

**Phase Two of an Investigation of
Peoples Gas Light and Coke Company's
Accelerated Main Replacement Program**

**Recommendation Implementation Monitoring
Eighth Quarterly Report**

**Presented to:
The Illinois Commerce Commission**



**Presented by:
The Liberty Consulting Group**



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Summary

- Work continued through the second quarter of 2017 -- the eighth and final quarter established for implementation monitoring of the recommendations set forth in Liberty’s May 5, 2015, Phase 1 report regarding the Accelerated Main Replacement Program (“AMRP”). The original 95 recommendations were reduced to 88 recommendations, following elimination or consolidation of several recommendations early in the implementation monitoring phase of our work. Work this quarter continued to concentrate on efforts to: (a) close out recommendations based on successful implementation, and (b) verify implementation results or verify that continuing efforts have been sustained, following recommendation close-outs in earlier quarters.
- We concluded those verification efforts this quarter, examining the current status of operations and activities related to recommendations previously determined to be implemented. In some cases, those close-outs recognized efforts still planned or in progress. The goal of these “Verification Activities” was to ensure continued execution of operations and activities anticipated based on full, earlier implementation. Separate discussions in this report address our findings about sustained post-implementation change.
- Implementation progress concluded this quarter with management addressing the details of an additional 11 recommendations whose implementation it considered complete.
- This report addresses closeout activities for those 11 recommendations, all of which we consider fully implemented (refer to the **Summary of Plan Activities and Status Detailed in This Quarter’s Report**, on page four).
- Of the 88 recommendations, we consider 81 to be accepted/closed. The chart on the next page summarizes the status of the remaining 7 recommendations.
- Below we describe the details underlying work on those implementation activities involving the 11 recommendations addressed in this quarter’s report. We consider nine closable based on full implementation, either in full accord with the original recommendation and approved implementation plans, or on terms equally or more likely to optimize AMRP performance. Discussions with management determined that the remaining two recommendations have been rendered moot by the Commission’s ongoing Stakeholder Process that has addressed AMRP-related issues.
- We concluded monitoring activities on the closed recommendations; these activities sought to address: (a) whether execution continues as planned, and (b) whether remaining plans or in-process implementation completion steps were completed.

Implementation Plan Monitoring Approach

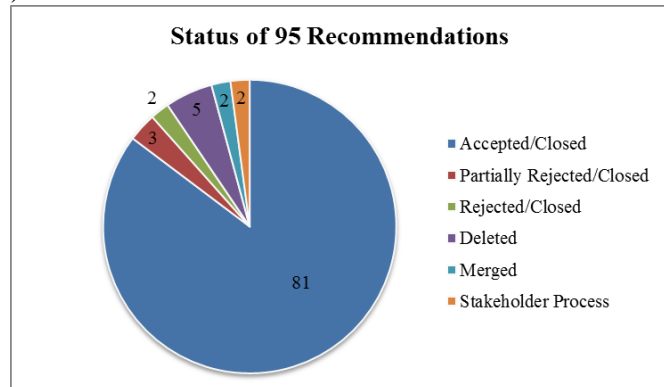
Liberty’s May 5, 2015, Final Report on the Phase One Investigation addressed the findings, conclusions, and recommendations resulting from an essentially year-long investigation of management and execution of the AMRP. That report set forth 95 recommendations for improving AMRP planning and execution. The May 5, 2015, report ended Phase 1 of a two-phased project. Liberty’s defined scope for Phase 2 was to conduct a structured, two-year program of monitoring the effectiveness of management’s implementation of the final report’s recommendations. Our scope does not include continual “auditing” of program performance.

The Phase 2 monitoring work led to the elimination of five recommendations (Numbers D.5, F.4, K.4, L.6, and V.1) for various reasons that are documented in the prior status reports (Q2 2016 and Q3 2016).

Two other recommendations were merged into others, to reflect the ability to address them through a common implementation plan. Of the 88 monitorable recommendations remaining after elimination and combination, all had what Liberty and management agreed were effective implementation plans at the end of Q4 2016.

This report describes the details of monitoring efforts on 11 of the 88 recommendations, nine of which we believe should be closed out. (Refer to the **Summary of Plan Activities and Status Detailed in This Quarter’s Report**, on Page 4).

To date, management and Liberty have closed out (accepted, partially rejected, or rejected) 86 of the original 95 recommendations. Another seven of the 95 have been deleted or merged. The remaining two recommendations (D.3 and E.3) management considers complete, given progress under the Stakeholder Process.



This report includes a summary of the status of all recommendations from the May 5, 2015, report (Appendix B).

Summary of Verification Activities

Liberty planned to conduct verification activities on 52 recommendations that were closed in this or in previous quarters. Appendix C to this report describes these activities. This appendix includes an updated summary discussion of each of those recommendations. These updates come in the form of “Liberty Verification Activities” sections, which we have added to the reports we prepared for the quarter during which we determined the underlying recommendation to be implemented.

Verification activities largely confirmed progress as planned, with some exceptions. On the whole, the broad extent of management’s accomplishment of changes to implement the recommendations appears to us to warrant a general close-out of the audit and the recommendations it made. WEC management has now had two years to design and establish its approach, resources, and methods for program management. The Stakeholder Process¹ addresses the program’s overall, defining parameters. Replacement work, still reflecting a multi-decade span, has now reached a significantly more mature stage.

¹ As used in this report, “Stakeholder Process” generally refers to ICC Docket No. 16-0376 and the workshops that preceded that docketed proceeding.

Our work over the past eight quarters has not “audited” performance and results (measured by factors such as risks reduced, units installed, costs expended, efficiency obtained, and progress against schedule, for example). Factors like these support a fresh approach to overseeing program work, as opposed to a continuing focus on recommendations now two years old and largely implemented. Performance and results factors form the appropriate focus of whatever iteration of the program the Commission approves going forward. The Stakeholder Process may result in changes to the structure of the overall program, but implementation of our recommendations has improved management and oversight of the program, helping to provide a strong foundation for progress as measured against whatever parameters define efforts to address high-risk pipe remaining in PGL’s system.

Summary of Plan Activities and Status Detailed in This Quarter’s Report

Rec. #	Recommendation	Previous Status	Current Status
D.3	Peoples Gas should provide a realistic schedule assessment based on an effective program plan	Stakeholder Process	Stakeholder Process
E.3	Peoples Gas should prepare a long-term AMRP management resource plan that specifically addresses (a) requisite skills needed both on an immediate and on a longer-term basis; (b) current gaps in internal capabilities; (c) the optimum balance of owner versus contractor personnel; (d) acquisition and development of resources; and (e) succession plans	Stakeholder Process	Stakeholder Process
G.1	Peoples Gas should develop a new Cost Plan Model that includes comprehensive measurement bases and critical assumptions regarding scope, quantities, productivity, labor costs, unit costs, and regulatory requirements; a reserve should be included as part of the overall program costs	In Progress	Accepted/ Closed
I.2	Peoples Gas should develop the in-house capability to replace gas main and install services on a larger and more long-term basis	In Progress	Accepted/ Closed
I.4	Peoples Gas should bring enhanced productivity measurement and management to resource planning	In Progress	Accepted/ Closed
I.5	Peoples Gas should more closely monitor contractor resources and production	In Progress	Accepted/ Closed
I.6	Peoples Gas should establish a centralized resource planning group or function	In Progress	Accepted/ Closed
J.1	AMRP management should promptly design and implement a two-pronged scope control process: (a) at the program level, and (b) at the individual project level	In Progress	Accepted/ Closed
N.5	Peoples Gas should upgrade AMRP performance metrics to include annual or cumulative progress versus the long-term (20-year) plan goals and metrics for the executive oversight group and the boards	In Progress	Accepted/ Closed
P.1	Peoples Gas should conduct a comprehensive assessment of AMRP risks associated with potential mismatches between work performed and work charged, and develop an ongoing program of annual testing designed to mitigate the risks identified	In Progress	Accepted/ Closed
U.4	Peoples Gas should adequately resource the AMRP Complaints Handling Group, and should monitor complaint resolution performance and the root causes of customer complaints, for the purpose of identifying improvement opportunities	In Progress	Accepted/ Closed

The next report sections address the results of the monitoring efforts undertaken during our seventh quarter on these recommendations. The discussions begin with a statement of the recommendation made in our May 5, 2015, report and the conclusions underlying it.

D.3 – Schedule Assessment

Peoples Gas should provide a realistic schedule assessment based on an effective program plan.

