audit forms, sometimes relying heavily on hand written notes. Large inspection units make it difficult to thoroughly review a representative number of records and field activities. Some work that could be done pre-inspection, such as selecting records, is not done until the inspectors are on site, leaving less time for field activities. PHMSA also criticized GSRB for spending inadequate time on inspecting construction of new and replacement lines, and spending inadequate inspection time in all geographic areas.

Utilities commented that GSRB inspections are inconsistent and not well planned, and that inspectors sometimes focus on procedural requirements when time might be better spent on safety-related concerns. Engineers recognize challenges in conducting utility inspections as well. For example, engineers state there are "too many overlapping regulations and inspection programs that lead to inefficient auditing. In addition, lack of organization in the group leads to many repetitive approaches to the same problem."

There are inconsistencies in inspection practices between North and South offices, and between engineers. Engineer's note taking procedures and use of PHMSA inspection forms during inspections are not consistent. There are no clear sampling procedures for records review and selecting field site visits. What is considered a violation by one engineer may not be considered a violation by another engineer, resulting in inconsistent enforcement of pipeline regulations. Typically, inspection reports in the North identify a significantly larger number of violations than inspection reports in the South.

4. Delays in completion of utility inspection reports and lack of follow-through on violations, recommendations, observations, and concerns.

Completion of utility inspection reports takes significantly longer than in other states. Long report completion times delay follow-through on any violations, recommendations, or concerns that were identified during the inspection. GSRB recognizes that they need to do a better job with follow-through on identified violations. PHMSA noted that GSRB is making progress, but that "there is a lack of compliance resolution within a reasonable time frame." Between 2007 and 2010, the average time from the end of the utility inspection to submission of the inspection report to the utility was 52 to 79 days. Between 2011 and 2013, the average time increased to 227 to 241 days. Best practices in other states ranged from 15 to 60 days from the inspection exit interview to submitting the inspection report to the utility. GSRB engineers have historically spent a significant amount of low value-added time on minor editing and formatting, rather than on content.

5. Delays in completion of incident investigation reports and lack of follow-through on violations, recommendations, observations, and concerns.

When the management audit started in April 2014, GSRB had a backlog of over 350 incidents that had not been closed. As of late 2014, most of these incidents have been closed, and GSRB is implementing an incident prioritization approach that will help reduce the potential for new backlogs. However, there are still concerns related to handling of incidents. PHMSA noted that GSRB could improve their "overall process and documentation of incidents from the initial report through the investigation, enforcement actions, and finally the closure of the investigations and follow-up actions with the pipeline operator." PHMSA also noted the high percentage of incidents resulting from underground excavation issues. CPUC does not have enforcement authority over excavators, leaving a major enforcement gap that, if in place, could help mitigate the majority of incidents.

6. Inability to analyze trends, risks, and other safety-related concerns across incidents, utility inspection findings, self-reported violations, and complaints.

There is a vast amount of data accumulating within GSRB on pipeline incidents, violations, complaints, self-reported violations, and safety related conditions. Between the limiting Access databases and long delays in completing reports, there is no mechanism for real-time evaluation of trends and risks. GSRB's inability to

identify, analyze, and track trends and risks relates directly to challenge/opportunity #2, inadequate database systems. The ability to analyze trends and risks would be extremely valuable in identifying potential problem areas, focusing utility inspections on safety concerns, and helping to deter future incidents.

7. Assignment of staff to multiple tasks without clear prioritization of activities to those with the greatest impact on safety.

One of the factors contributing to GSRB's poor follow-through on violations and long time lag in completing inspection and incident reports is a lack of prioritization among engineers' competing workload activities. We heard a range of comments related to prioritization that illustrate this challenge:

- "Historically work has not been prioritized well; the branch has been very reactive."
- "The last three years have been prioritized by San Bruno and catching up on audits, now it's time to regroup."
- "At times it's a bit frustrating because of changing priorities."
- "We need to do more planning and goal setting – as an Office, Branch, and individual section."
- "Articulate clear and achievable mission and goals without wavering in light of other distractions."
- "GSRB could improve work prioritization and increase the use of risk assessment to create a list of priorities and standards as far as our gas safety audits and special projects are concerned."

8. Lack of communication.

The survey comments and staff sessions responses show a strong desire among staff to be heard, to understand better what their peers are doing, to understand how the Risk Assessment Section fits into GSRB activities, and to understand the reasoning behind management decisions. There is currently no lessons-learned process following utility inspections, a simple step that could help reduce inconsistencies in utility inspection practices. Staff and management provided a number of suggestions to improve communication, some of which have already been implemented. However, it is clear from staff and management comments that the GSRB suffers from insufficient internal CPUC communication. GSRB external communication, primarily visible through CPUC's web page, is not easily accessible. There is a significant amount of natural gas safety information available on the web page. However, much of the information is dated, and not well organized.

9. Lack of performance measures, clear expectations, and accountability.

Currently, GSRB is evaluated against very few performance metrics. PHMSA provides a score for their annual audit, and monitors engineer days in the field (which must exceed 85 days per year). The lack of tracking tools is a barrier to meeting goals and objectives. There are no high level dashboards with aging reports for utility inspections, incidents, complaints, violation counts, or closure dates that managers can monitor to track performance. Until recently, there have not been clear workload performance goals, or regular check-ins between staff and supervisors to track progress on activities such as utility inspection reports, violation follow-up, and incident investigations.

10. Mix of staff experience and training does not provide a balance of regulatory, policy, or industry expertise to best support GSRB activities.

Most other state pipeline safety programs rely on a mix of engineers and inspectors with industry experience. While on one hand GSRB engineers are a diverse group, with a range of years of experience and solid technical backgrounds, they also provide a fairly uniform set of experiences. The sentiment of state program directors was that a combination of engineer and industry-experienced inspectors "works well – the nature of their different expertise and strengths can offset each other and provides for a

balanced approach – getting insight into daily operations and technical expertise." GSRB also does not have policy analysts that could help support many of the non-technical responsibilities of the group. Adding staff with industry and policy experience could, in the short term, exacerbate some existing staff challenges. As one online survey respondent noted: "There is a cultural rift between engineers and analysts, and between rank and file and management. This is true across the CPUC, but is more extreme within GSRB." As it relates to training staff, GSRB does not provide structured opportunities for additional training beyond PHMSA requirements. Pipeline regulation is extremely technical and complex, and GSRB engineers would benefit from specific training in areas such as pipeline risk management, cognitive interview skills, pipeline defects assessment, or risk-based inspection. GSRB currently has no budget for education, and should invest in its staff through enhanced training.

11. Implementation of new citation program is challenging due to concerns on precedent, legal issues, and lack of clarity and specificity in applying penalties.

In December 2011, Resolution ALJ 274 gave citation authority to GSRB engineers to impose penalties for utility pipeline safety violations. This was an important step to allow for a simpler enforcement mechanism than a Commission OII, which is still used for major violations. GSRB developed a Gas Safety Citation Program Standard Operating Procedure in September 2013. Unfortunately, implementation of the citation program has been challenging. The program was essentially put on hold during the San Bruno investigation OII proceeding in order to avoid the potential for setting precedent on penalty amounts for specific violations. The citation program is being implemented again; however, there are no clear definitions on what to cite for and the penalty amount for a given violation. CPUC opened a Rulemaking Proceeding (R14-05-013) in May 2014 to first develop a citation program for the electricity safety program, and second, to identify improvements and refinements to the natural gas and electricity citation programs. CPUC is in the process of developing the electricity citation program, and has not yet scheduled the improvements component of the proceeding. Regarding penalty levels, PHMSA recommended that CPUC increase maximum civil penalty levels, which currently are below federal maximum levels ($50,000 per day versus up to $200,000 per day ($2 million maximum)). CPUC's maximum penalty of $50,000 per day is specified in Public Utilities Code Section 2107, thus it would require legislative action to increase the fine.

12. Lack of integration of new Risk Assessment and Enforcement Section (RAS)

CPUC created the Risk Assessment and Enforcement Section in 2011. RAS was created in response to the Independent Review Panel recommendation to increase CPUC's expertise and application of risk management. Initially, the relationship between RAS and GSRB was not defined, and some within GSRB did not see the need for a separate risk assessment group. In the three years since it was established, the roles and responsibilities of RAS have evolved, and communication between GSRB and RAS at the management level has improved. However, there is little understanding of the role of RAS among GSRB engineers. The two groups are not yet providing the mutual support and coordination necessary to increase and integrate risk assessment tools to prioritize GSRB activities, as was originally envisioned when RAS was established.

GSRB Strengths

While the challenges GSRB faces are significant, GSRB has several promising characteristics:

- **Quality and respect of staff** – a key positive finding from the on-line survey given to employees was the respect GSRB staff hold for each other. When asked what the key strength of the program was, the majority of respondents said, "the staff". Staff see each other as knowledgeable, committed to work, and motivated. Representative on-line survey comments in response to the question, "What do you consider to be GSRB's strengths?" included:
  - "Motivated people who have a concern for safety."

  - "Dedicated people with strong technical skills."
  - "The people who work in this branch, the technical background."
  - "Analytical, proactive and professional."
- **Job satisfaction** – 78 percent of our survey respondents were satisfied or highly satisfied with their jobs. Staff take pride in their work and believe that their work is important and has a high impact. Typical responses to the question: "Based on your current job duties and responsibilities, how satisfied are you with the work you do at CPUC?" were as follows:
  - "I feel strongly about what I do and take pride in what we do to ensure safety of the gas pipeline systems in California."
  - "My job is very interesting and I feel like I'm making a real difference in the organization."
  - "I have worked on various gas safety projects and I believe that I have made significant contributions to enhancing gas safety."
- **Management initiative** – current GSRB and SED management have a solid understanding of the challenges that GSRB faces, including a lack of trust in management grown out of post-San Bruno management changes and internal and external criticism. The management team is addressing incident and investigation report backlogs, implementing performance goals, restructuring, reviewing procedures, and responding to PHMSA recommendations.

These positive factors provide a solid foundation upon which GSRB can build and improve. As we describe in this document, there are twelve potential areas of improvement. The fact that GSRB has a strong and dedicated staff and management team that are satisfied with their work will be critical as GSRB implements a comprehensive improvement strategy.

GSRB Progress To Date

SED is already taking steps to address the identified challenges/opportunities. CPUC's gas safety program has been expanding and evolving since 2011. CPUC has implemented an acceptable response to the five NTSB recommendations, and three of those recommendations have been successfully closed. CPUC has implemented ten of the 24 recommendations of the IRP, thirteen recommendations are in-progress, and one is not applicable.

During the nine months of our evaluation, GSRB added supervisor positions, restructured to improve supervisor reporting lines, assigned process leaders to major work activities, developed a prioritization system for incidents, significantly reduced the incident backlog, focused engineers on reducing the utility inspection report backlog, and redesigned the approach to utility inspections. Our recommendations are consistent with these in-progress or recently completed changes. GSRB is already in the process of implementing some or all components of ten of our recommendations. **Exhibit 2-1,** on the next page, provides a summary of CPUC's progress to date.

Exhibit 2-1
GSRB Progress To Date

Year	Activities
2011	■ Split Utility Safety and Reliability Branch (USRB) into Gas and Electric branches ■ Initiated rulemaking proceeding R-11-02-019 to strengthen natural gas safety rules ■ Closed NTSB recommendation P-10-7 on notifications to utilities ■ Required CPUC voting meetings to include safety presentation ■ Added Utility Engineers ■ Created Risk Assessment and Enforcement Section (RAS) ■ Required utility pressure testing plans ■ Authorized citations by GSRB engineers
2012	■ Developed hazard report (RAS) ■ Required utilities to prepare PSEPs ■ Monitored PSEP activities (ongoing) ■ Added Utility Engineers ■ CPUC established Safety Council ■ Initiated specialized utility inspections/audits ■ Increased flexibility in MHP/Propane inspections ■ Increased whistleblower protections
2013	■ Reorganized CPUC to create Safety and Enforcement Division (SED) ■ Developed Audit (Utility Inspection) best practices ■ Initiated rulemaking proceeding R-13-11-006 to incorporate risk assessment into general rate cases ■ Developed a Standard Operating Procedure for Gas Safety Citation Audits ■ Issued over $8 million in citations ■ Established bi-weekly coordination meetings with Energy Division
2014	■ Prepared Utility Office of Safety and Reliability Annual Plan with goals and metrics ■ Added Supervisor positions ■ Reorganized GSRB to improve reporting and supervisory roles ■ Adopted CPUC Safety Policy Statement ■ Conducted 15 integrity management audits of utilities as of August 2014 ■ Closed NTSB recommendation P-10-5 on PG&E Maximum Allowable Operating Pressure ■ Closed NTSB recommendation P-11-22 to conduct audits of PG&E with PHMSA ■ Evaluated, with RAS, PG&E's risk assessment approach in cost of service proposal ■ Developed improved incident process ■ Developed Self-Identified Violation process ■ Revised approach to utility inspections

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Section 3

Recommendations, Implementation Steps, and Performance Metrics

3. Recommendations, Implementation Steps, and Performance Metrics

The Safety and Enforcement Division (SED) is already taking steps to address the challenges/opportunities identified in Section 2. During the nine months of our evaluation, GSRB added supervisor positions, restructured to improve supervisor reporting lines, assigned process leaders to major work activities, developed a prioritization system for incidents, significantly reduced the incident backlog, focused engineers on reducing the utility inspection report backlog, and redesigned the approach to utility inspections. Our recommendations are consistent with these in-process or recently completed changes. Where applicable, we identify those specific recommendations that GSRB is already implementing.

The remainder of this report provides 33 recommendations to address the twelve challenges/opportunities identified in Section 2. The overarching goal of all 33 recommendations is to improve natural gas pipeline safety in California. There is an added benefit of improved GSRB performance; by improving their PHMSA program evaluation score, GSRB could receive up to $1million more per year in federal grant funding. The majority of recommendations are focused on improving utility inspections[1], which are a core GSRB responsibility. Our recommendations address the following areas (with some overlap between areas and recommendations):

- Utility Inspections ((U) 17 recommendations)
- Incident Investigations ((I) 5 recommendations)
- Work Prioritization, Staffing, and Training ((W) 3 recommendations)
- Technology and Tools ((T) 5 recommendations)
- Communication and Change Management ((C) 2 recommendations)
- Risk Assessment Approach ((R) 1 recommendation).

Exhibit 3-1, starting on page 3-3, provides 19 recommended performance metrics. Performance metrics will be critical to track and evaluate the success of the recommended initiatives, their impact on GSRB performance, and on natural gas safety. We provide additional descriptions, goals, and existing measures (when available) for each of the 19 recommended performance metrics in separate exhibits following each set of recommendations (see pages 3-15, 3-20, 3-25, 3-30, 3-33, and 3-35). It is important to note that at this point in time, GSRB does not have the ability to implement all of these performance metrics because of their inadequate databases and a resulting inability to analyze trends. To fully implement all recommended performance metrics, GSRB must first implement recommendations U-4, U-5, T-1, and T-2.

Exhibit 3-2, following Exhibit 3-1, provides a matrix of each GSRB challenge/opportunity and the recommendations that address them. The top half of Exhibit 3-2 identifies each of the twelve challenges/ opportunities, along with an associated number (in the colored circle). The lower half of Exhibit 3-2 lists each of the 33 recommendations, with an identifying number (i.e. U-1, U-2). For each recommendation, Exhibit 3-2 identifies the challenges/opportunities that the recommendation is intended to address, using the colored circle coding. Most of the recommendations address multiple challenges/opportunities. Exhibit 3-2 also identifies the ten recommendations that are “in-progress”, i.e. GSRB is already in the process of implementing some or all components of the recommendation.

[1] The terms “utility inspection” and “audit” are interchangeable. PHMSA uses “inspection” to describe site visits to gas utilities to verify compliance with pipeline regulations while CPUC has traditionally used the term “audit”.