Peoples Gas must correct promptly its inability to access short-term performance and, more importantly, the long-term schedule outlook. Peoples Gas needs performance targets based on long-term program requirements immediately. Simply providing a plan to make up the current schedule deviation over the next 15 years is likely to be simplistic and of little value. A more in-depth analysis is required, together with a front-end-loaded corrective scheme.

Underlying Conclusions

D.1 Current AMRP plans do not provide for sufficient program definition and the program has not been supported with sufficient assembly and analysis of performance information.

The AMRP should operate under a comprehensive and credible long-term plan that addresses all major components in a complete and consistent fashion. Liberty found that the AMRP does not have an integrated, up-to-date, sufficiently comprehensive program plan. Such a plan should clearly state critical assumptions. Liberty found critical planning assumptions neither well defined nor well documented. The kind of plan that the AMRP requires includes the provision of suitable contingencies for growth and other uncertainties. Liberty found no provision for contingencies or allowances to address the change and growth that are all but inevitable for a program of the AMRP's scope, complexity, and duration. Program management does not address these matters on a long-term basis, but confines contingency use to annual planning, and even in that case, largely limited to contractor work.

The program management organization does not have detailed information about progress to date. Performance data is not consistent, fully reliable, or well-suited to the analysis that a program such as the AMRP requires. Past performance does not undergo rigorous and continual analysis to ensure optimization. Liberty has not found detailed, meaningful analysis of performance for the purpose of identifying improvement opportunities. Neither did Liberty's field work disclose substantial documentation of corrective actions taken to address performance issues. Scope change typically has a significant impact on programs like the AMRP. There should exist clear documentation of the degree to which scope evolution has affected the program. Scope growth, particularly in terms of expanding project requirements has had an impact on the AMRP. That impact is not well-documented or quantified. The absence of data produces an inability of program management and senior leadership to isolate AMRP activities and costs from those of other work commonly managed with AMRP projects.

D.6 After four years, the project is not "on target" as suggested by Integrys management, but lags schedule and the trend is toward further schedule loss.

AMRP performance data certainly should, but does not support a reasonably precise estimate of schedule performance versus 20-year requirements. Liberty took various approaches to hypothesizing estimates in substitution for data that does not exist. These estimates led Liberty to conclude that the schedule is at least six months and perhaps a year or more behind schedule. This lag is disconcerting, given the short amount of time it has taken to lose so much ground. Liberty acknowledges that our assessment uses limited and questionable data, but available information does not permit a better assessment.

PGL Action Plan Steps

Item #	Task	Status
1	Evaluation of Burns and McDonnell model options	Complete
2	Development of project schedule scenarios	No longer applicable
3	Obtain stakeholder approval of project schedule	No longer applicable
4	Communication of the Project Schedule	No longer applicable

Burns & McDonnell (B&M) provided management a high-level cost and schedule model for remaining AMRP work. The final deliverable included proposed schedules at the neighborhood level for two scenarios: (a) a program ending in 2030 and (b) a program ending in 2040. Two separate Primavera P6 schedules for each of the above scenarios were developed. The total program cost was presented as a range of numbers for the following scenarios: New Management Target, Contingency Case (High Restoration Costs), and the Pre-Acquisition Path.

As originally planned, management intended new cost and schedule models to serve as critical tools to develop, validate, and generate new AMRP program cost estimates and schedules, with revised program assumptions, variables, parameters. The important initial deliverables using the new models were to be the AMRP program estimate and schedules for construction year 2016.

Management intended to use the model created from B&M to create a new five-year program plan. The five-year plan would incorporate the neighborhood ranking index in conjunction with the capital modeling. The five-year program plan would outline the neighborhood goals and be used for coordination /communication both internally and externally for areas and scope of the proposed work. The five-year plan would cover a rolling five-year period and be updated annually. From the five-year plan, management would create an Integrated Project Schedule providing a start-to-finish schedule. This schedule would include Engineering, Procurement, Permitting, Construction and Closeout components. The Integrated Project schedule would cover 2016 projects, and be expanded to incorporate future year projects.

In January of 2016 the Stakeholder Process began. Since then, management has observed that finalization of the System Modernization Program (SMP) performance metrics framework should await Commission decision in the ongoing AMRP/SMP proceeding, Docket 16-0376. This docket covers the cost, scope, schedule, and other areas related to Peoples Gas’ SMP and the establishment of program policies and practices. Thus, pending the order, the tasks described below will warrant reconsideration as appropriate to align with a newly defined scope and schedule for the SMP.

Expected Post-Implementation Conditions and Factors

The key distinction to be made in the implementation of this recommendation is the analysis of project schedule performance and its long-term ramifications. B&M provided a good start by clearly defining the work scope and determining various long-term schedule outcomes based on

various assumptions. Those outcomes became available in the Stakeholder Process, but management has recommended leaving the program completion date as a variable parameter. Instead, a five-year window was defined as a “target.” This approach has effectively eliminated long-term schedule commitments, and removed the ability to track against a fixed objective.

Elimination of such commitments and the ability to track against a fixed objective would make implementation of the recommendation as written impracticable. Nevertheless, the B&M analysis provided a solid schedule analysis as a foundation. Determination of whether to take long-term schedule analysis further remains an open question, addressable through the Stakeholder Process.

Summary of Liberty’s Steps to Verify Implementation

On July 11, 2017, Liberty met with management to discuss the closure of this recommendation.

Originally, completion of implementation of this recommendation would have required completion of management’s analysis of past performance and a commitment to a specific program completion date, approved by the ICC. The Stakeholder Process evaluation of schedule has made these steps moot.

Implementation Complete and Satisfactory?

Management has taken this recommendation as far as it can. The outcome does not conform to our recommendation. Nevertheless, consideration of schedule through the Stakeholder Process makes it appropriate to consider implementation complete.

Remaining Gaps, Needs

None.

PGL Position

Management considers the recommendation, given the Stakeholder Process, implemented.

Future Liberty Verification Activities

None.

General Observations

None.

E.3 – Long Term Resource Plan

Peoples Gas should prepare a long-term AMRP management resource plan that specifically addresses: (a) requisite skills needed both on an immediate and on a longer term basis, (b) current gaps in internal capabilities, (c) the optimum balance of owner versus contractor personnel, (d) acquisition and development of resources, and (e) succession plans.

This work should adhere to the guiding principle that the AMRP requires and can afford a top tier organization and staff. Liberty does not recommend a “money is no object” approach. Rather, so much money is involved, and the risks and opportunities for savings are so great, that acquiring the best people comprises the best approach for managing risks and pursuing opportunities and thus the most cost-effective option.

In defining skill requirements Peoples Gas should apply high standards. The Company should identify where gaps exist in those skills in the current organization. A simple, but highly effective approach would:

- Identify the standards and levels of capability appropriate for the AMRP
- Identify those areas worthy of analysis; i.e., where a mismatch might exist
- Identify gaps between standards and current capabilities
- Prepare an implementation plan for improvement / upgrade of capabilities

In performing this review, the Company should not just look at specific skills, but instead view existing resources holistically by seeking answers to questions like:

- Do we have people with these skills?
- Are there enough of them?
- Are they in the right positions?
- Do they have the organizational standing to get their job done?
- Do they have the appropriate systems and processes at their disposal?
- Where they have weaknesses, do available and communicated developmental opportunities address them fully?

These questions presume that the existing workforce will continue to have a big role, despite the changes required. The goal is not to replace incumbents. The goal is to develop further the capabilities of existing resources, align them properly, and supplement them with new people where needed. The long-term nature of the AMRP particularly opens incumbent development avenues to a greater extent than programs of shorter duration typically would.

Planning also must recognize the impracticability of staffing certain, highly specialized positions internally, and of staffing less specialized ones internally in the full numbers required. Peoples Gas therefore will continue to face the challenge of optimizing the employee/contractor mix, but should act pursuant to the goal of using the program’s length to secure in-house resources in areas where the Company has traditionally relied strongly on contractors.

Underlying Conclusions

E.2 The early years of developing the AMRP management organization have not brought sufficient skills, capabilities, and systems to provide the world-class management that the AMRP warrants. (Recommendation E.3)

A program of the magnitude and duration of the AMRP deserves, and can afford, a sophisticated organization. It should be staffed by a team having first-rate qualifications and experience. It should operate with the use of leading edge tools and systems. The Project Management Office, however, lacks a breadth of experience in some skill categories. Efforts to build the needed organization appear to have had low priority across the program's early years.