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Exhibit 3-1
Recommended Performance Metrics

Performance Metric Number	Brief Description	Applicable Recommendation Categories
PM-1	Days to complete inspection report (days from exit interview to report submitted to Program and Project Supervisor (PPS))	■ Utility Inspections ■ Work Prioritization, Staffing, and Training ■ Technology and Tools
PM-2	Days to review inspection report (days from submitted to PPS to report sent to utility)	■ Utility Inspections ■ Work Prioritization, Staffing, and Training ■ Technology and Tools
PM-3	Days to outstanding issues follow-up (days from report sent to utility to all follow-up complete)	■ Utility Inspections
PM-4	Number of days for utilities to respond to information requests	■ Utility Inspections
PM-5	Number of supervisor days in field	■ Utility Inspections
PM-6	Number and severity of violations identified in utility inspections	■ Utility Inspections ■ Risk Assessment Approach
PM-7	Number of pre-field and un-announced field inspections conducted per engineer	■ Utility Inspections
PM-8	Number of citations, amount of citations	■ Utility Inspections
PM-9	PHMSA Program Evaluation Score	■ Utility Inspections ■ Incident Investigations ■ Technology and Tools
PM-10	Days from incident occurrence to incident closure, by incident category	■ Incident Investigations ■ Work Prioritization, Staffing, and Training ■ Technology and Tools
PM-11	Days from incident occurrence to incident report to supervisor (subset of PM-10)	■ Incident Investigations
PM-12	Days for incident report review (subset of PM-10)	■ Incident Investigations
PM-13	Number of incidents by category (cause and level)	■ Incident Investigations ■ Technology and Tools ■ Risk Assessment Approach
PM-14	Number of incidents by miles of pipeline	■ Incident Investigations
PM-15	Staff opinion survey	■ Work Prioritization, Staffing, and Training ■ Communication and Change Management
PM-16	Number of non-PHMSA training hours per person, and average per GSRB	■ Work Prioritization, Staffing, and Training
PM-17	Time to complete and conduct follow-up for MHP/propane inspections	■ Technology and Tools
PM-18	Response to online survey question: “How effective are communications within CPUC?”	■ Communication and Change Management
PM-19	Participation at meetings, brown-bag lunches, office hours, and electronic suggestion box	■ Communication and Change Management

Exhibit 3-2
GSRB Challenges/Opportunities and Associated Recommendations

Challenge/Opportunity	
1	Frequent management changes, shifting priorities, and reactive responses to internal and external recommendations post-San Bruno led to a loss of focus, lack of clear direction, loss of trust in leadership, and unacceptable work backlogs.
2	Disparate, cumbersome, and inadequate database systems that are challenging to use and not conducive to organized recordkeeping, identifying and responding to higher risk areas, monitoring progress, or tracking performance.
3	Lack of consistency, focus, organization, depth and rigor, adequate recordkeeping, clear expectations, and follow-through in utility inspection practices.
4	Delays in completion of utility inspection reports and lack of follow-through on violations, recommendations, observations, and concerns.
5	Delays in completion of incident investigation reports and lack of follow-through on violations, recommendations, observations, and concerns.
6	Inability to analyze trends, risks, and other safety-related concerns across incidents, utility inspection findings, self-reported violations, and complaints.
7	Assignment of staff to multiple tasks without clear prioritization of activities to those with the greatest impact on safety.
8	Lack of communication.
9	Lack of performance measures, clear expectations, and accountability.
10	Mix of staff experience and training does not provide a balance of regulatory, policy, or industry expertise to best support GSRB activities.
11	Implementation of new citation program is challenging due to concerns on precedent, legal issues, and lack of clarity and specificity in applying penalties.
12	Lack of integration of newly formed Risk Assessment and Enforcement Section.

Challenge/ Opportunity	Recommendations
6 7 12	U-1 Incorporate enhanced risk assessment into utility inspection selection
3 4	U-2 Conduct topic-specific standard inspections **(in-progress)**
3 4	U-3 Evaluate approaches to increase the number and thoroughness of inspections **(in-progress)**
2 4 6 9	U-4 Implement utility inspection case management tools
4 6 9	U-5 Incorporate clear performance metrics for utility inspections **(in-progress)**
4 7	U-6 Schedule time for resources to prepare inspection report within 30 days **(in-progress)**
3 4 7 9	U-7 Redefine utility inspection information request expectations
3 4	U-8 Prepare CPUC-specific customized inspection forms
3 4	U-9 Prepare inspection letter and report templates
1 3 6 8 10	U-10 Develop training and tools
3 4 7	U-11 Increase pre-inspection planning
3 4 6	U-12 Conduct pre-inspection field reviews and unannounced field inspections
3 8 9	U-13 Consider assigning a supervisor to focus on utility inspections
3 6	U-14 Utilize integrity issues checklist
3 6	U-15 Conduct enhanced sampling approach for records review
3 8 9	U-16 Increase supervisors' time in the field
2 3 4 11	U-17 Establish and implement a procedure to ensure utility compliance **(in-progress)**

Challenge/ Opportunity	Recommendations
5 6 7	I-1 Implement a redesigned incident process **(in-progress)**
5	I-2 Create drop down menus with pre-approved language for incident reports
5 6 7 12	I-3 Develop a root cause analysis template
5	I-4 Obtain enforcement authority against excavators for dig-ins
6 7 8	I-5 Evaluate safety hotline/whistleblower CPUC system **(in-progress)**
4 5 7	W-1 Implement specialized staff assignments with rotations
1 10	W-2 Provide additional specialized training
10	W-3 Create and hire staff for two new position categories
2 4 5 6 7 12	T-1 Implement data visualization tools for risk assessment and analysis **(in-progress)**
2 3 4 5 6 7 9	T-2 Implement a management solution, leveraging and extending xRM
2 3 4 5	T-3 Implement a SharePoint site for managing GSRB documents **(in-progress)**
2 3 4	T-4 Evaluate use of tablets for utility and MHP/propane inspections
2 4 5 6 9	T-5 Obtain and deploy mobile leak detection technology
1 4 5 7 8 12	C-1 Implement a communication strategy **(in-progress)**
1 3 8	C-2 Institute change management process
6 7 9 12	R-1 Analyze incidents, violations, and findings to guide utility and field inspections

The remainder of this section describes the recommendations in more detail in a series of exhibits, example graphics, and an implementation strategy. The recommendations are presented in a four-column table. The first column defines the recommendation, and when applicable notes whether it is in-progress. The second column identifies which of the twelve challenges/opportunities the recommendation addresses and lists specific objectives and/or issues that the recommendation is intended to improve. The third column provides implementation steps for the recommendation. The fourth column identifies the timeframe to start implementing the recommendation:

1) Quick win (< six months)
2) Short-term (six months to a year)
3) Long-term (over one year).

Utility Inspection Recommendations

Below, we provide seventeen recommendations to improve GSRB utility inspection (audit) practices. Our recommendations are divided into three general categories: (1) utility inspection management, selection, and scheduling (**Exhibit 3-3,** beginning on the next page), (2) utility inspection forms and reports (**Exhibit 3-4,** following Exhibit 3-3), and (3) utility inspection process and procedures (**Exhibit 3-5,** following Exhibit 3-4).

The recommendations are presented in a four-column table. The first column defines the recommendation, and when applicable notes whether it is in-progress. The second column identifies which of the twelve challenges/opportunities the recommendation addresses and lists specific objectives and/or issues that the recommendation is intended to improve. The third column provides implementation steps for the recommendation. The fourth column identifies the timeframe to start implementing the recommendation: 1) Quick win (< six months), 2) Short-term (six months to a year), or 3) Long-term (over one year).

Following the description of the recommendations, in **Exhibit 3-6,** following Exhibit 3-5, we identify nine utility inspection performance metrics. Monitoring and tracking these performance metrics will be important to the successful implementation of the recommendations, and to demonstrating progress. In addition, the process of measuring the number of days to complete utility reports, review reports, and for utility responses, in and of itself, will help focus and prioritize GSRB efforts.

Exhibit 3-3
Utility Inspection Management, Selection, and Scheduling

Utility Inspection Management, Selection, and Scheduling			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
U-1 Incorporate enhanced risk assessment into utility inspection selection	6 7 12 ■ Focus resources where safety issues are most likely to occur	■ Work with the Risk Assessment Group to implement this recommendation and clearly integrate risk into existing inspection process at the front end and at completion ■ Develop a matrix of known risk areas for each inspection unit/type in order to clearly identify categories and level of risk for each unit, including: ☐ Leaks (PHMSA leak reports) ☐ Pipe characteristics ☐ High Consequence Areas ☐ Incidents ☐ Near misses/safety related conditions ☐ Prior violations ☐ Prior recommendations and concerns ☐ Date of last inspection ☐ Constructions/repairs conducted ☐ Field inspection findings ■ Populate the matrix at the end of each calendar year, based on the most recent activities and a ranking/scoring system (based on Washington Utility and Transportation Commission (WaUTC) approach) ■ Increase inspection frequency for those inspection units with high risk rankings ☐ Conduct additional inspections, as needed	Short-term
U-2 Conduct topic-specific standard inspections to reduce the size and scope of individual audits ***(in-progress)***	3 4 ■ Increase depth and rigor of utility inspections ■ Increase the frequency of audit visits at each inspection unit to increase GRSB visibility Reduce size of inspection unit to more readily conduct a complete review of utility operations and to complete inspection reports in a timely manner	■ Redefine standard inspection units, dividing the current scope of a standard inspection into three components, for example: ☐ Cathodic protection ☐ Regulators and valves ☐ Leak Surveys ■ Conduct one inspection component per year at each inspection unit ■ Conduct additional follow-up on inspection areas, as needed, in the following year inspection ■ Create a master schedule of inspection units and inspection topics that can be updated throughout the year based on completed inspections and risk assessments	Quick win

Exhibit 3-3
Utility Inspection Management, Selection, and Scheduling *(continued)*

Utility Inspection Management, Selection, and Scheduling			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
U-3 Evaluate approaches to increase the number and thoroughness of inspections conducted (for example, smaller audit teams in parallel with reduced size and scope of audits) ***(in-progress)***	3 4 ■ Increase depth and rigor of utility inspections ■ Increase the level of scrutiny of utilities and improve gas safety	■ Identify preliminary staffing and time allocation for new inspection units ■ Identify total number of utility inspections to be conducted each year, based on revised inspection unit and inspection subject approach ■ Determine appropriate number of staff and time necessary for each inspection unit ■ Evaluate opportunities to increase the number of inspections conducted, without reducing audit rigor ☐ Reduce staff assigned to each inspection ☐ Adjust scope of inspection ☐ Adjust time of inspection ☐ Incorporate pre-inspection field work and pre-inspection record review ■ Maximize inspection time, efficiency, and thoroughness by focusing on potential problem areas ☐ Obtain utility data prior to the inspection and select initial records for review prior to going on-site ☐ Develop checklists to help direct audit team to likely problem areas and reduce time spent on administrative compliance issues	Quick win
U-4 Implement utility inspection case management, tracking and reporting tools (see recommendation T-2)	2 4 6 9 ■ Improve accountability and reduce time for inspection report completion and close out	■ Develop a utility inspection case management tool, potentially leveraging CPUC's existing CRM/xRM license ■ Phase I CRM/xRM to replace Access for inspection tracking, reminders, analytics ☐ Develop utility inspection workflow ☐ Track assignments, due dates, reminders, approvals, targets for follow-up ☐ Create management dashboards to summarize status ☐ Estimate 2-3 month project timeline to develop prototype ■ Phase II could incorporate customized inspection forms within xRM ☐ Requires more extensive business rules, logistics ☐ Requires developing an approach for off-line completion of forms	Short-term

Exhibit 3-3
Utility Inspection Management, Selection, and Scheduling *(continued)*

Page 3 of 4

Utility Inspection Management, Selection, and Scheduling			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
U-5 Incorporate clear performance metrics and targets for utility inspection selection, scheduling, report completion, report review, utility response, follow-up, and inspection close-out, with completion of entire process[2] ***(in-progress)***	4 6 9 ■ Improve accountability and reduce time for inspection report completion and close out ■ Reduce time for utility inspection report completion	■ Send automated reminders/prompts, for example: ☐ 30 days prior to inspection to confirm schedule with utility ☐ 5 days following exit interview for information request to utility reminder ☐ 21 days following exit interview with reminder report due to PPS in 1 week and should already be reviewed by SUE ☐ 30 days following exit interview for report due to PPS ☐ 15 days following report submission to PPS with reminder review to be complete ☐ 10 days following report submitted to PM for report due to utility ☐ 30 days following report sent to utility – prompt that utility should have responded ☐ 2 weeks following utility response for closure letter indicating violations ☐ 120 days following exit interview for citation reviewed and issued ■ Utilize SharePoint work flows and/or Alerts to set up email reminders ■ Utilize utility inspection case management tool (U-4) once implemented, with integrated reminders ■ Track completion dates to new utility inspection schedule	Quick win
U-6 Schedule time for resources to prepare inspection report within 30 days of audit exit interview ***(in-progress)***	4 7 ■ Reduce time for utility inspection report completion	■ Identify an appropriate number of hours for the lead engineer and audit team to complete a typical inspection report ■ Allocate appropriate time specifically to inspection report preparation, spread between the 4 weeks following the exit interview ■ Minimize scheduling of Lead UEs to a second inspection in the month following an inspection that they led, to the extent possible	Quick win

[2] GSRB is implementing a new 120 day model for utility inspection closure, from the inspection exit interview to citation issued. The new schedule includes the 30 day due-date to PPS (U-6). The new timeline is as follows: (1) report completed, reviewed by Supervisor, and submitted to PPS 30 days from exit interview, (2) PPS has 15 days to review report and submit to PPM (45 days total), (3) PM has 10 days to send report to utility (55 days total), (4) utility has 30 days to respond (85 days total), (5) Lead UE/Supervisor have 14 days to respond to utility with closure letter indicating violations (99 days total), (6) Lead UE/PPS/PM draft citation within 1 week (106 days total), (7) Legal conducts review and citation is issued in 14 days (120 days total).

Exhibit 3-3
Utility Inspection Management, Selection, and Scheduling *(continued)*

Page 4 of 4

Utility Inspection Management, Selection, and Scheduling			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
U-7 Redefine utility inspection information request expectations	3 4 7 9 ■ Increase utility accountability and support GSRB efforts to reduce time for inspection report completion and close out	■ Prepare a document for utilities that clearly summarizes relevant aspects of GSRB's new approach to utility inspections ■ Define information request requirements and repercussions if not met □ Maximum 30 days for information requests □ Preferred 15 days for information requests following an inspection to facilitate completion of audit reports □ Maximum 30 days for response to audit reports □ Automatic violation of CFR Title 49, Section 190.203 (information request) and Section 190.209 (response) if 30 day time period is not met □ Establish a penalty if a utility repeatedly exceeds the 30 day requirement ■ Evaluate the need to specify a shorter information request period, to be incorporated into GO 112-E, to facilitate preparation of inspection reports within 30 days of the exit interview	Quick win

Exhibit 3-4
Utility Inspection Forms and Reports

Utility Inspection Forms and Reports			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
U-8 Prepare CPUC-specific customized inspection forms for standard inspections and field inspections	3 4 ■ Increase consistency of inspection practices and support staff in completing inspection reports in a timely manner ■ Address inconsistent utility inspection practices, inconsistent use of inspection forms, and poor inspection notes	■ Review PHMSA, Washington State, and Ohio standard inspection forms ☐ Identify desired approach and format ☐ Identify additional GO 112-E requirements to include in forms ☐ Ensure that format is easy-to-use and provides opportunity for engineers to provide comments ■ Determine appropriate form contents for each of the standard inspection sub-units ■ For each item, develop a question-format version of the topic. For example: ☐ "If the operator has a voluntary installation program for excess flow valves, the program must meet the requirements outlined in §192.383; if the operator does not have a voluntary program for EFV installations, customers must be notified in accordance with §192.383" becomes ☐ "Does the operator have an installation and reporting program for excess flow valves and does the program meet the requirements outlined in §192.383? Are records adequate?" ■ Create draft versions of forms and guidelines for use ■ Field test draft forms ■ Prepare final versions of forms and guidelines ■ Incorporate forms into mobile devices (Recommendation T-4) ■ Require completed forms as part of the inspection report	Long-term
U-9 Prepare inspection letter and report prototypes, incorporating standard responses for frequent code violations	3 4 ■ Increase consistency of inspection practices and support staff in completing inspection reports in a timely manner ■ Address long inspection report review time and need for multiple rounds of revisions	■ Review existing inspection reports and templates ■ Identify key report components ☐ Introduction ☐ Summary of findings ☐ Response dates ☐ Description of violations, recommendations, observations, and concerns ■ Identify most frequent violation, recommendation, observation, and concern types ■ Develop specific report language for each frequent event that can be readily inserted into a report ■ Create drop down menus with pre-approved language for frequently occurring violations ☐ Instruct engineers to add bullet points for inspection-specific details ■ Create library of prototypes and report language inserts for easy access and use ■ Incorporate into mobile devices (Recommendation T-4) ■ Provide training on use of report templates and language inserts	Long-term