Resource planning for the AMRP management organization must determine the quality of management the Company needs to employ across the program's life. The program's history indicates that senior management did not begin program work with the correct perception of what a program of this magnitude entails. On an absolute basis, the project's dimensions include, for example, 2,000 miles of pipe to replace, more than \$5 billion in total expenditures in all probability (and maybe significantly more), and a need for a compelling level of management, executive, and board attention for two decades. It dwarfs by comparison any typical Peoples Gas program or initiative. It seems clear that the Company did not understand, and certainly did not respond fully to, the magnitude of the challenges involved in ramping up to very high levels of production and sustaining them across twenty years.

Liberty has not examined and therefore does not draw any negative conclusions about the attention that Peoples Gas has paid to building its internal capabilities through the years. They may have been sound for business as usual. They should not, however, have produced confidence that organizations built for traditional utility projects would sustain a burden vastly greater than that of traditional work. Liberty's work in the electric industry found a similar phenomenon with companies undertaking nuclear plant construction in the 1980s. Peoples Gas cannot go back four or five years to change how it viewed the challenges of the AMRP. The Company can, however, change for the future. It is essential for Peoples Gas, Integrys, or whoever owns and operates the Chicago gas utility in the future to accept the need for a fundamental revision to thinking about meeting those challenges. The challenges will remain and they may grow bigger as the years pass.

Utilities (and Peoples Gas is no exception) tackling a super-project (which the AMRP certainly is) need to enhance their management capabilities extensively. By definition, internal organizations, designed and built for traditional work, cannot absorb a program far more challenging.

E.3 A series of staffing decisions (whether explicit or implicit) have constrained the ability to manage the AMRP and to build a reliable, long-term, qualified management team for the program's still long future.

Peoples Gas' staffing decisions made when moving into the AMRP and during its early years of operation worked against developing a strong management approach and team. Many AMRP elements warrant substantial improvement in this regard:

- Lack of clear assessment and definition of the skills needed to manage the AMRP
- Lack of a plan to acquire and develop requisite skills

- Lack of a long-term organization philosophy and design
- Failure to recognize the need for very active owner participation in key management positions
- Over-reliance on contractors
- Failure to assign full-time, Chicago-based project management
- Lack of common, single leadership of the planning and execution of program activities that were distributed among the Integrys-led Project Management Office and the Peoples Gas North, Central, and South Shops
- Failure to develop or acquire strong internal program controls skills
- Failure to soundly integrate AMRP with non-AMRP planning, resourcing, and scheduling as they concern field work and supporting services performed by Peoples Gas
- A resulting inability to marshal adequate resources to meet AMRP priorities
- Lack of succession planning for key managers.

E.4 Peoples Gas lacks a credible plan for the acquisition and development of resources to manage and execute the AMRP.

Liberty found that program management lacked sound knowledge of the required program skills, numbers of people, and overall capabilities to form a sound program management resource plan. The Company cannot develop such a plan without first identifying needs through a structured review and analysis. The planning process therefore must get underway as soon as possible, with definition of needs being the first step. That process requires a long-term focus to complement short term efforts to fill the most critical positions. The AMRP’s length gives it more the nature of permanent organization, which can attract dedicated, high-quality personnel. Identifying and filling personnel needs in a revised AMRP management organization lies among the initiatives that management states are now underway, following discussions that began with Liberty last September.

PGL Action Plan Steps

Item #	Task	Status
1	Identify Resource Planning Team(s) and Define their task	Complete
2	First project team draft report – Assessment of internal resources, their individual gaps, and organizational gaps	No longer applicable
3	Second project team report on contractor resource availability	No longer applicable
4	Annually recollect the project team to audit resource planning performance and identify opportunities for improvement	No longer applicable

The focus of this recommendation is on long-term planning. Management considered immediate-term modifications critical to providing a foundation for longer term changes. As part of that

foundational effort, WEC management accomplished several preliminary tasks within 90 days of coming on board:

- Install senior leadership to guide the overall company and identify a single centralized executive leader for the AMRP / capital construction program.
- Secure and bring in-house key AMRP/capital construction program leaders with experience including:
 - Field construction management
 - Project controls and program governance
 - Engineering; and
 - Contract and procurement management.
- Gain a high-level understanding of:
 - The organization and changes to that organization under new leadership established prior to the WEC acquisition
 - Interactions between construction activities and operating areas routinely sharing resources
 - Expectations and areas of concern for external stakeholders such as the Illinois Commerce Commission, Chicago Department of Transportation, and elected officials
 - Jacobs Engineering's management role
 - Capabilities of construction contractors and general availability of contract resources
 - Organizational capabilities and skill sets of existing team members.

Identifying Capital Construction resource needs, assessing the organizational gaps, and prioritizing the sequence of filling positions depended on first addressing several other factors (*e.g.*, positions with leadership gaps). Selection of the Directors of Engineering, Construction, Contracts, and Project Management and Controls resulted from these initial efforts.

An ensuing phase (involving the Directors and the Vice President of Construction) developed prioritizations for all positions, and assigned a phased ranking corresponding to the waves of job postings and fillings.

The selection process recognized those capable and well-performing contract resources in place in order to focus on other gaps, later determining where to bring contractor resources in-house as employees. Management delayed an organizational assessment until filing the above-noted leadership positions, to allow the new leaders to contribute to the organizational gap assessment.

Going forward, management's plan was to continue to evaluate resource and leadership needs within the organization throughout the year. In addition to talent acquisition, management focused on talent retention through appropriate skill-building, training, and development of its resources. Management expected talent management and succession planning to continue as focus areas, as it addressed natural attrition, industry hiring trends, and the availability of resources at the full range of required levels.

Expected Post-Implementation Conditions and Factors

The benefits of a well-defined long-term resource plan include:

- The ability to recruit and develop a deep “bench” of talent to accommodate changes in management resources and unexpected internal or external circumstances
- Reduced organizational risk exposure from staff attrition or changes in the availability of internal and contract resources
- Providing growth, development, and career path opportunities for team members
- Cooperation with internal and external labor organizations to anticipate resource and training gaps, and jointly develop shared training and recruiting strategies
- Improved program performance from matching tasks to the appropriate skill and experience levels of staff
- Improved operational efficiency and overall ability of the program to meet goals and targets as planned.

Summary of Liberty’s Steps to Verify Implementation

On July 11, 2017, Liberty met with management to discuss the continuing significance of this recommendation. Originally, management considered the following deliverables as closeout components:

- An active internal long-term resource staffing, training and capabilities plan that is refreshed annually
- An active external (contractor) plan that identifies needs, resources and a forward-looking projection for contractor resources.

Observed Conditions and Factors

As noted in other E-series recommendations, management has devoted considerable time, internal personnel and supporting consultants to the development of a sophisticated resource planning and management capability. At the completion of our audit and verification work, one element may be lacking: the long-term planning of resources. Management, given the Stakeholder Process, has not committed to a final program completion date. As a result, resource requirements beyond the three-year planning window remain unknown.

Implementation Complete and Satisfactory?

Liberty considers this recommendation complete and largely satisfactory. The lack of a long-term component, while problematic, should not necessarily detract from the resource planning successes the Company has achieved.

Remaining Gaps, Needs

None

PGL Position

Management believes it has met the intent of this recommendation.

Future Liberty Verification Activities

None.

General Observations

None.

G.1 – Cost Plan and Model

Peoples Gas should develop a new Cost Plan Model that includes comprehensive measurement bases and critical assumptions regarding scope, quantities, productivity, labor costs, unit costs, and regulatory requirements; a reserve should be included as part of the overall program costs.

A first deliverable of this Model will be the new Total Cost Estimate. For Peoples Gas to be able to project final AMRP costs on a continuous basis, it has to establish a new capability to estimate on an almost real-time basis the total program costs. Liberty understands that a new AMRP cost forecasting model will be developed by the Planning and Forecasting Manager. Features important to consider in development of that model include a number of elements that will assist in making the cost plan a sound, comprehensive baseline for continually measuring performance.

Key parameters to measure at the program level include:

- Cost Metrics (input related)
 - Program-to-date costs by year expended
 - Potential cost impacts from Cost Trend Program
- Production Metrics (output related)
 - Program-to-date miles of main installed
 - Program-to-date miles of main retired
 - Program-to-date services installed
 - Program-to-date meters moved/installed
 - Program-to-date pressure regulator stations installed
- Productivity Metrics (output versus input)
 - Average cost per mile installed
 - Average cost per mile retired
 - Average cost per service installed
 - Average cost per meter moved
 - Average cost per pressure regulator station installed.