Exhibit 3-5
Utility Inspection Process and Procedures

Page 1 of 4

Utility Inspection Process and Procedures			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
U-10 Develop training and tools, including information exchanges, to support staff development, consistency, and increased rigor during utility inspections and field visits (see recommendation W-2)	1 3 6 8 10 ■ Invest in GSRB staff professional development ■ Increase quality and consistency in utility inspection practices ■ Increase depth and rigor of utility inspections ■ Improve ability to focus resources on potential problem areas ■ Increase the level of scrutiny of utilities	■ Invest in annual training, beyond PHMSA requirements ■ Identify and prioritize training topics, such as: ☐ Pipeline risk management ☐ Pipeline defects assessment ☐ Risk-based inspections ☐ Cognitive interview skills ☐ Welding and corrosion ☐ Pipeline integrity management ■ Budget for and organize annual all-staff in-house training sessions (1-3 days) on selected topics (bring trainers to CPUC) ■ Identify supplemental (beyond PHMSA) training appropriate for selected engineers to improve specialized capabilities ☐ Budget for and send selected engineers to supplemental training ☐ Require engineers to present training highlights during all-staff meetings or telephone calls ■ Schedule and conduct regularly monthly all-hands telephone meetings to discuss inspection and incident findings for the month, including violations, warnings, recommendations, concerns, and questions ■ Establish process to identify uniformity in areas that require CPUC decisions (for example, grey area violations) to institutionalize how GSRB handles and communicates these decisions ■ Based on staff experience, additional training, integrity issues checklist, and risk assessments, develop tools (questionnaires, guides, checklists) to support utility inspection activities in key areas such as: ☐ Leak surveys ☐ Valve and vault maintenance ☐ Regulating stations ☐ Corrosion ☐ Welds/joining ☐ Hazard categories ☐ Pressure testing ☐ MAOP procedures ☐ Damage prevention programs ■ Tools should incorporate key questions, data points to evaluate, warning signs, early indicators, etc.	Short-term to Long-term

Exhibit 3-5
Utility Inspection Process and Procedures *(continued)* *Page 2 of 4*

Utility Inspection Process and Procedures			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
U-11 Increase pre-inspection planning in order to develop and implement a consistent approach for each similar type of utility inspection	3 4 7 ■ Increase quality and consistency in utility inspection practices ■ Increase depth and rigor of utility inspections ■ Improve ability to focus resources on potential problem areas	■ Develop a protocol for pre-inspection planning to include: ☐ Specific topic areas for each category of inspection ☐ Clarification of topics addressed in prior or subsequent inspections ☐ Adherence to PHSMA and/or CPUC inspection forms ☐ Clear assignments for each UE on the inspection team ☐ Procedures for questions and addressing new issues ■ Obtain and review data on utility assets and activities prior to the inspection ☐ Utilize information to assist in developing inspection plan ■ Lead engineer to determine inspection team assignments and track completion ■ Lead engineer to compile questions and determine approach for addressing areas of concern	Quick win
U-12 Conduct pre-inspection field reviews and unannounced field inspections	3 4 6 ■ Increase depth and rigor of utility inspections ■ Increase the level of scrutiny of utilities	■ Implement two types of unannounced field inspections: ☐ Observations of crossings, regulators, compressors, and other open locations (will not require utility reporting) ☐ Observations of construction and maintenance activities (will require utility reporting) ■ Develop a protocol for unannounced inspections of crossings, regulators, compressors, and other locations ☐ Create a map of MHP/propane locations and relevant utility pre-inspection locations ☐ For locations >2 hours from SF, LA, or Sacramento, link MHP/propane audits to unannounced field inspections ☐ Develop a form to summarize inspection results ■ Modify GO-112E[3] to require utilities to send a daily construction/maintenance report to CPUC via email, using Washington Administrative Code (WAC) as an example: ■ WAC 480-93-200 (12): "Each gas pipeline company must send to the commission, by e-mail, daily reports of construction and repair activities. Reports may be faxed only if the gas pipeline company does not have e-mail capability. Reports must be received no later than 10:00 a.m. each day of the scheduled work, and must include both gas pipeline company and contractor construction and repair activities. Report information must be broken down by individual crews and the scheduled work must be listed by address, as much as practical. To the extent possible the reports will only contain construction and repair activity scheduled for that day, but they may include a reasonable allowance for scheduling conflicts or disruptions" ■ Establish and monitor target metrics for engineers to conduct a specified number of unannounced pre-inspection and construction/maintenance field inspections each quarter ■ Upload forms/findings from unannounced inspections to the audit database for the appropriate audit unit ■ Utilize findings from unannounced inspections in scheduling utility inspections and follow-up activities	Short-term to Long-term

[3] If requiring utilities to provide daily notification of construction/maintenance activities must be authorized through GO-112E, these changes to the Order could take over one year. GSRB may be able to request utilities provide daily reports without changing GO112-E, and may observe open locations with no additional authorizations.

Exhibit 3-5
Utility Inspection Process and Procedures *(continued)* *Page 3 of 4*

Utility Inspection Process and Procedures			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
U-13 Consider assigning a supervisor to focus on utility inspections across all locations in order to help reinforce inspection consistency	3 8 9 ■ Increase quality and consistency in utility inspection practices	■ Evaluate benefits/costs of assigning one supervisor to manage utility inspections across all offices. Potential roles could include: □ First review of all inspection reports □ Regular field observation of inspection teams □ Lead monthly telephone meetings to discuss inspection findings and questions □ Central resource for questions, concerns, addressing inspection grey areas □ Regular communication to inspection teams on process, approach, current findings, frequent violations, etc. □ Tracking progress of inspection reports and follow-up activities	Short-term
U-14 Utilize integrity issues checklist as part of audit procedures	3 6 ■ Increase depth and rigor of utility inspections ■ Increase the level of scrutiny of utilities ■ Increase quality and consistency in utility inspection practices	■ Review draft pipeline integrity issues matrix (to be developed by Crowe team). Matrix will identify □ Pipeline integrity issues □ Related PHMSA/CPUC requirements/code □ Recommended audit approach to assess integrity □ Implementation steps to assess integrity ■ Develop a checklist of integrity issue procedures to be evaluated during relevant inspections ■ Track implementation of checklist, modify, as needed, to improve applicability	Short-term
U-15 Conduct enhanced sampling approach for record review and selecting field work ; define and implement criteria for detailed record review	3 6 ■ Increase depth and rigor of utility inspections ■ Increase the level of scrutiny of utilities ■ Increase quality and consistency in utility inspections practices	■ For each category of utility records reviewed during inspections, clarify the objectives of the record review and potential record selection criteria, considering areas such as: □ Code compliance □ Integrity issues □ Historical trends □ Warning indicators □ Prior problem areas □ Red-flag warning criteria □ Percent of records to be reviewed □ Time period of records □ Data analytics for electronic records ■ Based on the objectives and criteria, develop a record review strategy that maximizes the probability of identifying potential problems and areas of concern ■ Monitor and revise the records review approach, as necessary, to address changes in record formats and integrity issues	Long-term

Exhibit 3-5
Utility Inspection Process and Procedures *(continued)* *Page 4 of 4*

Utility Inspection Process and Procedures			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
U-16 Increase supervisors' time in the field to evaluate and mentor utility inspection practices	3 8 9 ■ Increase quality and consistency in utility inspections practices	■ Establish specific requirements for supervisors' time in the field at management's discretion ☐ This recommendation is being partially implemented; however, given significant changes underway in utility inspection practices, incident investigations, and reducing backlogs, supervisors' current priority is to be in the office to implement and support these changes ☐ Once GSRB's new processes are stabilized and the team is meeting new delivery targets, new supervisor field time targets should be implemented ☐ Observe each engineer during records review and in the field ☐ Specify minimum total number of days per year ■ Develop observation checklist that lists specific areas for supervisor evaluation ■ Supervisors to provide specific feedback to engineers following each observation ■ Supervisors to meet and discuss trends in observations that may suggest additional training needs	Short-term
U-17 Establish and implement a procedure to ensure utility compliance with inspection recommendations and identified violations	2 3 4 11 ■ Increase utility accountability	■ Create a follow-up file for each utility inspection unit as one component of the inspection report ☐ Identify issues to be addressed immediately post-inspection, compliance dates, and (when completed) final disposition ☐ Identify issues to be addressed in subsequent inspections, compliance dates, and specific actions utility is expected to have taken ☐ Utilize follow-up file in audit selection and scheduling, and in preparation for upcoming inspections ■ Implement reminder emails to lead engineer and supervisor for follow-up reminders at 30-day (minimum) intervals ■ Revise citation process to increase clarity and specificity for application of penalties ***(in progress)*** ■ Utilize citation process if utility consistently delays responses and/or compliance	Quick win

Exhibit 3-6
Utility Inspection Performance Metrics

Page 1 of 2

Utility Inspection Performance Metrics		
Description	**Discussion and/or Recommended Goals**	**Current Status**
PM-1 Days to complete inspection report (days from exit interview to report submitted to PPS)	**30 days** from the exit interview to submitting the inspection report to PPS (Supervisor review is included within the 30 days). We recognize that this is a significant reduction from the current state. Since GSRB is implementing a revised utility inspection approach, we recommend instituting this substantially more challenging goal, recognizing that it may take some time to reach the target	The current structure of the audit database allows for measurement of the total days from inspection completion to letter submitted to utility. For the last three years, the average days from exit interview until inspection letter is sent to the utility, as of October 15, 2014, are as follows: ■ **2011**- 227 ■ **2012** – 241 ■ **2013** – 234 (with 11 reports still pending (and counting*)) * This count will increase when outstanding reports are completed; we utilized days as of 10/15/14 to count days for 2013 reports.
PM-2 Days to review inspection report (days from submitted to PPS to report sent to utility)	**25 days** from when the report was submitted to the PPS to sending the utility response letter, including 15 days for PPS review and 10 days for PM review	
PM-3 Days to outstanding issues follow-up (days from report sent to utility to all follow-up complete)	**45 days** maximum for most items; develop longer timelines for more involved follow-up activities; shorter (immediate) corrections for high-risk problems; includes 30 days for utility response and 14 days for GSRB response and closure letter	Final follow-up is not currently tracked. Days to utility response is tracked in the database. The utility response days over the last three years, as of October 15, 2014, are as follows: ■ **2011** – 19 ■ **2012** – 30 ■ **2013** – 41 (with 4 responses still pending (and counting))
PM-4 Number of days for utility to respond to information requests	30 days maximum; develop shorter timelines for post-utility inspection requests, for example 2 weeks	Not currently tracked
PM-5 Number of supervisor days in field	GSRB should identify a number that balances supervisors' workload, utility inspection schedules, and the value of on-site observations	Recommended but no current target
PM-6 Number and severity of violations identified in utility inspections	It is not appropriate to identify a specific target number of violations. However, we expect that this number could increase (particularly for Southern California) for the first few years of implementing the new utility inspection approach, then decrease over time as utilities improve performance	Beginning on page 3-36, see number of violations identified during utility inspections by utility and unit in **Exhibit 3-17**; and number of violations identified during utility inspections by utility and type in **Exhibit 3-18**

Exhibit 3-6
Utility Inspection Performance Metrics *(continued)* *Page 2 of 2*

Utility Inspection Performance Metrics		
Description	**Discussion and/or Recommended Goals**	**Current Status**
PM-7 Number of pre-field and un-announced field inspections conducted per engineer	GSRB should identify a target number that balances engineer workload, utility inspection schedules, and MHP/propane schedules. We recommend starting with 10 unannounced field inspections per engineer per year. The target will also depend on when CPUC can require daily activity reports from utilities. It would be reasonable to gradually increase the target over time, as GSRB becomes more experienced at conducting unannounced inspections.	None currently required or conducted
PM-8 Number of citations, amount of citations	Like number of violations, we would expect that the number and value of citations might increase initially, then decrease over time as utilities improve performance. GSRB has been working to clarify the citation process, and after almost one year without any citations, issued a citation in November 2014.	GSRB has issued the following citations, since obtaining authority to issue citations in December 2011: ■ **12/27/2012** – $16.8 million citation to PG&E for failure to conduct leak surveys ■ **10/11/2013** – $140,000 citation to PG&E for General Order violation ■ **10/25/2013** – $150,000 citation to Southern California Gas for missing leak survey ■ **11/5/2013** – $8.1 million citation to PG&E for non-standard pipeline testing ■ **11/18/2013** – $50,000 citation to PG&E for self-reported violations ■ **12/5/2013** – $375,000 citation to PG&E for GO 112-E violations, withdrawn on 12/20/2013 ■ **11/20/2014** – $10.85 million citation to PG&E for Carmel-by-the-Sea incident in March 2014
PM-9 PHMSA Program Evaluation Score	Achieve a score of >90 within three years, with improvement over 2013 levels in each year. Within utility inspections, GSRB should focus on increasing points in the following areas where deductions were taken in 2013: ■ Organization and accessibility of files ■ Size of inspection units ■ Progress from 2013 evaluation ■ Organization and use of inspection notes and inspection forms ■ Uploading information into PHMSA database ■ Follow-up on violations ■ Number of field inspections	PHMSA Program Evaluation scores for the last three years were: ■ 2011 – 87.9 ■ 2012 – 86.8 ■ 2013 – 83.8

Incident Investigation Recommendations

Below, in **Exhibit 3-7,** we provide five recommendations to improve GSRB performance in incident investigations. Since this management review began in April 2014, GSRB has made significant progress in reducing the incident backlog and developing a new incident process. Following the five recommendations, in **Exhibit 3-8,** we provide six performance metrics related to incidents. As with utility inspection metrics, closely tracking the time required to complete incident investigations will support quicker completion of incident reports.

The recommendations are presented in a four-column table. The first column defines the recommendation, and when applicable notes whether it is in-progress. The second column identifies which of the twelve challenges/opportunities the recommendation addresses and lists specific objectives and/or issues that the recommendation is intended to improve. The third column provides implementation steps for the recommendation. The fourth column identifies the timeframe to start implementing the recommendation: 1) Quick win (< six months), 2) Short-term (six months to a year), or 3) Long-term (over one year).

Exhibit 3-7
Incident Investigations

Page 1 of 3

Incident Investigations			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
I-1 Implement a redesigned incident process to triage and address incidents by level ***(in progress)***	5 6 7 ■ Reduce time spent on low risk incidents results in backlog and delays in closing incidents ■ Reduce time spent on incident investigations stemming from CPUC's media coverage reporting requirement ■ Improve the incident management process to mitigate future backlogs	■ Develop classifications and criteria for incident priority ■ Current incident priority defined by level: ☐ **Level 1** – no injury, fatality, fire or explosion; may be due to event outside utility's control ☐ **Level 2** – no injury, fatality, fire or explosion; may potentially have been caused by utility's non-compliance or code violation ☐ **Level 3** – release of gas but no injury, fatality, fire or explosion; may potentially have been caused by utility's non-compliance or code violation ☐ **Level 4** – injury, fatality, fire or explosion caused by release of gas from utility's facility ■ Develop process for classifying incidents by level at the time they are received ■ Assign and track incident close-out time periods for each level ■ Identify frequently occurring example incidents for each category (vehicle hitting meter, excavator did not call 811, utility improperly marked location, etc.) to facilitate report language development and help identify activities to reduce occurrence ■ Develop report language drop-down menus for each incident level, including model language for frequently occurring example incidents ■ Evaluate new incident approach after at least 6 months and determine need for refinement, including potential for administrative close-out of some low-level incidents. Evaluation to include: ☐ Number of incidents by level ☐ Number of incidents by cause ☐ Days to incident close out by level ☐ Number of open incidents, by level and cause ☐ Assessment of whether levels appropriately bracket potential risk	Quick win

Exhibit 3-7
Incident Investigations *(continued)* *Page 2 of 3*

Incident Investigations			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
I-2 Create drop down menus with pre-approved language (as applicable) for incident reports (including immediate closure for low priority incidents)	5 ■ Improve the incident management process to mitigate future backlogs	■ Identify frequently occurring incidents for each category (vehicle hitting meter, excavator did not call 811, utility improperly marked location, etc.) ■ Identify applicable code violations, recommendations, concerns, observations for each frequently occurring incident category ■ Review previous incident reports for each of the frequently occurring incident categories ■ Prepare model dropdown menus that incorporate appropriate language from previous reports and improved language from new incident process ☐ Include space for customizing report to specific incidents ■ Test incident menus and make additional refinements, as needed ■ Provide training on use of incident menus ■ Evaluate and update menus, as needed	Long-term
I-3 Develop a root cause analysis template to help guide incident inspections	5 6 7 12 ■ Improve the incident management process to mitigate future backlogs	■ Review and evaluate draft incident root cause analysis from State of Washington (**Exhibit 3-19**, on page 3-36, provides an example schematic based on a portion of Washington's root cause analysis) ■ Identify primary incident causes over last several years, compare to Washington categories ☐ Identify additional or revised first level causes ☐ Develop definitions for first level causes ☐ Link to incident levels, when applicable ■ For each first level cause, identify secondary and potentially tertiary causes ■ Develop questions to help identify and narrow down secondary causes, when applicable. ■ Prepare flow-chart and/or on-line drop-down menu version of root cause analyses ■ Test applicability of root cause tool ☐ Revise and refine tool as needed ■ Conduct training on use of root cause analysis template	Long-term

Exhibit 3-7
Incident Investigations *(continued)* *Page 3 of 3*

Incident Investigations			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
I-4 Obtain enforcement authority against excavators for dig-ins	5 ■ Provide a greater deterrence to dig-ins, which cause the majority of incidents	■ Prepare case for obtaining excavator enforcement authority ☐ Utilities provide inconsistent enforcement of excavators that do not call 811 ☐ Approximately 50% of incidents are a result of dig-ins; frequently the excavator did not call 811, or was otherwise at fault ☐ The actual number of dig-ins is greater, as not all dig-ins are reported by utilities; most that are reported are due to media involvement ☐ PHMSA noted the large number of excavation incidents in California ☐ At least ten other states have enforcement authority over excavators ☐ Need to address the fact that GSRB does not currently have resources for additional authority. There is potential that eventual reduced staff time due to expected reduction in excavation incidents could be applied to support expanded education and enforcement of excavators ■ Evaluate model legislation and programs from other states (New Mexico, Washington, Louisiana (with state/local law enforcement sharing role)) ■ Work with Legislative Affairs Office to develop and obtain approval for legislative proposal	Long-term
I-5 Evaluate safety hotline/ whistleblower CPUC system	6 7 8 ■ Provide a mechanism for reporting of, and response to, significant safety concerns	■ Create a web-based tool for online submission of whistleblower complaints, including a tracking system ***(in progress)*** ■ Monitor number of safety hotline and whistleblower reports by month, utility, status, etc. ■ Track outcome and time to closure for each event ☐ Assign priority level of event (use incident levels) ☐ Results of investigation ☐ Time to event closure ■ Compare investigations resulting from safety hotline and whistleblower reports with investigations resulting from self-identified violations, incidents, safety related concerns, or other sources ■ Evaluate effectiveness of safety hotline/whistleblower system: ☐ Is the system resulting in identification of safety-related events that would likely not otherwise be reported? ☐ Are significant safety-related events being identified? ☐ Is GSRB responding to these events in a timely manner? ☐ How much GSRB staff time is spent on these events? ☐ Are events being resolved in a manner that improves safety and reduces potential for reoccurrences? ☐ Could/should promotion of the systems be improved?	Quick win to Long-term

Exhibit 3-8
Incident Investigation Performance Metrics

Incident Investigation Performance Metrics		
Description	**Discussion and/or Recommended Goals**	**Current Status**
PM-10 Days from incident occurrence to incident closure, by incident category	■ **Level 1** – report finalized and approved by Supervisor within 60 days ■ **Level 2** – report finalized and approved by Supervisor within 90 days ■ **Level 3** – report finalized and approved by Supervisor within 120 days ■ **Level 4** – closure timing depends on unique characteristics of each Level 4 incident, but may take 180 days or longer Note: GSRB should evaluate these targets and seek to reduce Level 1-3 targets in early 2016	The current structure of the incident database allows for measurement of the total days from when the incident occurred to when the incident was closed. For the last three years, the average days from incident to closure, as of May 29, 2014*, are as follows: ■ **2011** – 590 days (and counting) (120 completed and 12 outstanding) ■ **2012** – 466 days (and counting) (120 complete and 33 outstanding ■ **2013** – 289 days (and counting) (80 complete and 81 outstanding)) *These counts will increase when outstanding reports are completed; we utilized days as of 5/29/14 to count days for the outstanding incidents
PM-11 Days from incident occurrence to incident report to supervisor (subset of PM-10)	■ **Level 1** – 55 days ■ **Level 2** – 70 days ■ **Level 3** – 100 days ■ **Level 4** – variable	
PM-12 Days for incident report review (subset of PM-10)	Days from report submitted to Supervisor to report approved by Supervisor: ■ **Level 1** – 5 days ■ **Level 2** – 20 days ■ **Level 3** – 20 days ■ **Level 4** – 30 days	
PM-13 Number of incidents by category (cause and level)	GSRB should seek to reduce the number of incidents by each category. GSRB should also refine the incident cause categories that are in the current Access database, and reduce the use of the "other" category. Many of the incidents classified as "other" were listed as dig-ins or fires, and/or could have been more usefully classified. A key goal should be reducing the upward trend in incidents that has occurred over the last ten years.	Exhibit 1-5**,** on page 1-6, illustrates the number of incidents, by cause, between 2005 and May 29, 2014. **Exhibit 3-20,** on page 3-40, illustrates the number of dig-in incidents by year, between 2005 and 2013. The trend line for dig-ins (shown in black) shows a clear upward tendency. The trend lines for the other seven causes (not shown) showed slight upward tendencies.

Exhibit 3-8
Incident Investigation Performance Metrics *(continued)*

Page 2 of 2

Incident Investigation Performance Metrics			
Description		**Discussion and/or Recommended Goals**	**Current Status**
PM-14	Number of incidents by miles of pipeline	GSRB should seek to reduce the number of incidents per mile to below 0.0006, the lowest number in the last 10 years. GSRB could also develop metrics comparable to those of the Pipeline Safety Trust (PST). PST compares DOT reportable incidents per mile of transmission and distribution line. These figures would be lower than the total incidents per mile, as not all incidents are DOT reportable.	**Exhibit 3-21,** on page 3-41, provides a graph of the incidents per mile of pipeline (transmission, distribution, and gathering) between 2005 and 2013. The lowest year was 2006, with 0.0006 incidents/ mile; the highest year was 2013, with 0.0013 incidents per mile. These data include all types of incidents, not just DOT reportable incidents, and also assume pipeline miles were stable during this time period (miles have shifted slightly up and down).
PM-9	PHMSA Program Evaluation Score	Achieve a score of >90 within three years, with improvement over 2013 levels in each year. Within incidents, GSRB should focus on increasing points in the following areas where deductions were taken in 2013: ■ Incident investigations, documentation, and follow-up ■ Incident closure	PHMSA Program Evaluation scores for the last three years were: ■ **2011** – 87.9 ■ **2012** – 86.8 ■ **2013** – 83.8

Work Prioritization, Staffing, and Training Recommendations

Below, in **Exhibit 3-9,** we provide three recommendations related to work prioritization, staffing, and training. We provide four performance metrics for this recommendation category in **Exhibit 3-10,** following Exhibit 3-9.

The recommendations are presented in a four-column table. The first column defines the recommendation, and when applicable notes whether it is in-progress. The second column identifies which of the twelve challenges/opportunities the recommendation addresses and lists specific objectives and/or issues that the recommendation is intended to improve. The third column provides implementation steps for the recommendation. The fourth column identifies the timeframe to start implementing the recommendation: 1) Quick win (< six months), 2) Short-term (six months to a year), or 3) Long-term (over one year).

Exhibit 3-9
Work Prioritization, Staffing, and Training

Page 1 of 3

Work Prioritization, Staffing, and Training			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
W-1 Implement specialized staff assignments with rotations and potential for increased integration between offices ■ Utility inspections/ field inspections ■ Incidents/ MHP-Propane/other inspections/ PSEP ■ Special assignments/ field inspections	4 5 7 ■ Improve ability to focus resources on potential problem areas ■ Improve work prioritization ■ Improve ability to complete reports in a timely manner	■ Evaluate staffing requirements for each key GSRB activity ■ Implement a resource loading tool to assign and allocate resources across GSRB activities (implement this step, even without rotations) ■ Develop prototype rotations (see **Exhibit 3-22,** on page 3-42), for example: ☐ Group 1 - 2 engineers assigned for full year to policy and program activities and field inspections ☐ Group 2 - One-half remaining engineers assigned for 6 months to utility inspections and field inspections ☐ Group 3 - Other half of remaining engineers assigned for 6 months to incidents, other inspections, MHP/Propane, and PSEP inspections ☐ Switch Group 2 and Group 3 after 6 months ☐ Require Group 2 to complete all required reporting within 15 days of switch ☐ Require Group 3 to complete all required reporting within 15 days of switch (with exception of major incident investigations, which could be kept with original assignment or transferred) ■ Evaluate workload balance and adjust as needed during first 6 month rotation ☐ Is rotation approach improving ability to meet report completion targets? ☐ Are engineers in all groups meeting PHMSA field day requirements? ☐ Is the split of responsibilities relatively even between Groups 2 and 3? ☐ Do engineers support the rotation approach? ■ Evaluate rotation approach after one year of implementation ☐ Revise and adjust based on evaluation	Long-term

Exhibit 3-9
Work Prioritization, Staffing, and Training *(continued)* *Page 2 of 3*

Work Prioritization, Staffing, and Training			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**

W-2 Provide additional specialized training (beyond PHMSA requirements)
▪ Specialist subject matter experts in particular topics attend appropriate off-site trainings
▪ Bring formal training to CPUC offices
	1 10
	▪ Invest in GSRB staff professional development
	▪ Increase quality and consistency in utility inspection practices
		▪ Invest in annual training, beyond PHMSA requirements
		▪ Increase funding to budget line item for training activities (there is currently no education budget)
		  ▫ In-house training: estimate $50,000 to $100,000 per 3 to 6 day class
		  ▫ Off-site training for 10 individuals per year: estimate $24,000 total
		  ▫ Out-of-state travel for 10 individuals per year: estimate $24,000 total
		▪ Identify and prioritize training topics, such as:
		  ▫ Pipeline risk management
		  ▫ Pipeline defects assessment
		  ▫ Risk-based inspections
		  ▫ Cognitive interview skills
		  ▫ Welding and corrosion
		  ▫ Pipeline integrity management
		▪ Budget for and organize annual all-staff in-house training sessions (3-6 days) on selected topics (bring trainers to CPUC)
		▪ Identify supplemental (beyond PHMSA) training appropriate for selected engineers to improve specialized capabilities
		  ▫ Budget for and send selected engineers to supplemental training
		  ▫ Require engineers to present training highlights during all-staff meetings or telephone calls
			Short-term to Long-term

Exhibit 3-9
Work Prioritization, Staffing, and Training *(continued)* *Page 3 of 3*

Work Prioritization, Staffing, and Training			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
W-3 Create and hire staff for two new position categories in GSRB ■ Inspectors with industry experience ■ Public Utilities Regulatory Analyst(s) (PURA)	⑩ ■ Bring additional industry insight to GSRB to increase the level of scrutiny of utilities ■ Increase effectiveness in completing program and special assignments that do not require engineers	■ Work with CPUC Human Resources and California Department of Human Resources, Statewide Workforce Planning and Recruitment Unit to develop and obtain approval for a new natural gas utility inspector classification ☐ Establish approval process, selection methods, and timeline to develop and implement classification ☐ Build on existing classifications and approvals to streamline process to the maximum extent possible ■ Develop case to support the new classification: ☐ Best practices in other states ☐ Challenge of recruiting and retaining qualified staff when limited to degreed engineer positions ☐ Need for improved utility inspection practices, per PHMSA ☐ Value of blending technical and industry expertise in evaluating utility operations ☐ Precedent within CPUC for non-engineer inspector positions, including: Assistant and Associate Railroad Track Inspector, Associate Signal and Train Control Inspector, Electrical Inspector II ■ Develop and obtain approval for draft Natural Gas Utility Inspector specification ☐ Combine relevant aspects of Utility Engineer and Inspector specifications (see **Exhibit 3-23,** on page 3-43, for a preliminary draft prototype) ■ Add one PURA II (or above) position to GSRB to support technical and analytical research work and consultative and advisory services in the areas of natural gas safety economics, finance, and policy: ☐ This position would be responsible for leading GSRB support of Commission proceedings (including rate cases), legislative analyses, and other special assignments ☐ The PURA would work closely with engineers to obtain input on technical aspects of analyses ☐ The PURA could provide additional support and analytical capabilities to promote increased use of risk assessment tools within GSRB, and in coordination with RAS ■ In the future, as utilities increasingly utilize electronic records, evaluate the need for staff with forensic IT capabilities	Long-term

Exhibit 3-10
Work Prioritization, Staffing, and Training Performance Metrics

Work Prioritization, Staffing, and Training Performance Metrics			
	Description	**Discussion and/or Recommended Goals**	**Current Status**
PM-10	Days from incident occurrence to incident report to supervisor (see incident metrics)	The time to complete incident reports should decrease as a result of implementing staff rotations. ■ **Level 1** – 55 days ■ **Level 2** – 70 days ■ **Level 3** – 110 days ■ **Level 4** - variable	See incident metrics
PM-1 PM-2	Days to complete inspection report (days from exit interview to report submitted to PPS) (see utility inspection metrics)	■ 30 days from the exit interview to submitting the inspection report to PPS. ■ 55 days from the exit interview to submitting the report to the utility. ■ The time to complete utility inspection reports should decrease as a result of implementing staff rotations.	See utility inspection metrics
PM-15	Staff opinion survey	Obtain staff feedback on the staff rotation approach on the following questions: ■ Does the rotation approach make it easier to complete reports and assignments? ■ Are you able to focus on specific assignments? ■ Does the rotation approach help improve quality of your work? ■ What changes would you make to this approach, if any?	N/A
PM-16	Number of non-PHMSA training hours per person, and average per GSRB	This number should increase as GSRB establishes a training program that extends beyond PHMSA requirements. GSRB should pick a reasonable target for each year, building up to a training goal that is sustainable, given budget and time constraints. Most training classes are 3 to 6 days in length, so adding a single in-house training would be 24 to 48 hours per year.	N/A

Technology and Tools Recommendations

Below, in **Exhibit 3-11,** we provide five recommendations related to use of technology and tools. These recommendations range from one that is in process, to those that may take some time to evaluate and implement. We also provide five performance metrics in this category in **Exhibit 3-12,** following Exhibit 3-11. Only one of the performance metrics is new (for MHP/propane inspection reports), as implementing these technology recommendations should result in improvements in all program areas.

The recommendations are presented in a four-column table. The first column defines the recommendation, and when applicable notes whether it is in-progress. The second column identifies which of the twelve challenges/opportunities the recommendation addresses and lists specific objectives and/or issues that the recommendation is intended to improve. The third column provides implementation steps for the recommendation. The fourth column identifies the timeframe to start implementing the recommendation: 1) Quick win (< six months), 2) Short-term (six months to a year), or 3) Long-term (over one year).

Exhibit 3-11
Technology and Tools

Page 1 of 4

Technology and Tools			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
T-1 Implement data visualization tools (Tableau) for risk assessment and analysis of incidents, audits, violations, complaints/ whistleblowers ***(in progress)***	2 4 5 6 7 12 ■ Focus resources where safety issues are more likely to occur ■ Implement and track performance metrics	■ Obtain data analytics software (Tableau purchase is in process for two desktop licenses) ■ Determine staff (GSRB and/or RAS) to be primary Tableau analysts ☐ Provide staff training ■ Develop series of key analyses reports utilizing Tableau: (See Exhibits 1-3, 1-5, 3-17, and 3-18 for examples of analyses exported from Tableau. A greater benefit of Tableau comes from the ability to analyze and manipulate data real-time, which cannot be shown in these static examples) ☐ Incidents by type, utility, location, injury, versus pipeline locations, status of reports, violations, etc. ☐ Utility inspection by type, utility, frequency, violations, locations, versus pipeline locations, status of reports, status of compliance, etc. ☐ MHP/Propane inspections by location, year to be inspected, status of reports, status of compliance, ■ Develop interim approach to link and/or export Access databases to Tableau analyses ■ Create data links from new xRM system (if and when developed) to allow for real-time analyses and tracking of performance metrics	Quick win

Exhibit 3-11
Technology and Tools *(continued)*

Page 2 of 4

Technology and Tools			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
T-2 Implement a management solution for audits/incidents/ complaints/ whistleblowers, leveraging and extending xRM, which is already in use by CPUC	2 3 4 5 6 7 9 ■ Improve ability of management to track and monitor work progress ■ Focus resources where safety issues are more likely to occur ■ Implement and track performance metrics ■ Address inconsistent utility inspection practices, inconsistent use of inspections forms, and poor inspection notes	■ Develop a utility inspection case management tool, leveraging CPUC's existing CRM/xRM license ■ The system could be scalable and implemented in smaller implementation phases, for example: □ Phase 1a: utility inspection workflow and database with SharePoint Data Storage □ Phase 1b: Incident management □ Future functionality: ● MHP/propane ● Consumer Complaint Portal ● Utility Complaint and Data Upload Management Portal ● Integrated GSRB and/or PHMSA inspection form integration with mobile tablet usage ■ Phase 1a CRM/xRM to replace Access for utility inspection tracking, reminders, analytics □ Develop utility inspection workflow □ Track assignments, due dates, reminders, approvals, targets for follow-up □ Create management dashboards to summarize status □ Estimate 2-3 month project timeline to develop prototype ■ Implementation steps include: □ Determine how to expand and purchase the additional Microsoft Dynamics CRM licenses to be used by GSRB employees □ Determine whether the solution would be housed on local servers or leverage cloud hosted services that are now promoted by the State's CIO □ Define and determine how to obtain resources to configure CRM to meet your business needs: for example, issue an RFO under the California Master Agreement Services (CMAS) for Technical consulting services which expedites the process as long as the budget is $500k or below ■ Once configured, system can be managed and enhanced by GSRB Staff ■ **Exhibit 3-24,** on page 3-44, provides an example roadmap for a phased implementation of a Microsoft xRM GSRB management system	Quick win to Long-term