A comprehensive cost plan should incorporate the following elements:

- Effective cost control tools
- Specifically defined tools for each key element of the AMRP project costs
- Ability to promptly identify and respond to cost issues during the course of each project, facilitating corrective action and providing meaningful and timely forecasts
- Agreement among the team on the structure and viability of the tools and resulting reports
- Understanding by the managers regarding the tools and commitment to their use
- Ability to document that AMRP project costs were prudently managed during the life of the program.

Such a plan should take the following approach:

- Senior Management communicates cost management expectations
- Responsible manager assists in developing the cost element plan

- The cost element plan is evaluated
- Performance is measured by compliance with the cost management plan.

The plan should seek to establish:

- Accountabilities for specific cost elements
- Tools to be utilized, including how and when
- The tasks required of the manager, cost analysts, and others
- Data and reports, including when prepared and to whom distributed
- Analytical expectations
- Corrective action responsibilities.

Other guidelines for developing the cost plan include:

- The plan should identify tasks that represent a disproportionate cost risk or otherwise require special treatment (this identification should include tasks that have a relatively high work-hour budget)
- An assigned cost analyst should prepare the cost element plan with input received from all involved managers
- The cost element plan should undergo review and approval by AMRP project manager before its inception
- The cost element structure should be simple, and consist of one to two pages.

Important features of the cost element structure include:

- Breaking the AMRP down into specifically identified cost elements
- Structuring the elements in accordance with their control characteristics
- Elements that might include engineering, planning and support functions, materials, mains, services, meters and regulators, other construction items, such as intra-stations, city gate stations, and pressure regulator stations, for example
- A total population of 8-12 elements, of various size and importance
- Element features that define the following:
- A cost estimate, including its basis and assumptions
 - The manager responsible for the costs associated with the element
 - A cost engineer or cost analyst assigned to track and analyze its associated costs
 - Its control category based on its controllability and the sophistication of control demanded:
 - A = High importance – maximum control activities
 - B = Either less important or less controllable, but still significant and some degree of special attention is appropriate
 - C = Inconsequential – hence ignore.

The plan should also include a Cost Element Database having the following characteristics:

- The cost element database serves as the repository for all of cost element information
- The database structure supports collection of cost estimates and documentation of changes to them

- The sum of the cost elements at any point in time produces the “defined cost.”

Each element falling into Category A or B elements (as described immediately above) requires a cost management plan with the following characteristics:

- The plan can be anywhere from one to a few pages, and may include supporting attachments.
- It defines the specific actions that will be taken to manage costs.
- It is both a tutorial and a procedure.
- It is likely to include key metrics and specifically what is to be done with them, required reports by contractors and others, a requirement for monthly analysis by the cost engineer, specific actions required of the manager, and update requirements for the model.
- Plans should be maintained and updated in a cost management manual.

One suggested approach for the AMRP would develop Individual Cost Management Plans to focus on the major cost elements:

- Main Installation
- Service Installation
- Meter Installation
- Other Construction Items
- Engineering
- All Other Support Groups
- Materials.

These major cost elements focus on cost issues common to all projects or phases of a project, producing a template like that shown in the next illustration.

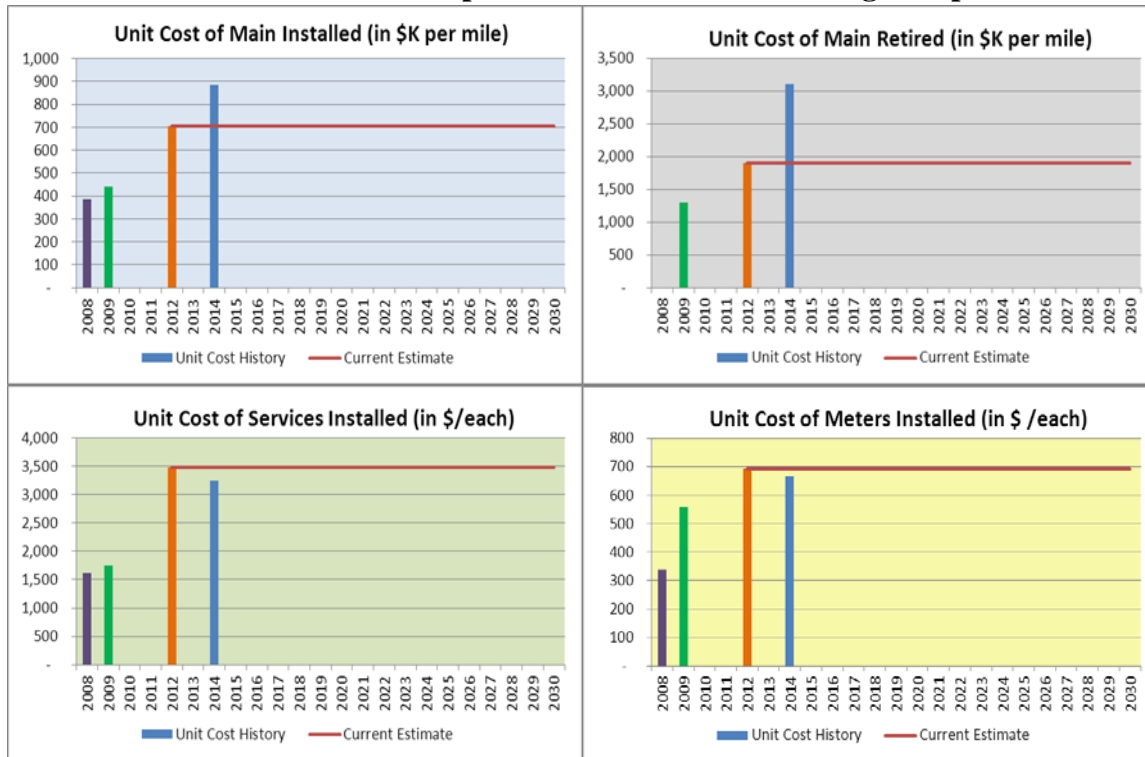
Illustration G.6: Cost Element Template Example

	Main Installation	Service Installation	Meter Installation	Other Construction Items	Engineering	All Other Support Groups	Materials
	Category A	Category A	Category A	Category B	Category B	Category B	Category B
Project A							
Project B							
Project C							
Project D							
Project N							

Management should prepare and continuously maintain a detailed cost management plan for each element.

Monitoring proves essential to making a cost plan function optimally. Given the AMRP’s long duration, management should monitor annually the following areas: unit cost of main installed, unit cost of main retired, unit cost of services installed, and unit cost of meters installed. The following charts show examples of monitoring depictions.

Illustration G.7: Depictions of Annual Monitoring Components



Explanations of the source of data on the preceding charts include:

- 2008 – Historical data up to that year
- 2009 – Original AMRP Total Cost Estimate (\$2.63 billion)
- 2012 – Current AMRP Total Cost Estimate (\$4.45 billion)
- 2014 – Actual based on completed projects.