Exhibit 3-11
Technology and Tools *(continued)*

Technology and Tools			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
T-3 Implement a SharePoint site for managing GSRB documents ***(in progress)***	2 3 4 5 ■ Reduce time for utility inspection report completion ■ Increase consistency of inspection practices and support staff in completing inspection reports in a timely manner ■ Address inconsistent utility inspection practices, inconsistent use of inspections forms, and poor inspection notes	■ Identify all GSRB documents that could potentially be stored and managed within SharePoint, including: ☐ PHMSA and CPUC inspection forms ☐ Report templates ☐ Checklists and guidelines ☐ Procedure manuals and guidelines ☐ Training documents ☐ Various forms and applications ■ Develop a document hierarchy and folder structure ☐ Create a folder for each utility inspection organized by utility, type, date ☐ Create a folder for each incident organized by date, utility, level ■ Develop naming and notification systems for folders and documents associated with specific utility inspection categories ■ Create links to case management tool, when developed ■ Store all utility inspection, incident investigation, other investigation, MHP/propane inspection documents in the SharePoint site in appropriate folders and libraries ■ Utilize the SharePoint calendar for utility inspection schedule, meetings, training, etc. ■ Implement automatic email reminders through SharePoint work flow or alert functions ■ Evaluate and update the SharePoint site on an annual basis, adding and integrating functionality as appropriate ■ Utilize SharePoint to track progress in implementing the 33 recommendations in this report	Quick win to Short -term
T-4 Evaluate use of tablets for utility and MHP/propane inspections	2 3 4 ■ Reduce time for utility inspection report completion ■ Increase consistency of inspection practices and support staff in completing inspection reports in a timely manner ■ Address inconsistent utility inspection practices, inconsistent use of inspections forms, and poor inspection notes	■ Evaluate tablet hardware options suitable for field work, including issues such as: ☐ Durability ☐ Warranty ☐ Compatibility ☐ Cost ☐ Connectivity ■ Evaluate tablet software options for utility inspections, incident inspections, MHP/propane inspections, considering: ☐ Custom system integrated with xRM ☐ Off-the-shelf inspection/audit applications (there are many) ☐ Ability to create inspection forms and reports ☐ Ability to incorporate pictures, notes, and signatures ☐ Ability to upload to SharePoint and/or xRM system ☐ Connectivity ☐ Cost ■ Purchase a small number of tablets to test applicability and effectiveness ■ Evaluate use of tablets, update approach, and purchase additional tablets, if appropriate (See **Exhibit 3-25,** on page 3-45, for a list of benefits and challenges of tablets)	Long-term

Exhibit 3-11
Technology and Tools *(continued)* *Page 4 of 4*

Technology and Tools			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
T-5 Obtain and deploy mobile leak detection technology to support GSRB inspection and investigation activities	2 4 5 6 9 ■ Focus resources where safety issues are most likely to occur ■ Increase the level of scrutiny of utilities and improve gas safety	■ Purchase advanced leak detection technology, such as that currently used by PG&E and the Environmental Defense Fund (EDF) to monitor and map natural gas (methane) releases: □ Picarro Surveyor™ is a mobile technology that is 1,000 times more sensitive in detecting natural gas (methane) than traditional leak detection technologies (See **Exhibit 3-26,** on page 3-46, for an illustration of maps showing methane leaks by size. The maps were developed through an EDF/Google Earth Outreach partnership using Picarro Surveyor™ technology) □ CPUC has already approved use of this tool by PG&E (PG&E has 8 vehicles outfitted with Picarro Surveyor™) □ Allows for leak detection of mains and services at driving speeds □ Could be funded with penalty dollars □ Supports implementation and monitoring of SB 1372 (Leno, Chapter 525, Statutes of 2014), requiring the CPUC to adopt rules and procedures related to minimizing natural gas leaks, considering safety and reduction of greenhouse gas emissions ■ Deploy the mobile technology to identify leaks first in high consequence areas and areas shown in risk assessments to be higher risk zones ■ Utilize the mobile technology to identify leaks, monitor utility repairs, and support enforcement of pipeline safety rules ■ Conduct field inspections in locations with identified leaks ■ Integrate leak maps with Tableau analyses to further support risk assessment activities	Long-term

Exhibit 3-12
Technology and Tools Performance Metrics

Technology and Tools Performance Metrics			
	Description	**Discussion and/or Recommended Goals**	**Current Status**
PM-10	Days from incident occurrence to incident report closed (see incident metrics)	The time to complete incident reports should decrease as a result of improved management systems. ■ **Level 1** – 60 days ■ **Level 2** – 90 days ■ **Level 3** – 120 days ■ **Level 4** – variable	See incident metrics
PM-1 PM-2	Days to complete inspection report (days from exit interview to report submitted to utility) (see utility inspection metrics)	■ 55 days from the exit interview to submitting the inspection report to utility. ■ The time to complete utility inspection reports should decrease as a result of improved management systems.	See utility inspection metrics
PM-9	PHMSA Program Evaluation Score	Achieve a score of >90 within three years, with improvement over 2013 levels in each year. Related to technology and tools, GSRB should focus on increasing points in the following areas where deductions were taken in 2013: ■ Organization and accessibility of files ■ Organization and use of inspection notes and inspection forms ■ Uploading information into PHMSA database ■ Follow-up on violations	PHMSA Program Evaluation scores for the last three years were: ■ **2011** – 87.9 ■ **2012** – 86.8 ■ **2013** – 83.8
PM-17	Time to complete and conduct follow-up for MHP/propane inspections	Use of tablets for MHP/propane inspections should increase efficiency and improve follow-up for MHP/ propane inspections. If tablets are implemented, GSRB should identify a pre- and post-tablet metric, such as days to closure, and track changes.	N/A
PM-13	Number of incidents	Use of advanced leak technology could lead to a reduction in the number of incidents and should decrease over time, as leaks are identified and addressed earlier.	See incident metrics

Communication and Change Management Recommendations

Below, in **Exhibit 3-13,** we provide two recommendations related to communication and change management. These two recommendations will be important to the success of the other 31 recommendations in this report. We provide three performance metrics in this category in **Exhibit 3-14,** following Exhibit 3-13. These performance metrics will provide management with feedback on program changes and can help shape implementation strategies and approaches.

The recommendations are presented in a four-column table. The first column defines the recommendation, and when applicable notes whether it is in-progress. The second column identifies which of the twelve challenges/opportunities the recommendation addresses and lists specific objectives and/or issues that the recommendation is intended to improve. The third column provides implementation steps for the recommendation. The fourth column identifies the timeframe to start implementing the recommendation: 1) Quick win (< six months), 2) Short-term (six months to a year), or 3) Long-term (over one year).

Exhibit 3-13
Communication and Change Management *Page 1 of 2*

Communication and Change Management			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
C-1 Implement a communication strategy ***(in progress)***	1 4 5 7 8 12 ■ Implement effective communication to provide a foundation to meeting the GSRB's goals and objectives ■ Increase learning and understanding among staff and between staff and management ■ Provide opportunities for sharing, lessons-learned, and training to increase staff's understanding of their own activities ■ Provide venues for staff to provide feedback to management (concerns, questions, suggestions) ■ Provide venues for management to communicate to staff about new activities, policies, goals, etc. – including why they are being implemented ■ Increase information sharing between GSRB and RAS to facilitated identification of areas for mutual support and collaboration	■ Conduct an annual off-site meeting, to include: ☐ Reflection on prior year activities and achievements ☐ Look ahead to new year activities and goals ☐ Outside speaker/training session(s) ☐ Staff presentations/lessons-learned ☐ Technical roundtable sessions ■ Conduct quarterly all-staff meetings ☐ Update on quarter's activities, including utility inspections ☐ Technical presentation(s) ■ Hold informal monthly brown-bag lunches to discuss key topics and recent work activities ■ Conduct bi-weekly management meetings ■ Conduct monthly Section meetings ■ Implement a monthly email newsletter ☐ Use as a tool to provide information on upcoming utility inspections, status of proceedings, Risk Assessment Section activities, incident reports, etc. ■ Implement an electronic suggestion box ☐ Provide a mechanism for staff to offer suggestions and feedback ☐ Available options are free or with monthly subscription fee ■ Conduct Deputy Director open office hours ■ Conduct Program Manager open office hours ■ Conduct regular visits by Deputy Director and Program Manager to Sacramento and Los Angeles offices	Quick win

Exhibit 3-13
Communication and Change Management *(continued)* *Page 2 of 2*

Communication and Change Management			
Description	**Challenges, Opportunities, and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
C-2 Institute change management to facilitate implementation of recommendations	1 3 8 ■ Increase the likelihood of successful implementation of new GSRB initiatives ■ Increase learning and understanding among staff and between staff and management ■ Increase integration and understanding of GSRB's day-to-day activities at the Commission level	■ Develop a change management program to support implementation of program recommendations: □ Implementing the recommendations in this report will require cultural change within CPUC and GSRB. Staff need to see that leadership is backing them up, to have clear goals, and be empowered to reach for higher goals to more effectively oversee the safety of California's extensive natural gas pipeline systems □ Increase Commission involvement in the Safety program through Commission approval of GSRB annual plans and goals □ Promote consistency between Commission leadership and upper management □ Change management is the people side of change – activities that are required to prepare an organization for the delivered change (i.e. the implemented recommendations) □ "Likelihood of successful implementation and adoption increases when the organizational structure, processes, and people are continually aligned to a common vision." (Association of Change Management Professionals (ACMP), Standard for Change Management©, 2014) ■ Ensure all components of change are in place: vision, skills, incentive, resources, action plan ■ Manage change over multi-year time frame ■ Implement a structured change management process, for example, high level processes from ACMP include: □ Evaluate change impact and organizational readiness □ Formulate the change management strategy □ Develop the change management plan □ Execute the change management plan □ Complete the change management effort	Short-term

Exhibit 3-14
Communication and Change Management Performance Metrics

Communication and Change Management Performance Metrics			
Description		**Discussion and/or Recommended Goals**	**Current Status**
PM-18	Response to online survey question: "How effective are communications within CPUC?"	■ Compare numerical results with those obtained in the May 2014 online survey. ■ Evaluate open-ended survey comment responses on communication. ■ Given the number of leadership changes within GSRB and SED over the last several years and number of new staff, it may take some time for the communication culture within the GSRB to evolve to the 2014 Annual Plan vision of one that is open and clear. It is important during this transition to keep building the communication strategy, maintaining open communication, and listening and responding to staff feedback.	The May 2014 online survey reflected mixed opinions on the effectiveness of communication within the GSRB. Among all respondents: ■ 11 percent rated communication as very effective ■ 33 percent rated communication as effective ■ 28 percent rated communication as neither effective or ineffective ■ 20 percent rated communication as ineffective ■ 8 percent as very ineffective Half of the eight respondents at the manager/other level felt communication was ineffective.
PM-19	Participation at meetings, brown-bag lunches, office hours, and electronic suggestion box	Record and monitor participation in the various communication venues/tools over time. Measure the number of participants and the amount of participation (number of speakers, questions, comments). Participation should increase as staff are more accepting of program changes and recognize that their input is valued.	N/A
PM-15	Staff opinion survey (responses to annual online change readiness survey)	Change readiness should consider factors such as: ■ Perception of GSRB's readiness for change ■ Personal readiness for change in general ■ Assessment of the change itself and how staff perceive the personal impact of that change ■ Integration of RAS As part of the change management effort, SED should develop and annually administer a short online survey that will measure and track change readiness. Survey responses should reflect an increased acceptance of change over time.	Responses to the May 2014 online survey indicated mixed readiness for change. As identified in Challenge/Objective #1, there has been a lack of trust of leadership, due in large part to frequent leadership changes over the last few years. Survey comments reflect a range of comments, from those welcoming program changes, to those inevitable few that are apprehensive about new initiatives.

Risk Assessment Approach Recommendation

Below, in **Exhibit 3-15,** we provide one recommendation related to risk assessment. Use of risk assessment should follow naturally from many of the other recommendations in the utility inspection, incident categories, and technology and tools categories. We also provide two performance metrics in this category in **Exhibit 3-16,** on the next page. These metrics of violations and incidents reflect that fact that improved use of risk assessment should result in fewer natural gas safety problems.

The recommendations are presented in a four-column table. The first column defines the recommendation, and when applicable notes whether it is in-progress. The second column identifies which of the twelve challenges/opportunities the recommendation addresses and lists specific objectives and/or issues that the recommendation is intended to improve. The third column provides implementation steps for the recommendation. The fourth column identifies the timeframe to start implementing the recommendation: 1) Quick win (< six months), 2) Short-term (six months to a year), or 3) Long-term (over one year).

Exhibit 3-15
Risk Assessment Approach

Risk Assessment Approach			
Description	**Challenges, Opportunities (C/O), and Objectives/Issues Addressed**	**Implementation Steps**	**Timing**
R-1 Analyze incidents, violations, and findings to guide utility inspections and field inspections	6 7 9 12 ■ Focus resources where safety issues are more likely to occur ■ Implement and track performance metrics	■ Work with the Risk Assessment Group to implement this recommendation ■ Track and analyze incident investigations, including: ☐ Root cause ☐ Severity (level) ☐ Location ☐ Pipe characteristics ☐ Date ■ Track and analyze violations (including self-identified violations), including: ☐ Applicable code section(s) ☐ Safety implications ☐ Utility ☐ Pipe characteristics ☐ Location ☐ Date ■ Track and analyze known risk areas for each inspection unit/type, including: ☐ Leaks (PHMSA leak reports) ☐ Pipe characteristics ☐ High Consequence Areas ☐ Incidents ☐ Near misses/safety related conditions ☐ Prior violations ☐ Prior recommendations and concerns ☐ Date of last inspection ☐ Constructions/repairs conducted ☐ Field inspection findings ■ Utilize Tableau and other analysis tools, as appropriate, to identify and evaluate high risk areas and concerns ■ Develop a prioritized list of areas for further evaluation/inspection/follow-up ■ Increase inspection frequency for those inspection units with high risk rankings ☐ Conduct additional inspections, as needed	Quick win to Short-term

Exhibit 3-16
Risk Assessment Approach Performance Metrics

Risk Assessment Approach Performance Metrics			
	Description	**Discussion and/or Recommended Goals**	**Current Status**
PM-6	Number and severity of violations identified in utility inspections	The number of violations identified should decrease over time, as GSRB's risk-based approach focuses on and addresses higher risk areas. The severity of violations should also increase, as GSRB focuses efforts on higher-risk areas and activities	See utility inspection metrics
PM-13	Number of incidents by category	The number of incidents should decrease over time, as GSRB's risk-based approach focuses on and addresses higher risk areas before they become incidents. The number of remaining incidents should generally become less severe, as potentially severe incidents are avoided.	See incident metrics

Example Exhibits and Graphics

The tables, figures, and exhibits below provide examples for specific recommendations and/or metrics, as described.

Exhibit 3-17, on the next page, and **Exhibit 3-18,** following Exhibit 3-17, are based on GSRB's utility inspection databases, using data from 2006 through May 29, 2014. Exhibit 3-17 provides the total number of violation records (i.e. individual violations of specific natural gas regulatory code) by utility and utility division. Each utility is color-coded, and the utility divisions are identified on the horizontal axis. In some cases, the parent company Sempra Energy is a distinct division, while in others, their subsidiaries, San Diego Gas and Electric (SDG&E) or Southern California Gas (SoCal) are distinct divisions.

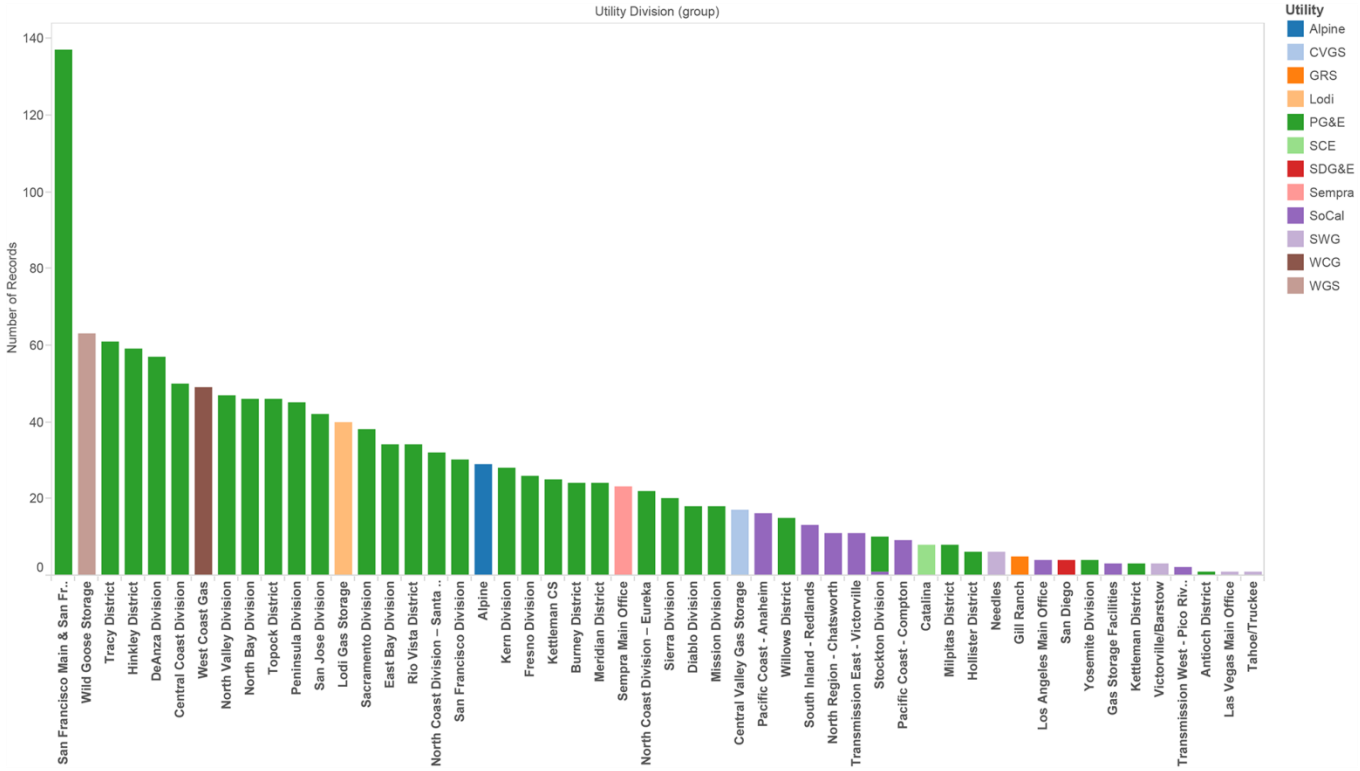
Exhibit 3-19, following Exhibit 3-18, provides an example of a root cause analysis diagram from Washington State. The purpose of the diagram is to help identify incident causes and to focus investigation efforts toward the underlying cause of natural gas accidents, so that those causes can be addressed and responsibility for the accident can be assigned appropriately. This example focuses on construction error as the primary cause of an incident. Within "construction error", there are ten potential root causes (plus "other", which should not be used, if possible). Within each of those ten secondary causes, the diagram identifies several deeper potential causes of construction error accidents.

Exhibit 3-20, following Exhibit 3-19, is based on 2005 through 2013 data from GSRB's incident databases. The figure provides the number of incidents caused by dig-ins (excavators hitting a natural gas pipeline) by year. Exhibit 3-20 illustrates an upward trend in incidents caused by dig-ins, shown as the dashed black line. Not all dig-ins are reported by utilities. One reason for the rise in incidents in 2010 was implementation of CPUC's requirement that utilities report all incidents where the media was present to CPUC, resulting in utilities reporting incidents that they had not previously been required to report.

Exhibit 3-21, following Exhibit 3-20, compares incidents per mile of natural gas pipeline, based on GSRB's incident databases, and an average during the time period of 121,948 miles of transmission and distribution lines. Similar to Exhibit 3-20, Exhibit 3-21 shows an increasing number of incidents, with a large increase in 2010 (after the media reporting requirement), and gradual increases since.

Exhibit 3-22, following Exhibit 3-21, provides an example staffing rotation, as suggested in Recommendation W-1. The estimated days per year are based on interviews with GSRB management to identify average resource needs for each GSRB activity area. These data utilize planned number of utility inspections for 2015, required MPH/propane inspections, and average numbers of investigations, by type, from recent years.

Exhibit 3-17
Total Number of Violations Identified During Utility Inspections by Utility and Unit (2006 to May 29, 2014) (includes General Requirements Procedures Violations)



Utility Acronyms: Alpine = Alpine Natural Gas; CVGS = Central Valley Gas Storage; GRS = Gill Ranch Gas Storage; Lodi = Lodi Gas Storage; PG&E = Pacific Gas and Electric; SCE = Southern California Edison; SDG&E = San Diego Gas and Electric; Sempra = Sempra Energy; SoCal = Southern California Gas Company; SWG = Southwest Gas; WCG = West Coast Gas; WGS = Wild Goose Storage (These acronyms are also used in Exhibit 3-17).

Exhibit 3-18
Total Number of Violations Identified During Utility Inspections by Utility and Type (Excluding General Requirements Procedure Violations) (2006 to May 29, 2014)

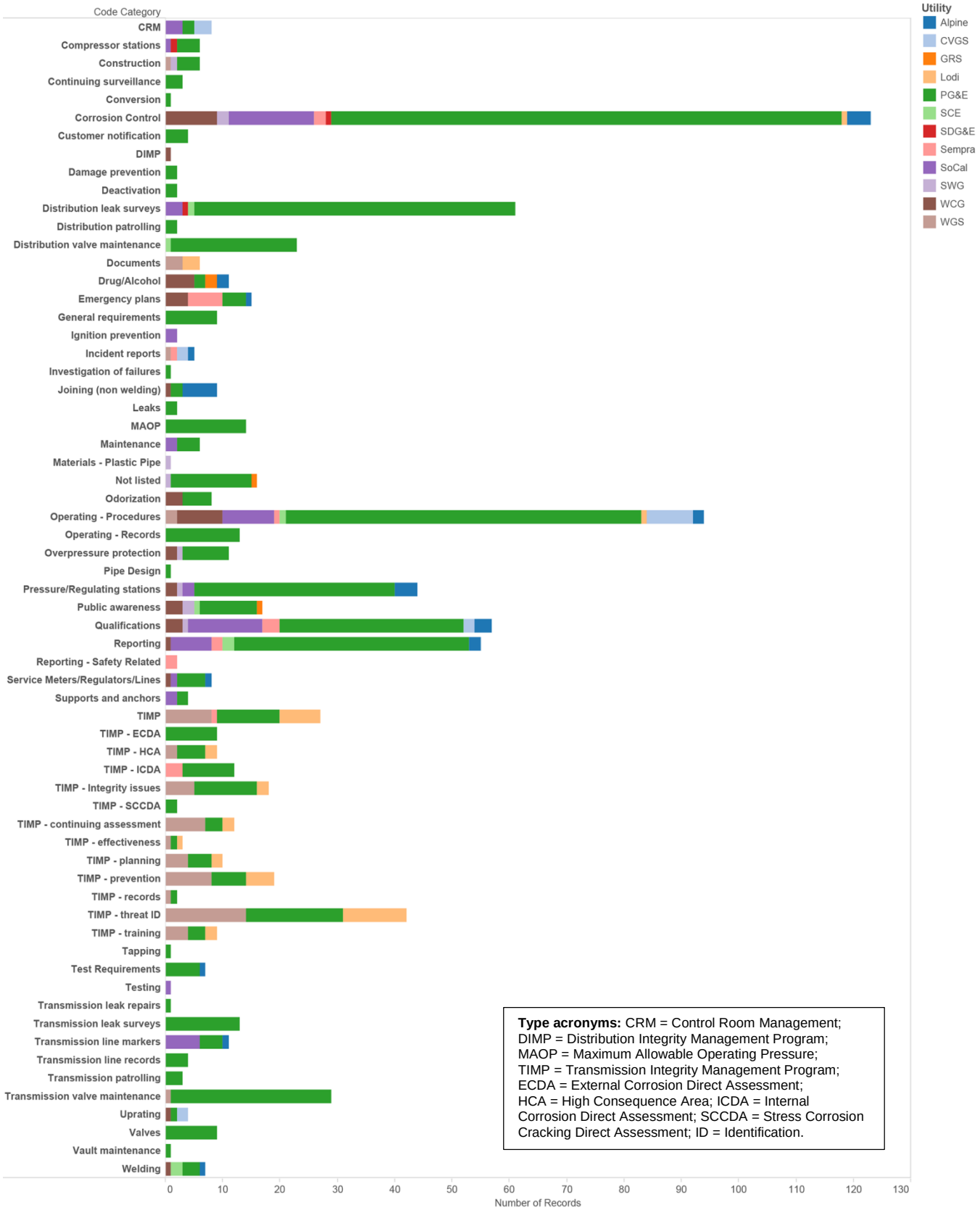


Exhibit 3-19
Example Draft Incident Root Cause Analysis (Courtesy of State of Washington)

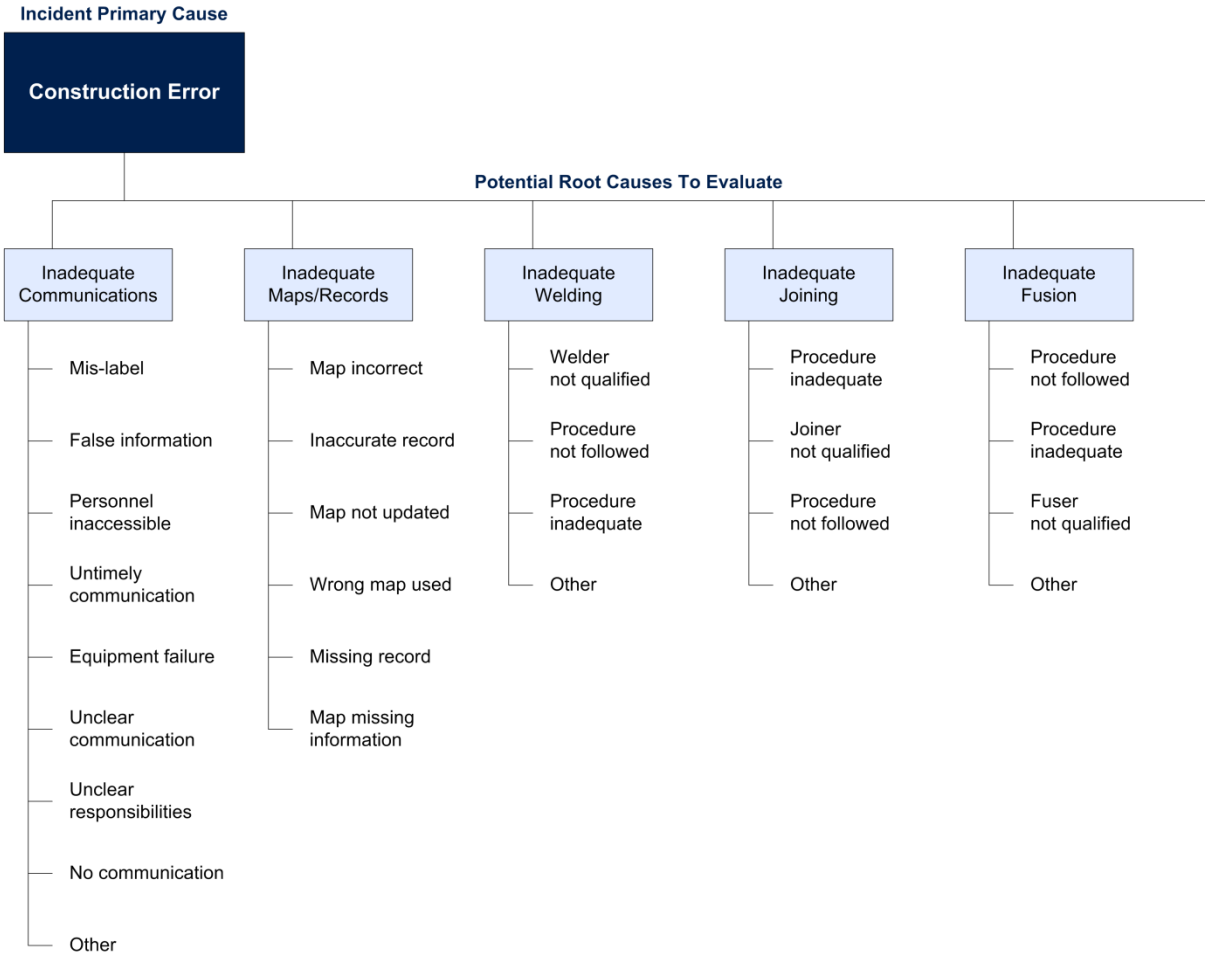


Exhibit 3-19
Example Draft Incident Root Cause Analysis (Courtesy of State of Washington) *(continued)*