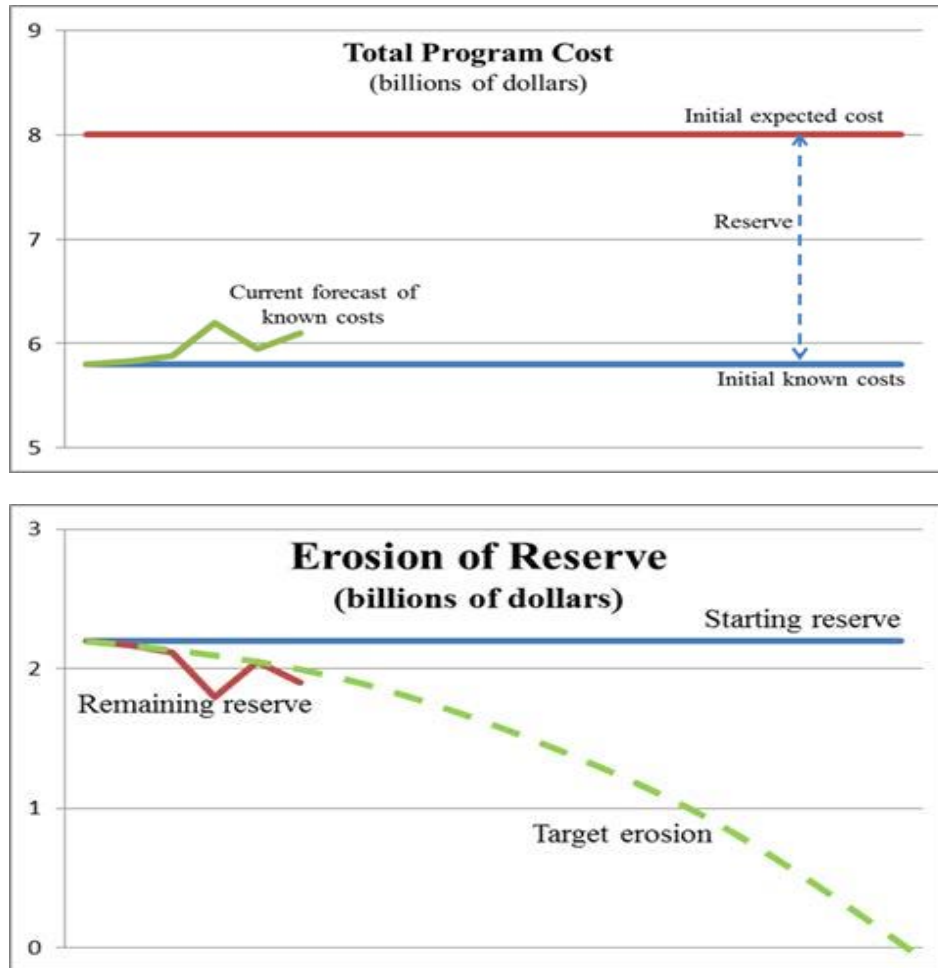
Note that unit costs in the 2012 Current Total Cost Estimate would provide the monitoring base until management completes a new Total Cost Estimate.

Other important elements in tracking total AMRP costs should include:

- The defined and expected costs become the standards for tracking program costs
- As the defined costs change, the amount of reserve remaining erodes, and the pace of such erosions becomes a key metric
- Expected costs may undergo periodic revision if and as the pace of erosion becomes too fast or too slow
- The key metrics can be displayed over the full 20-year period, but a shorter window can be selected to supplement the long-range view as warranted.

The next charts show simplified, hypothetical means for depicting erosion in the cost plan.

Illustration G.8: Depicting the Erosion of Program Reserve



Two important aspects should apply with respect to model updates:

- The model produces real-time cost forecasts; *i.e.*, changes in the defined program costs as they are revealed
- The assigned cost analysts or cost engineers initiate model changes, based on reconciled cost trends and monthly analysis of cost elements.

After completing the current work to establish a new final AMRP cost estimate, Peoples Gas needs to develop an effective cost forecasting capability, in concert with the cost management program.

Underlying Conclusions

G.1 The AMRP does not have a long-term cost plan that provides a credible estimate of final program costs; management is only now creating the modeling capability to produce such an estimate.

The original (2009) Cost Plan contained sufficient detail, and used appropriate assumptions to establish production quantities and unit costs. The 2012 estimate updated total program costs, but

its \$4.45 billion estimate used 2012 dollars. The use of 2012 dollars significantly understates expected final costs. The AMRP needs a new cost plan that will provide a current final cost estimate. An effort to provide such an estimate collapsed in mid-2014.

We found, as Peoples Gas has acknowledged, that it could not provide a meaningful total estimate of AMRP costs without first developing new cost modeling capability. Sound estimates comprise a critical element in effective management of AMRP costs. Peoples Gas has embarked on efforts to develop that model. It needs to complete model development, and estimate work expeditiously. Moreover, the results of the modeling effort need to address more than the direct costs of AMRP work. Peoples Gas also needs to develop the modeling capability to address the ongoing O&M costs and savings over the long term. The Planning and Forecasting Manager has responsibility for cost model development.

G.2 AMRP estimates break program costs down into suitable major categories by year, but management does not use that breakdown to inform cost tracking at either the program-wide or project-specific levels.

Managers cannot manage what they do not monitor, and cannot monitor what they do not measure. Cost tracking needs to provide information at a significantly enhanced level of detail.

G.3 The AMRP program's lack of reserve to cover cost growth fails to reflect potential cost exposure.

Best cost estimating practice regards contingency or reserve as a necessary part of a total cost estimate. Cost estimates need to recognize uncertainties that make full cost driver definition imprecise. A specific portion of funding should be earmarked to account for unforeseeable elements of cost. Hence, owners often add contingency or reserve to an estimate to provide for uncertainties in defined scope and in internal and external cost drivers.

A traditionally derived contingency amount will likely prove inadequate in forecasting the costs of a major, long-term program. Liberty therefore favors the term “reserve” or “management reserve” to account for the many uncertainties that exist within and outside program scope as currently defined. Scope changes will almost inevitably occur, and likely have substantial impacts. This broader definition allows a more robust portrayal of forecasted final costs.

G.4 Management does not compare AMRP costs and performance with what others in the industry have experienced.

Major main replacement work has become more common in the industry. It is useful to examine the performance of others, in order to provide a benchmark for gauging one's own approaches, methods, practices, and results. The AMRP appears to use no organized or documented approach to meeting this need. Instead, project management simply cites the experience of Jacobs Engineering, which leads and staffs most of the Project Management Office, as providing insight into other companies' efforts, making such comparisons unnecessary in its view.

In the development of the revised Total Cost Estimate, Peoples Gas did make use of some industry data; i.e., a conversion factor published by the Handy Whitman Construction Trend of Utility

Construction – North Central Region to price out most of the major commodities. The next table summarizes that information.

Table G.5: Handy Whitman Index Data

Handy-Whitman Cost Index	2010, Jan 1	2012, Jul 1	Factor
Mains, Steel	656	826	1.2591
Mains, PE (polyethylene)	482	521	1.0809
Services, PE	501	536	1.0699
Meter, Materials	257	271	1.0545
Meter, Installation	708	923	1.3037
Regulator Materials	406	438	1.0788
Regulator Installation	692	889	1.2847
Regulator Stations	567	700	1.2346
City Gate Stations	568	704	1.2394

G.5 Peoples Gas does not sufficiently understand and quantify major cost drivers.

A cost driver is an activity or component that adds significant cost to a project or program. Periodic cost analysis of actual data can yield relationships or linkages between events and contributions to cost increases. Examples of such contributors include contractor change orders, restoration contractor costs, material pricing, changes in City requirements, labor costs, and escalation. Cost professionals in the cost management organization should perform such analyses.

PGL Action Plan Steps

Item #	Task	Status
1	Develop new estimate	Complete
2	Develop Cost Plan for long term sustainability:	In Progress
3	Establish standard cost elements for each project (and program as a whole)	In Progress

4	Define tools for collecting data associated with each cost element	In Progress
5	Establish reporting format for each element	In Progress
6	Analytical and variance expectations defined (including responsibilities)	In Progress
7	Corrective action process defined	In Progress

Management contracted with Burns & McDonnell (B&M) to prepare the new AMRP cost and schedule model. B&M provided a high-level cost and schedule model for the remaining AMRP work. The final deliverable included proposed schedules at the neighborhood level for program scenarios ending in 2030 and, alternatively, 2040. Two separate Primavera P6 schedules for each of the above scenarios were developed, presenting a range of total program costs for several scenarios: New Management Target, Contingency Case (High Restoration Costs), and the Pre-Acquisition Path. Management used new cost and schedule models as a central tool for developing, validating, and generating new AMRP program cost estimates and schedules, which included revised program assumptions, variables, and parameters. The AMRP program estimate and schedules as of the year 2016 formed key initial deliverables derived using the new models.

Management developed a cost element matrix for Liberty to review in a recent workshop, with the matrix under revision to address those project components management believed to require a different cost management approach. Management prepared a main installation cost plan template for review and comment by Liberty, using the Albany Park Project as a pilot to test the cost plan template. Liberty made plans to review this deliverable as part of verification activities.

Expected Post-Implementation Conditions and Factors

Management initially considered the new cost and schedule models developed by B&M a central component of its Integrated Project Controls program management approach for AMRP management. It intended the new cost model to update comprehensive measurement bases and critical assumptions regarding scope, quantities, productivity, labor costs, unit costs, and regulatory requirements. However, this model only serves to provide periodic forecasts of total program costs. The Cost Plan and Model recommended by Liberty should enable cost management at a more detailed level (*e.g.*, main or service installations under a specific neighborhood project).