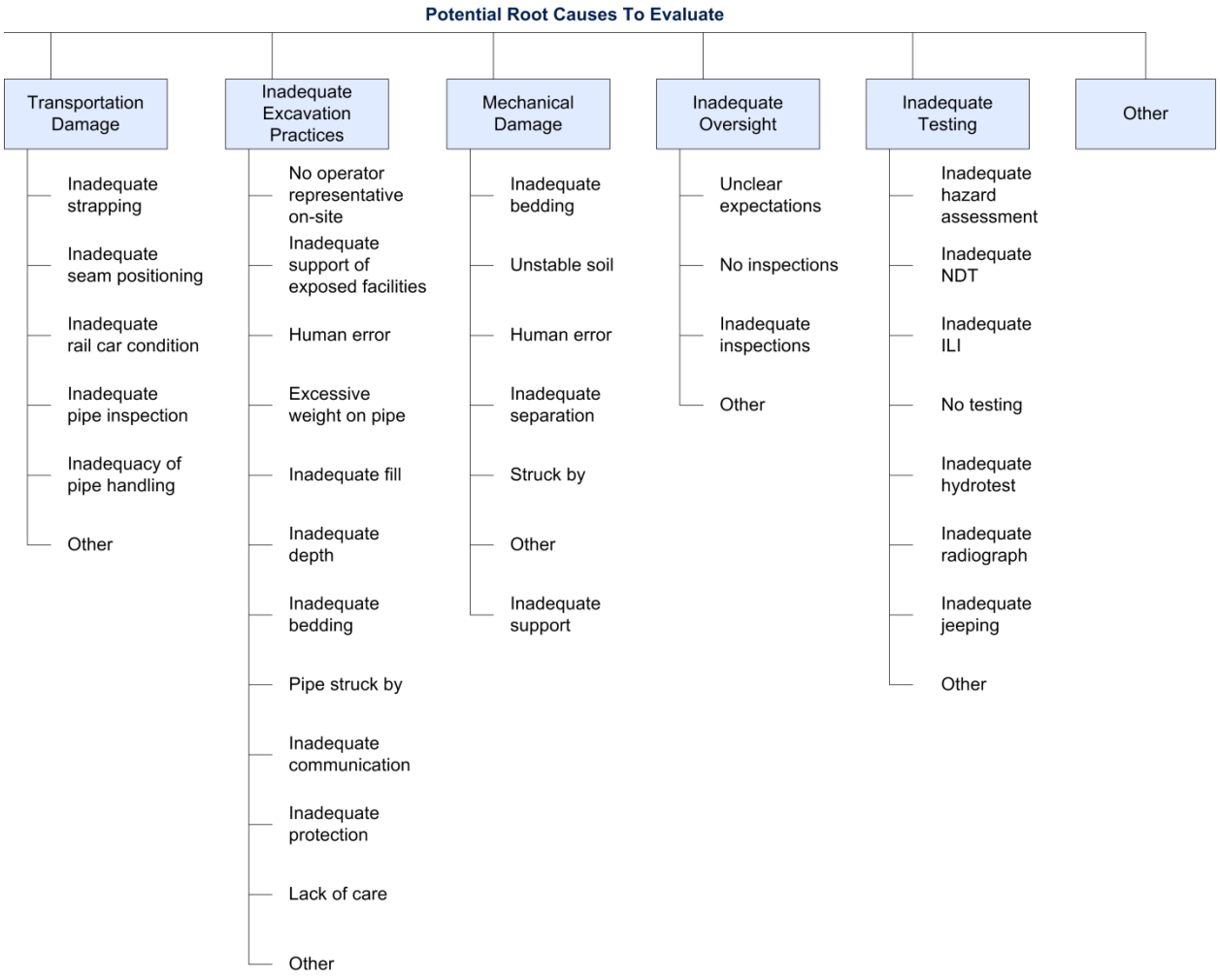
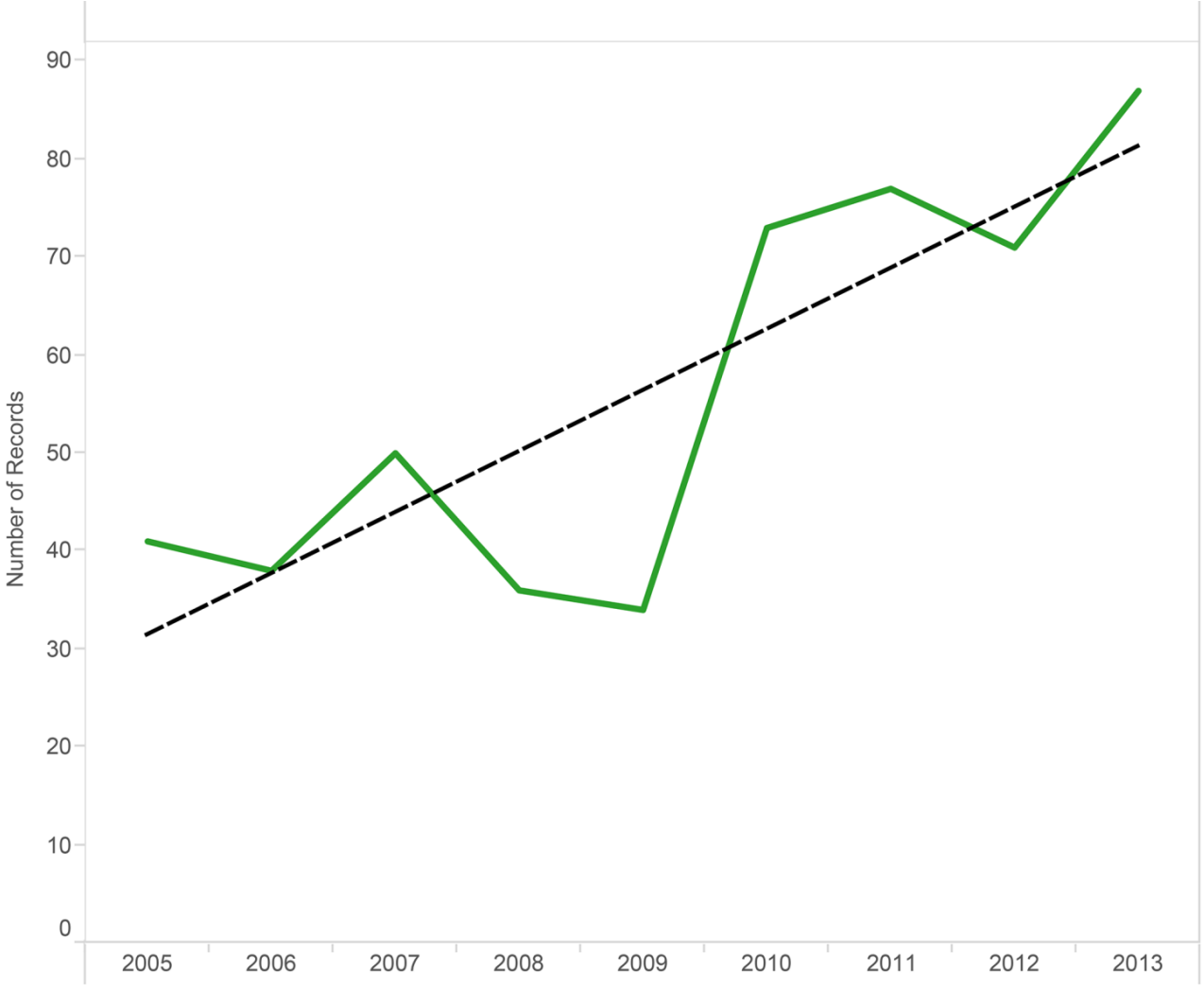
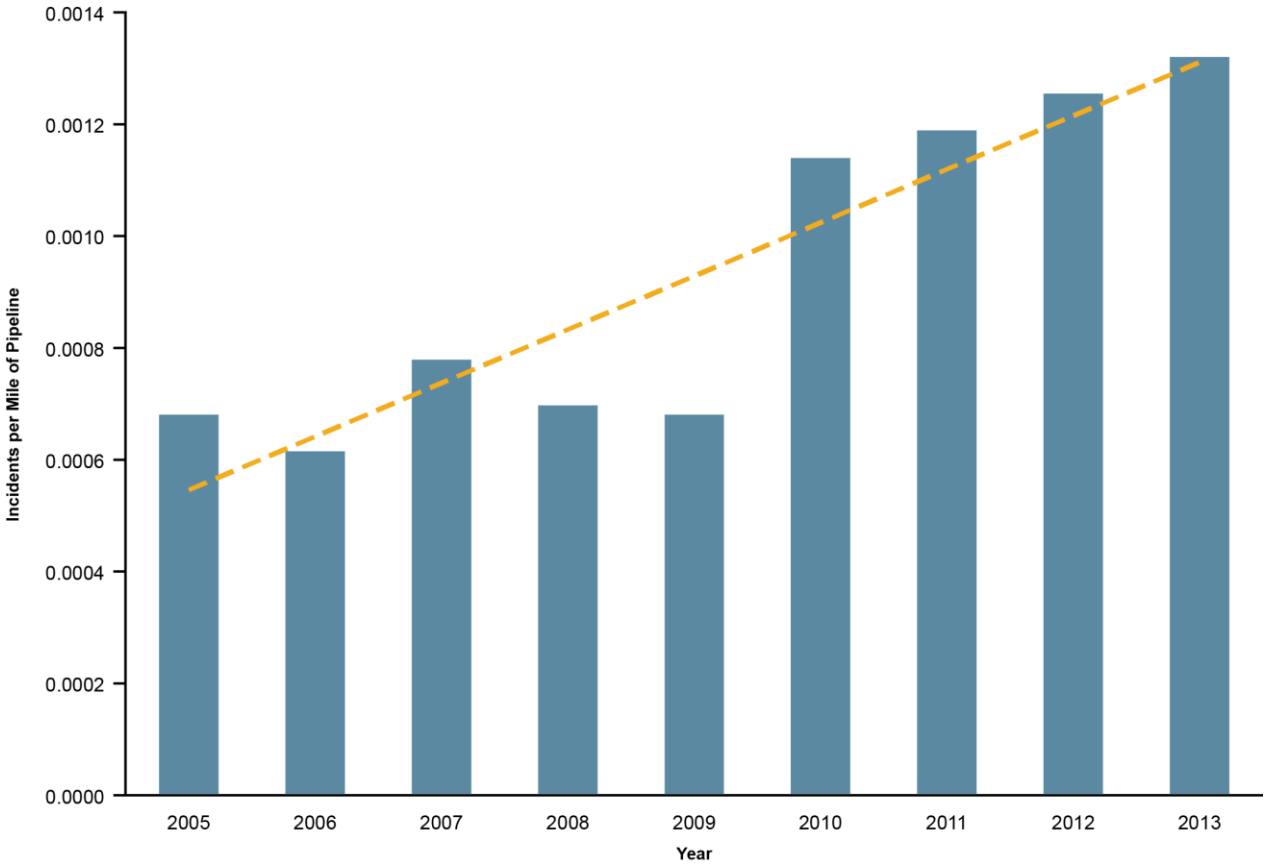


Exhibit 3-20
Number of Dig-in Incidents[4] by Year (2005 to 2013)



[4] Not all dig-ins are reported by utilities. One reason for the rise in incidents in 2010 was implementation of CPUC's requirement that utilities report all incidents where the media was present, resulting in utilities reporting incidents to CPUC that they had not previously been required to report.

Exhibit 3-21
Incidents[5] per Mile of Natural Gas Pipeline (2005 to 2013)



[5] Similar to Exhibit 3-20, one reason for the rise in incidents in 2010 was implementation of CPUC's requirement that utilities report all incidents where the media was present, resulting in utilities reporting incidents to CPUC that they had not previously been required to report.

Exhibit 3-22
Example GSRB Staff Rotation and Estimated Days per Year

Rotation	Estimated Person Days per Year	Notes
Rotation #1		■ Including administration/meetings and training, equivalent to ~ 12 engineers (GSRB currently has 11 engineers available for this rotation) ■ Switch with Rotation #2 after 6 months
Utility and Field Inspections	2,480	
Total	**2,480**	
Rotation #2		■ Including administration/meetings and training, equivalent to ~ 12 engineers (GSRB currently has 11 engineers available for this rotation) ■ Switch with Rotation #1 after 6 months
Incident Investigations	695	
Other Natural Gas Investigations	720	
MHP/Propane Programs	295	
PSEP Inspections	672	
Total	**2,382**	
Rotation #3		■ Including administration/meetings and training, equivalent to ~ 2 staff (ideally would include one PURA and one engineer) ■ Rotation #3 does not switch during the year
Policy and Program Activities	222	
Field Inspections (2/3)	160	
Total	**382**	

Exhibit 3-23, on the next page, provides example language for a new Natural Gas Utility Inspector position, as referenced in recommendation W-3. The draft language represents a blending of the Utility Engineer specification and Inspector specifications. Such language could be used as a starting point for discussions to add inspectors with industry experience to GSRB.

Exhibit 3-24, following Exhibit 3-23, provides a high level roadmap for GSRB implementation of a CRM Management System. Implementation across four key GSRB activities (gas utility inspections, incidents, other investigations, and MHP/propane inspections) would be phased in across three key areas. The first implementation step would be to develop case management tools for tracking, workflow, and document management, addressing a critical GSRB weakness. Once the initial system was in place within each area, GSRB could add reports/letters, and in a second step, incorporate forms. The second implementation phase would be to develop portals for companies to upload data and receive reports, and for public reporting. The final phase would be to develop mobile technology platforms for each area, using tablets, first with direct connectivity, and then to address situations when data must be entered offline and uploaded later.

Exhibit 3-23
Example Draft – Inspector Specification

Natural Gas Utility Inspector

California State Personnel Board Specification

- **Schematic Code:**
- **Class Code:**
- **Established:**
- **Revised:**
- **Title Changed:**

Definition

Under direction, to conduct the most complex investigative and surveillance activities with respect to enforcement of the Federal pipeline safety regulations and CPUC's rules and requirements related to natural gas pipeline safety. Incumbents are assigned duties and responsibilities commensurate with their background, training, and experience. Under supervision, incumbents perform a wide variety of office and field inspection assignments in connection with gas pipeline systems; and do other related work.

Typical Tasks

Natural Gas Utility Inspectors evaluate adequacy, reliability, and quality of service; participate in safety inspections of natural gas systems; investigate accidents of utilities and recommend corrective action; inspect the facilities of utilities for compliance with Commission rules, regulations, and orders; examine records and recommend applicable safety measures for natural gas utilities; prepare correspondence, reports, safety oversight plans, and exhibits; testify in formal proceedings before the Public Utilities Commission, public interest groups, the regulated industries, and various governmental agencies as well as the Legislature; may serve as lead person over engineering and technical personnel on projects of limited scope.

Minimum Qualifications

- **Either I**
  - Successful completion of PHMSA Mandatory Training for Gas Inspectors and two years of experience as a state or federal inspector engaged primarily in the inspection of natural gas utility facilities.
- **Or II**
  - Six years of progressively responsible work experience in natural gas utility construction, maintenance, or operations.

Knowledge and Abilities

Knowledge of: Natural gas utility inspection, maintenance methods, equipment and general natural gas safety facilities; proper corrective action to be taken in order to bring utility operations into compliance with Federal and CPUC regulations and requirements; physical properties of natural gas utilities and standards of safety, service, and reliability; trends, issues, and State and Federal requirements.

Ability to: Determine the safety of utility operations and the adequacy of maintenance procedures; understand maintenance standards and utility procedures and detect deviations therefrom; determine adequacy of utility facilities in accordance with the provisions of Federal and CPUC regulations and requirements; conduct investigations of natural gas accidents; develop and evaluate alternatives; communicate effectively; gain and maintain the confidence and cooperation of those contacted during the course of work.

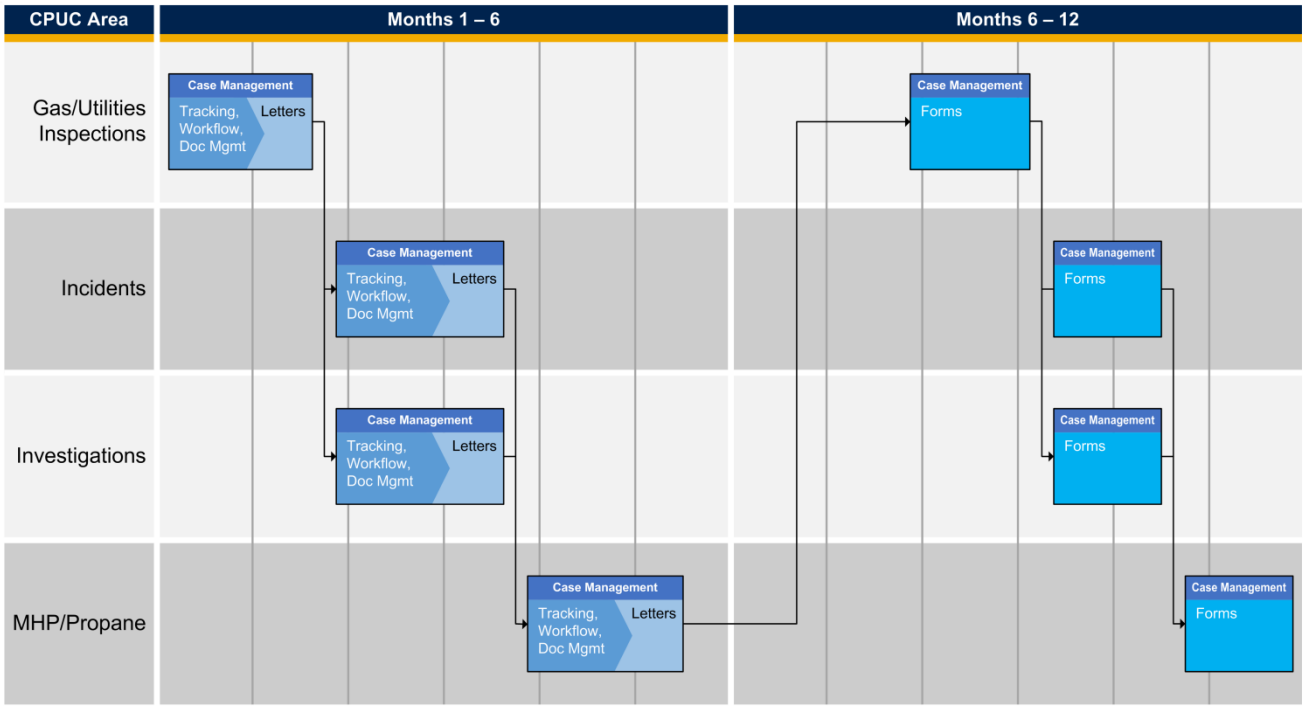
Special Personal Characteristics

Keenness of observation; tact; and willingness to travel.

Additional Desirable Qualification

Education equivalent to completion of the twelfth grade.

Exhibit 3-24
Example Roadmap for CRM Management System Solution for Case Management, Portal, and Mobile Applications



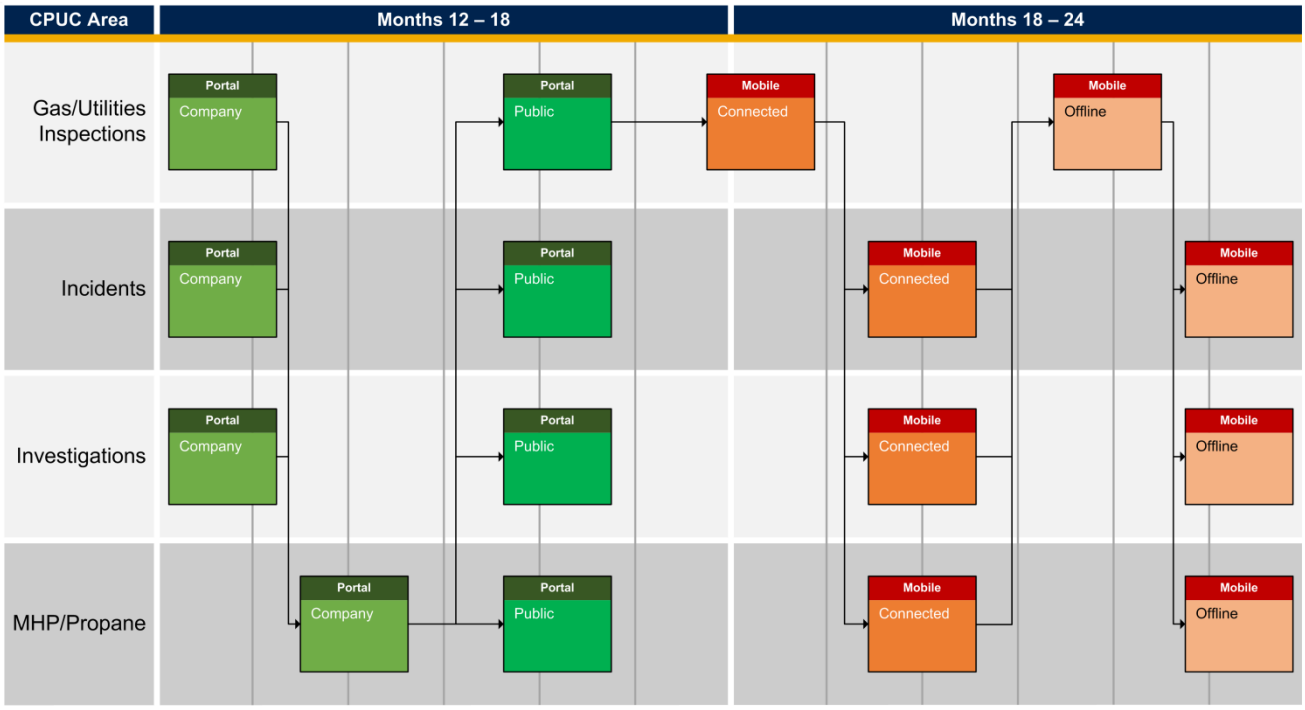


Exhibit 3-25
Benefits and Challenges for Utilizing Tablets for Utility and MHP/Propane

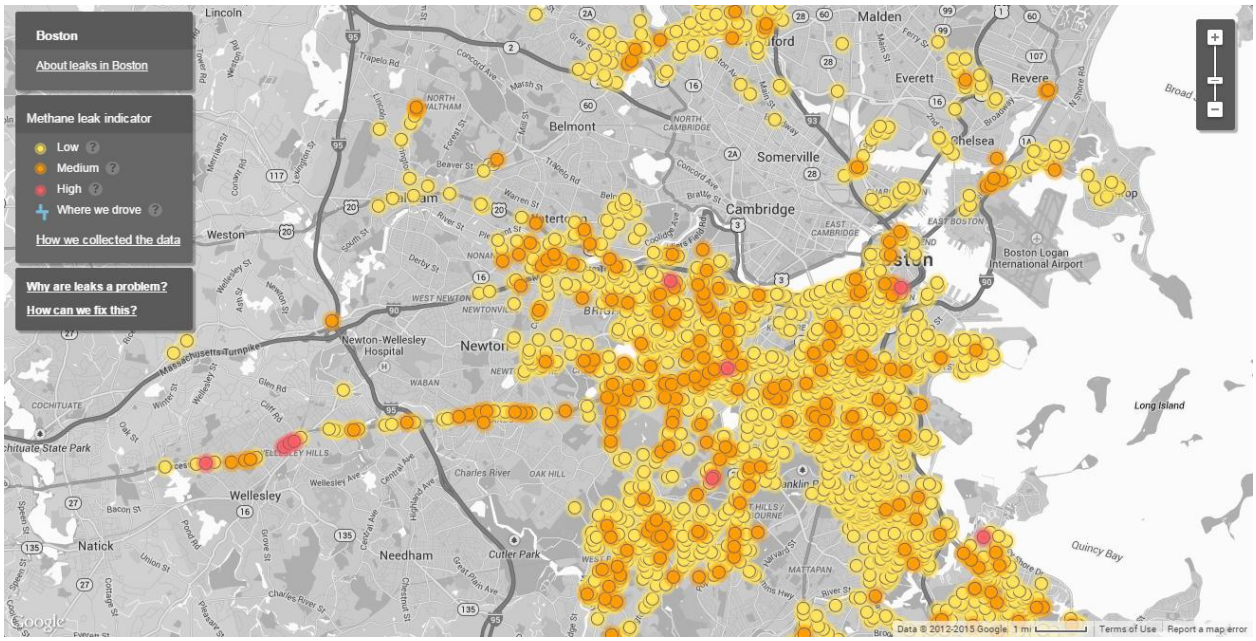
Benefits	Challenges
Capability to customize application with PHMSA and/or CPUC inspection forms	Need to determine mobile application development strategy
Ability to take and insert photos, and add arrows and comments to support findings.	Initial costs and procurement may pose barriers to implementation
Upload data to server, export to various formats, if necessary	Lack of cell/internet access in some locations will require work around
Easier to handle and use in the field than a laptop	Need to consider how rugged tablets should be to reduce potential damage
Direct entry into form on tablet reduces time in taking or transcribing notes	Will require training to support change of current processes and work patterns
Ability to obtain sign-off from MHP/propane operator on-site	
Automatic incorporation of time stamps and GIS location	
Ability to upload data directly to analysis tools	

Exhibit 3-25, above, provides a summary of benefits and challenges when transitioning to use of mobile applications. There is a widespread trend among federal, state, and local government regulatory entities toward use of tablets to improve efficiency and effectiveness in the field.

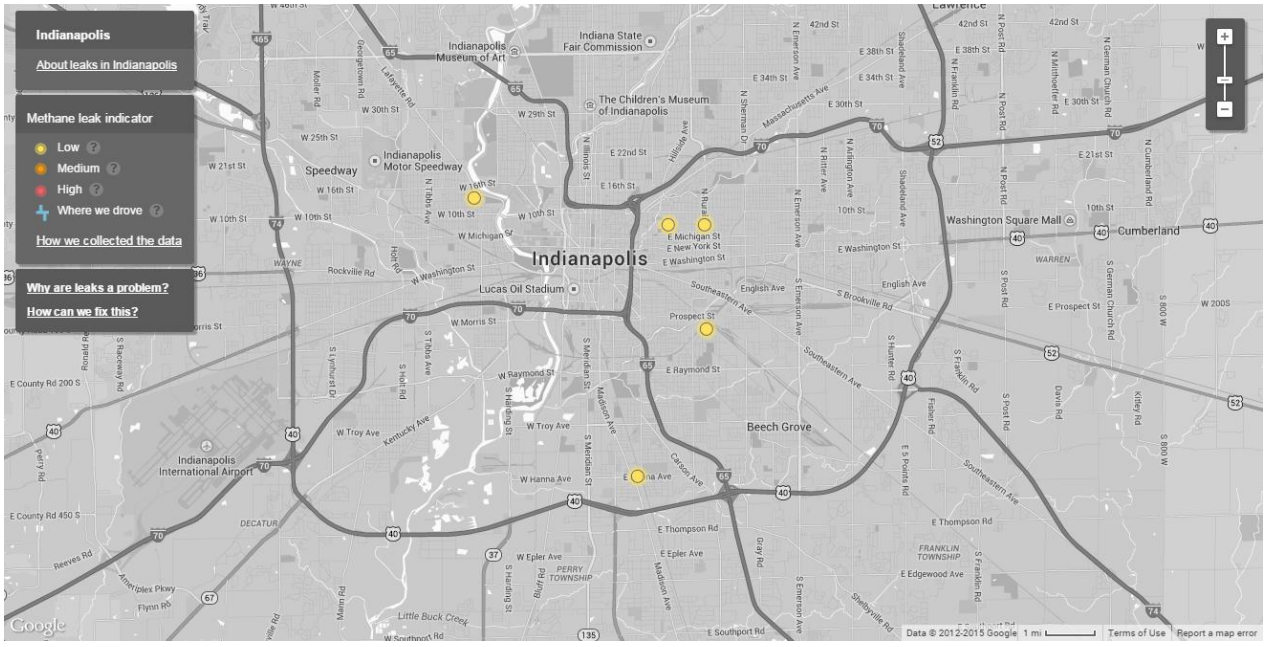
Exhibit 3-26, on the next page, illustrates results of leak surveys using mobile leak detection technology. The data was developed by the Environmental Defense Fund (EDF) using highly sensitive mobile detection tools, and illustrates one application of these tools.

Exhibit 3-26
Environmental Defense Fund Maps of Natural Gas Leaks in Boston and Indianapolis

Boston (Older pipes, more leaks)



Indianapolis (Newer pipes, fewer leaks)



Source: Environmental Defense Fund: http://www.edf.org/climate/methanemaps)

Implementation Strategy

The 33 recommendations identified in this report vary in level of effort and length of time to implement. Given the timing of this report, GSRB has already begun implementing some of the recommendations. Implementing these recommendations will primarily require management and staff time for planning and development.

Some recommendations will require authorization from other entities within CPUC, and/or legislation. Implementing these recommendations will require additional time for planning, development, and approval.

Exhibit 3-27, beginning on the next page, provides a potential implementation schedule for the 33 recommendations. The blue shading illustrates the planning phase. This phase includes identifying supervisors and/or staff that will lead the planning effort, outlying specific actions to be taken, and obtaining necessary approvals. The time required for the "blue phase" could be longer if any necessary outside approvals are not obtained within the projected timeframe. For most recommendations, the planning period is one to two months. However, in some cases, the planning period is longer, reflecting the fact that there are multiple activities within the recommendation that might take longer to develop (for example, within the communication strategy).

The green shading illustrates the development and early implementation phase. This is the time period when GSRB will be developing and testing materials or processes for the recommendations. For a few "quick win" recommendations, the development phase is only one month long. For most recommendations, this development and early implementation phase will last two or more months. Once the development and implementation phase is over, we assume (but do not show on the exhibit) continued implementation. GSRB should measure and evaluate performance metrics during continued implementation, improving recommendations as necessary.

Our approach in this implementation strategy was to focus first on "in-progress" recommendations and those most likely to improve performance of utility inspections. This includes an emphasis on technology and risk assessment, consistent with improving GSRB's performance on the PHMSA program evaluation. This strategy timeline attempts to take into account staffing and supervisor time limitations that could slow the implementation of recommendations. It will be more effective for GSRB to implement a few recommendations at a time, and gradually add new recommendations. Full implementation of these recommendations could take three years. As GSRB moves ahead on specific recommendations, it might be necessary to reevaluate this timeline, and make adjustments to reflect current program and/or implementation constraints.

Exhibit 3-27
Recommendation Timeline

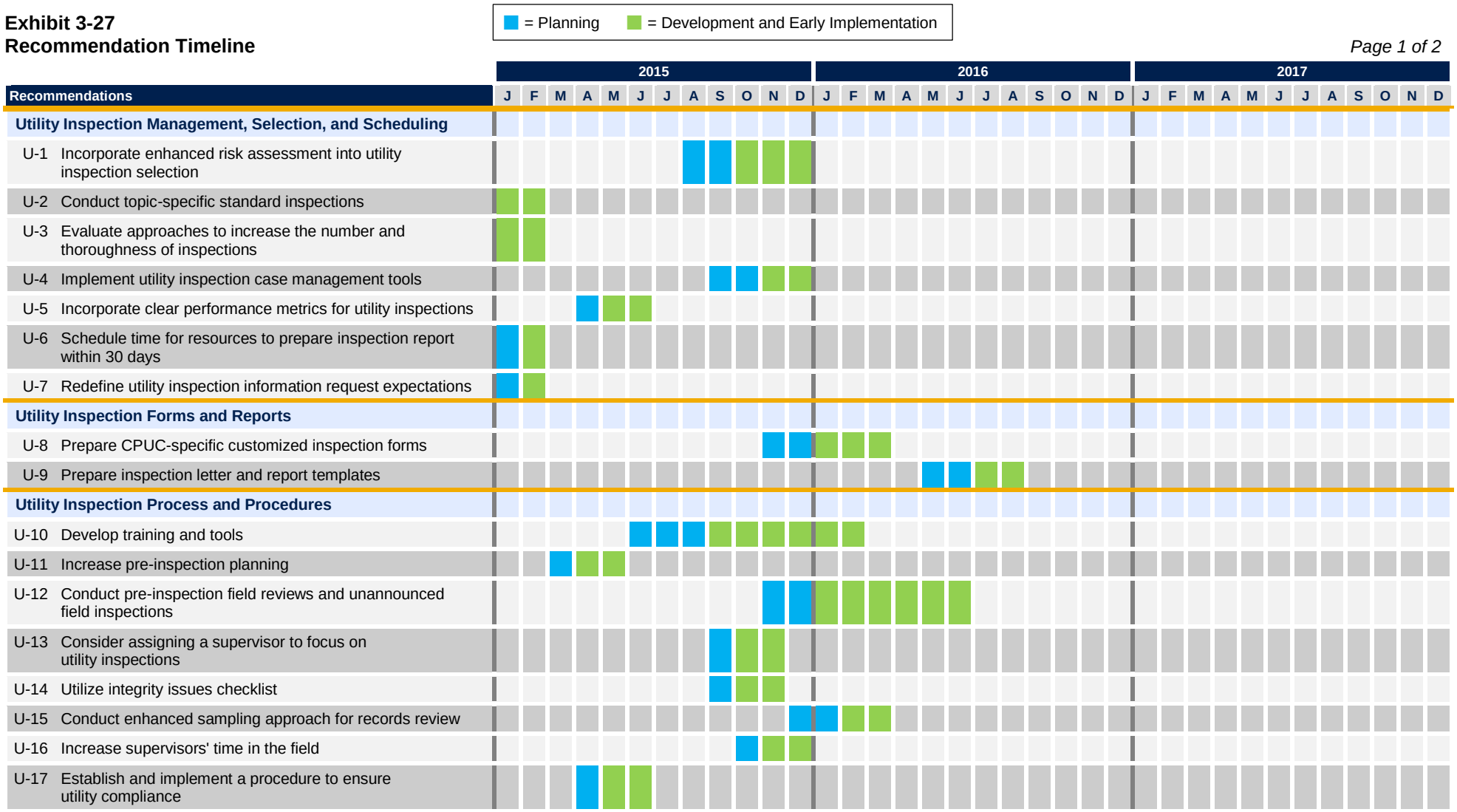
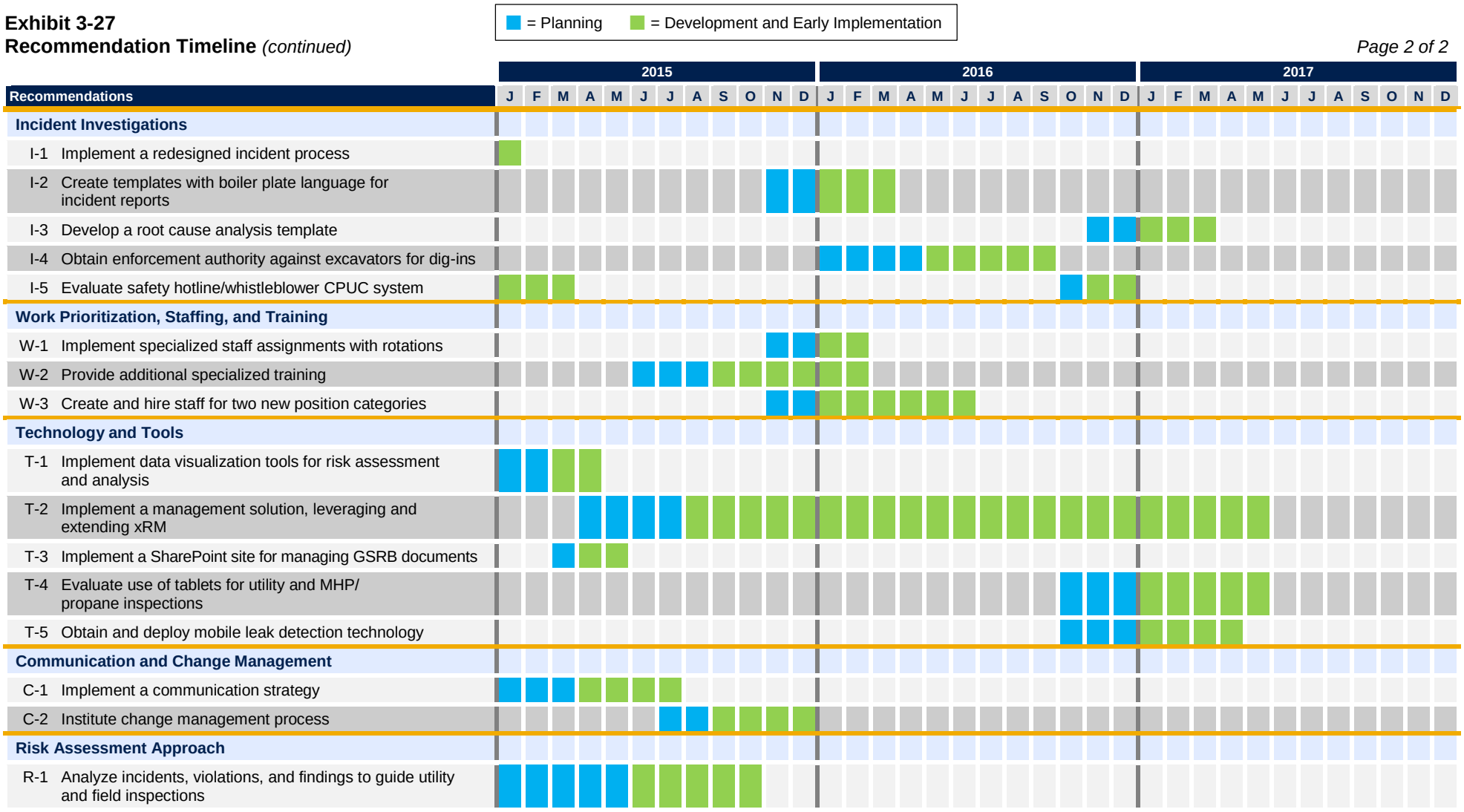


Exhibit 3-27
Recommendation Timeline *(continued)*



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