Management has since adopted individual Cost Element Plans for all future neighborhood projects. These plans will focus on the cost components of main installation, service installation, restoration, meter mark and bar, other construction costs, stock material, engineering and other support costs. These formal, structured cost element plans define how costs will be managed, establish individual accountabilities, and identify systemic or cultural issues that require specific focus and methods. Management will seek to design them under guiding principles from upper management and execute them using the developed cost controls tools as the building blocks.

The holistic cost management approach structure that Liberty recommends is now complete. Project managers will have visibility on all project costs and productivity performance. Coupled with an effective cost trend program, management has developed a real-time ability to forecast final project costs readily. These efforts should foster an increasingly sensitive culture.

Summary of Liberty's Steps to Verify Implementation

On June 9, 2016, management provided the Program Level Cost Forecast and Schedule Model designed by Burns & McDonnell for preliminary discussion. This document reports on the cost estimates and schedule models for 2030 and 2040. The models included comprehensive measurement bases and critical assumptions. The document itemizes specific contingency elements and percentages. A May 25, 2017 on-line Cost Plan Workshop supported discussion with Liberty informed by drafts of a Cost Element Matrix and a Cost Element Plan for Main Installation/Retirement.

Liberty then met with management on June 1, 2017 to discuss actions taken and to review implementation progress. That meeting included discussion of the following close-out documents:

- A draft Cost Element Matrix: this new matrix will include main installation, services installation, restoration, mark & bar, stock materials, other construction costs, engineering, other direct labor, and other support costs
- A draft Cost Element Plan for Main Installation/Retirement.

Management also plans to revise the Cost Management Procedure to insert a section on Cost Plan development for all future neighborhood projects. Management considers the AMRP Cost Estimate Model 2015 and the AMRP Schedule Model 2015 as key deliverables and closeout components for the new cost estimate.

Observed Conditions and Factors

We found that management accepts the existence of what we view as the fundamental benefits of the cost element plan concept. It has committed to revising the Cost Management Procedure to require cost plans for all future neighborhood projects. Management has established essential cost control tools, such as the Detailed Forecast Files, the cost trend program, and the performance metrics, for example.

Implementation Complete and Satisfactory?

We found a substantial basis for confidence that management will prove able to implement this recommendation fully. Given that our monitoring period is at a close, we consider it appropriate not to leave this recommendation classified as open, under the circumstances. As noted below, however, we scheduled this recommendation among our last verification activities.

Remaining Gaps, Needs

Management needs to revise the cost element matrix and the cost management procedure. Management will have to start developing cost plans for all the elements, starting with the Albany Park Project.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

The last quarter of our monitoring effort included verification activities designed to review the Cost Plan Development section of the Cost Management Procedure. Appendix C discusses these verification activities.

General Observations

None.

I.2 – In-House Labor Capability

Peoples Gas should develop the in-house capability to replace gas mains and install services on a larger and more long-term basis. (Conclusion I.5)

Contractor availability has been sufficient so far to meet AMRP needs. Longer term planning needs to consider that many other utilities and their regulators face large inventories of high-risk pipe and long (some extraordinarily so) durations for eliminating them. The contractor availability situation can change materially and perhaps rapidly. The contractor workforces are facing a similar aging problem as well. That is why developing internal skills is important.

Peoples Gas should move toward increasing the use of internal resources for main and service installations. One model to use as a planning basis might be to set a target (e.g., up to one quarter) of baseline AMRP work to be performed by the internal workforce. Working gradually towards that goal would allow the Company to verify that there are no adverse work cost or quality implications. Doing so would also provide some protection against potentially diminished contractor availability. It would also address more generally (i.e., outside the strict confines of the AMRP) the need for sustaining suitably trained and capable resources in the wake of turnover in the current workforce...

Underlying Conclusions

I.5 Peoples Gas' current resource plan assumes, probably correctly in the short-term, that there is no contractor resource availability problem, but relying on that assumption for the longer term is risky, as main replacement programs extend across the industry. (Recommendations I.2 and I.6)

The “Resource plans should address how suitable staffing will be ensured long term. The next two charts show that the internal workforce is only going to perform about 10 percent of the work over a span of 20 years. The consensus within Peoples Gas is that contractor availability will never be a problem. However, Liberty believes that growth in demand for contractor resources (as natural gas use expands due to fundamental changes in price competitiveness and as other utilities tackle the massive amount of leak-prone pipe remaining in the industry) creates a real risk over time.

PGL Action Plan Steps

Implementation involves three tasks, the first two of which management has completed. The third is expected to remain in progress through the remainder of this year, and will involve the use of additional in-house resources for meter moves.

Item #	Task	Due Date	Actual
1	Evaluate the use of in-house resources to perform work other than the meter moves.	12/31/16	Completed
2	After implementing Recommendation I.3, evaluate the availability and capability of in-house resources to perform the	TBD	Completed

	AMRP work currently undertaken by contractors.		
3	If in-house resources are available and the cost of involving them is competitive with contractors, skill development training has to be in place to bring them up to speed and at par with contractor resource capability. Such a training process must be formulated.	TBD	End of 2017

Expected Post-Implementation Conditions and Factors

We expected that Peoples Gas would have access to an in-house work force trained to perform additional capital work. This enhancement would expand available internal skills sets, giving management greater options for in-house or contractor workforces. Such expansion can be expected to exert some leverage in controlling contractor costs. Management has identified installation of new services as an area where in-house labor and resources appear competitive with contractors. Management has approved acquisition of necessary specialized equipment and the conduct of training necessary to implement this change on a pilot basis. Management will seek bargaining unit approval for the change, under a process expected to take until the end of 2017

Summary of Liberty’s Steps to Verify Implementation

Liberty does not have any plans to monitor or verify the implementation of this recommendation.

Observed Conditions and Factors

Since the start of Phase 1 audit, management has steadily increased the number of in-house workers engaged in various AMRP activities. Their main role is in performing “mark and bar” operations. These activities include determining the locations of new outside meter sets, installing a meter bar at those locations, and, where possible, initially installing new interior gas piping. After new meter activation, employees complete the interior connections, check for leaks, and re-light gas appliances. Management recently has proposed a pilot program to train in-house employees to perform service- line installations that have been skipped during AMRP work or that are “new.” The next table summarizes the numbers of bargaining unit employees involved in capital work.

Employees Involved Capital Work

Year	Number
2014	120
2015	145
2016	160
2017	250

Implementation Complete and Satisfactory?

Implementation progress to date has been satisfactory, and is on a trajectory to attain completion by the end of this year.

Remaining Gaps, Needs

Management will need to perform yearly reviews of in-house versus contractor costs, to continue to optimize the balance between internal and external resources.

PGL Position

Management has agreed that this recommendation should be evaluated and if economically justified implemented.

Future Liberty Verification Activities

None

General Observations

None.

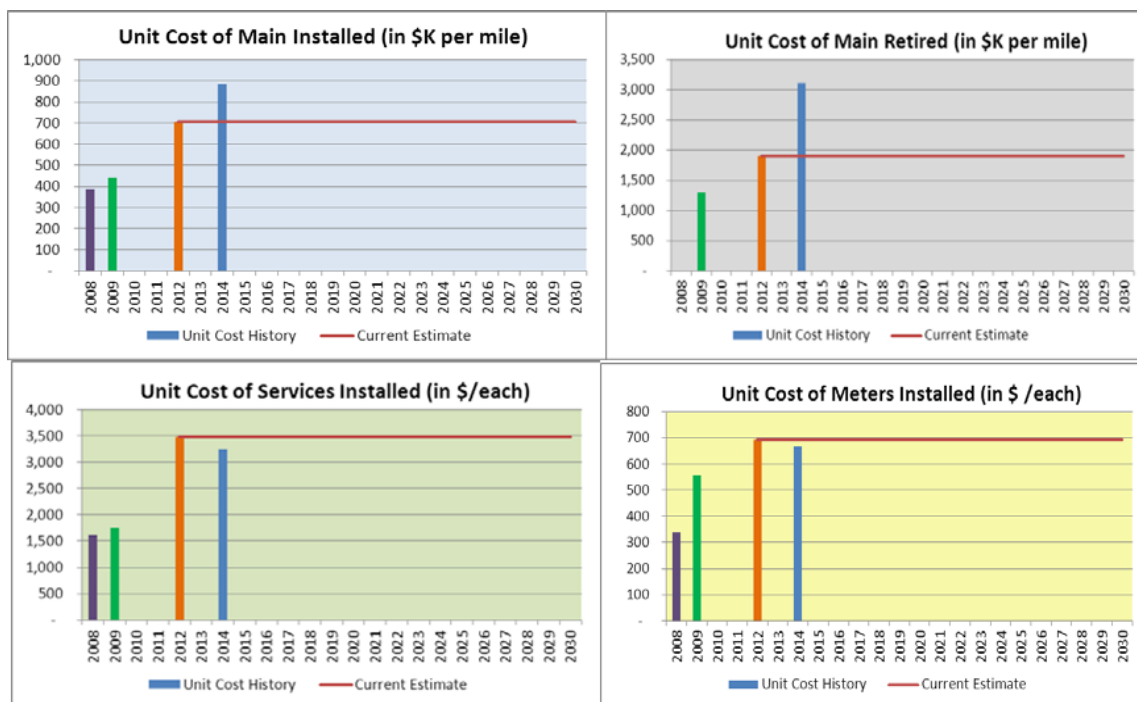
I.4 – Enhanced Productivity Consideration in Resource Planning

Peoples Gas should bring enhanced productivity measurement and management to resource planning.

As noted in a number of this report’s chapters, Peoples Gas has focused on production quantities, and not on the resources it is using to produce them. It is important to evaluate regularly and accurately the relationships between what is produced (output) and what has been used (input). This key metric can readily warn of AMRP program overruns.

Liberty examined a sampling of completed projects. The sample included 102 projects or phases of a project. Peoples Gas needs to monitor productivity in installing the three major AMRP components; *i.e.*, mains, services, and meters. The Company must, of course, know its cost performance in retiring mains. The charts below show program results to date, and provide an example of how the Company needs to monitor these unit costs.

Chart I.9: Installation Productivity Measures



These charts show the kinds of unit cost observations that require analysis and may, depending on the root causes for them, also require corrective actions. For example:

- Mains installed: overrun of 25 percent
- Services installed: underrun of 7 percent
- Meters installed: close to par, with a 4 percent underrun
- Main retired: overrun of 63 percent.

The sample size is small, but the exercise illustrates the importance of monitoring unit costs. Such metrics also have substantial importance in providing solid information for current efforts

(focusing so far on developing a new cost model) to produce a comprehensive and credible forecast of final program costs. job.

Underlying Conclusions

I.7 Current resource plans do not consider rising productivity, or monitor overall program productivity.

The long duration of the AMRP makes it important to use productivity assumptions that match program phases, and that target improvement over time. Peoples Gas is developing a new AMRP Total Cost Estimate using a Planning and Forecasting Model under development. The model must incorporate rising productivity into the estimate. Likewise, the resource planning tool that the newly hired resource manager is charged with developing should take the expected rising productivity into consideration in future resource planning.

PGL Action Plan Steps

Item #	Task	Status
1	Project Director to appoint Productivity Metrics implementation Task Lead	Complete
2	Define objectives and requirements for the Productivity Metrics process & procedures	Complete
3	Design the Productivity Metrics process and procedures	Complete
4	Prepare Productivity Metrics process and procedures	Complete
5	Approve and issue Productivity Metrics process and procedures	In Progress
6	Provide orientation and training to project personnel on Productivity Metrics	In Progress
7	Document completion of the recommendation implementation	In Progress
8	Conduct semi-annual program productivity analysis	In Progress
9	Prepare Program Productivity Analysis reports	In Progress

Continuous monitoring and reporting, supported by insightful and candid analysis form central elements in effective management and executive reporting. The activities and performance metrics housed within the Integrated Project Controls process provide embedded bases for securing the needed information. The approach described by management involves recognizing and implementing productivity enhancements, followed by continuing efforts to push efficiency targets further - - generating a process of continuous improvement in efficiency and productivity. As management recognizes, this process required identification of appropriate cost driver

groupings. Obvious AMRP measurement groups include mains installed, services, meters, and mains retired. Compiling productivity measurements will produce an ultimate cost per distance or cost per unit. Management plans to continually monitor and analyze AMRP productivity analyzed, incorporating into annual construction forecasts expected efficiencies, pushed by target and stretch goals.

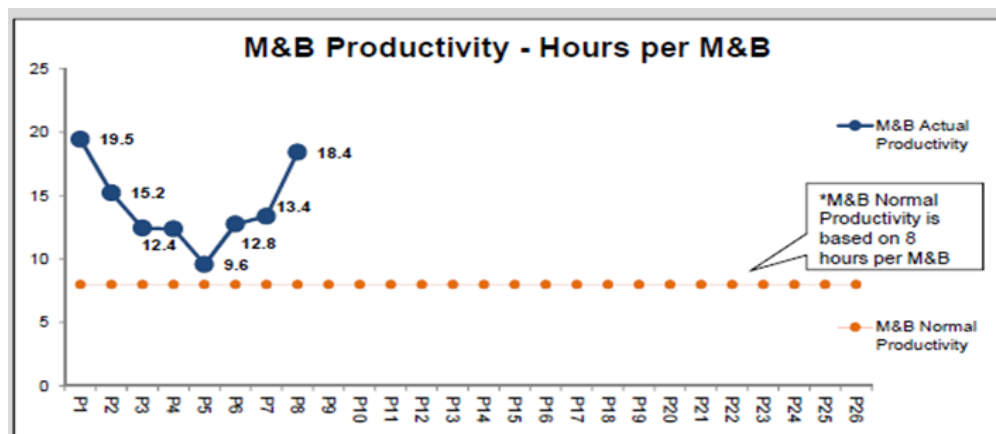
Management’s initial focus concentrates on measuring and managing the productivity of internal resources, and using the efforts to inform resource planning. Management intends to expand the focus of productivity measurement and management to include contractor performed work as needed in the future.

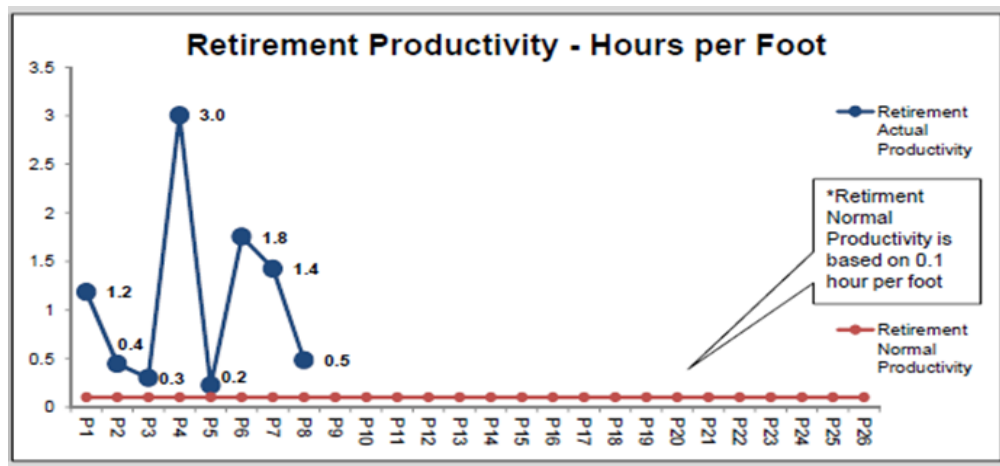
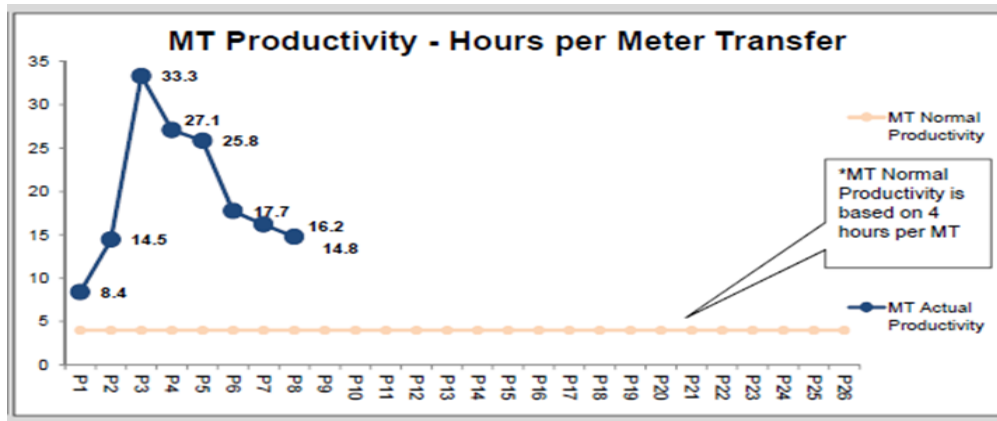
The Director of Project Management & Controls and the Director of Construction serve as task leads for productivity metrics implementation. The requirements and objectives for the productivity metrics process comprise:

1. Specify performance metrics to monitor progress against goals, and evaluate the effectiveness and efficiency of construction.
2. Use performance metrics to assist with allocating and managing resources.
3. Use performance metrics, with analysis and report development, to provide actionable information to assist with decisions about budgets, priorities, and staffing.
4. Monitor and assess productivity changes with the goal of enhancing cost management.

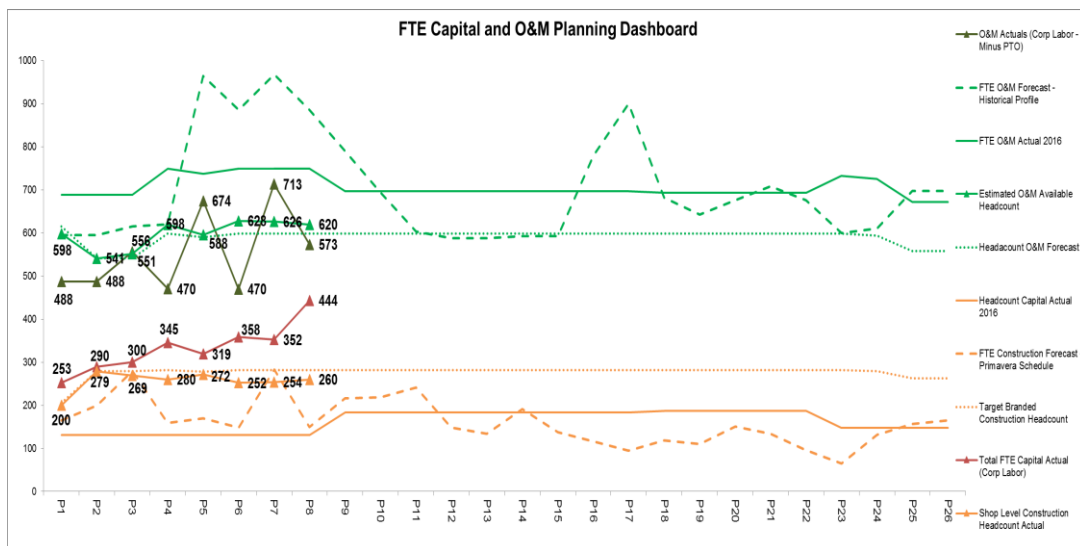
Management will review productivity metrics used for the internal labor Full Time Equivalent (FTE) forecasting process (against the P6 schedule) every quarter against the prior quarter’s actual average productivity. Once reviewed, and collectively agreed upon by the productivity metrics implementation task leads, productivity metrics adjustment will occur as needed, in conjunction with the forecasting efforts. The Resource Planning stakeholders that meet bi-weekly continue to refine and improve the FTE forecasting process, to ultimately enhance and improve future productivity.

The Resource Planning Model has been completely developed. Reports have been generated since the beginning of 2017, used to measure multiple aspects of the internal workforce related to the AMRP program. Specifically, this report provides the basis for a bi-weekly resource planning meeting. The following charts illustrate the three major commodities this model now monitors: Mark & Bar (M&B), Meter Transfer (MT), and Main Retired.





An Executive Dashboard (illustrated below) provides an overview of capital and O&M resources, permitting direct observation of any trend to divert resources from capital construction to O&M work.



Management has developed a Productivity Use and Training Guide to direct the productivity metric process, with associated training scheduled for the third quarter of 2017.

Expected Post-Implementation Conditions and Factors

Enhanced productivity management can offer substantial value in matching productivity assumptions with resource allocation more efficiently, during all program and project phases. Management will use its enhanced measurement results to evaluate cost driver groupings at project and program levels to measure productivity, evaluate scope control, and ultimately make adjustments. Management, as it should, expects AMRP productivity increases as operational efficiencies at all levels of program implementation (*e.g.*, contractors, inspectors, etc.) increase during program implementation.

Summary of Liberty's Steps to Verify Implementation

In May 2016, management provided the following preliminary documents for review:

- New organizational charts showing the addition of Senior Field Coordinator and Field Coordinator positions reporting to AMRP Project Construction Manager
- Job Profile of Senior Field Coordinator (job summary, responsibilities, competencies, experiences, education, travel requirements, physical demands, other requirements, and working conditions)
- Job Profile of Field Coordinator (job summary, responsibilities, competencies, experiences, education, travel requirements, physical demands, other requirements, and working conditions).

Liberty met with management on June 1, 2017 to discuss actions taken and review implementation progress, reviewing several close-out documents:

- Productivity User Process and Training Guide with the following details:
 - Establishment of Productivity Metrics
 - High Level Lifecycle for Resource Planning
 - Detailed view for Resource Planning
 - Shop Level Dashboards
 - Executive Dashboards: Internal AMRP Productivity Output
 - Change in Full Time Equivalent (FTE) Analysis
 - Shop Headcount movement - Illustration
 - Capital and O&M FTE Planning Dashboard
 - Construction Completion & Cost
 - Construction Productivity Charts

Management plans to define the Productivity Metrics process in a procedure that forms part of the Project Execution Plan. A semi-annual Program Productivity Analysis report will form the key deliverable in implementing this recommendation. Completion of implementation will come with institution of the procedure, followed by informing managers of their roles in the process and management's expectations for compliance. Thereafter, management will continue to issue a group of charts or graphs showing the total cost per distance or unit versus time.

Observed Conditions and Factors

We observed that resource planning currently focuses only on internal company resources, thus limiting productivity measurement to employee-performed work. Management continues to believe that it does not “control” contractor resources, who select the means and methods they employ. We accept that view under the current mode of operation, which provides for contractor performance of all main installation, services installation, and restoration. In the future, however, contractor resource availability may diminish. Given the potential for that occurrence, the Resource Planning Group needs to position itself to analyze workload demands and coordinate the internal and external labor supplies.

As a minimum, the Resource Planning Group should monitor the unit cost rates of various types of contractor work from year-to-year, and assess the direction of their movement. The Contracting Group should make such information available.

Implementation Complete and Satisfactory?

The Resource Model can now use productivity information for resource planning. When management has good historical productivity information, the resource planning function can consider rising productivity in work performed by the internal workforce. These factors make implementation reasonably complete.

Remaining Gaps, Needs

Management needs to complete the semi-annual Program Productivity Analysis, and issue the Report. It needs to complete the Productivity Metrics Procedure. Management also needs to expand the model to support monitoring contractor unit costs in main installation, services installation, and possibly restoration. Eventually, management also should develop the contractor unit work-hour rates for contractor work.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

The last quarter of our monitoring effort included verification activities designed to review the Program Productivity Analysis Report, if available. Appendix C discusses these verification activities.

General Observations

None.

I.5 – More Closely Monitor Contractor Resources and Production

Peoples Gas should more closely monitor contractor resources and production.

The Company should analyze every completed project or phase of a project to understand the root-cause of cost growth. This report describes elsewhere the importance of such analysis for cost management purposes. Here, its importance is in supporting sound assumptions about future resource requirements.

Peoples Gas must require contractors to report work-hours, even for unit cost or lump-sum contracts. First of all, calculation of safety metrics requires the information. It will enable the analysts to undertake wage rate analysis and comparison. The work-hours will give the supervisors a greater sense of workload size. Managers will have increased ability to foresee where and by how much the schedule will suffer, should contractors put inadequate numbers of workers on the job.

Underlying Conclusions

I.2 Consistent with the overall AMRP strategy, the Company’s short-term resource plans make an appropriate overall assignment of contractor and employee roles, but do not properly identify internal personnel to install meters and contractors to perform main replacement, service installation, and ground restoration.

AMRP resource plans must identify where the utility will use external and internal personnel. The strategy the utility used to define the overall roles of contractors and internal resources is appropriate for the short-term. However, changes in resource availability in the future may leave the Company in a reactive mode. Peoples Gas cannot rely exclusively on the short-term plans to accommodate future circumstances.

Failure to develop more substantial levels of internal workers skilled in replacing mains and installing services will force near total reliance on contractors for the life of the AMRP. Should the future bring a tighter market for resources (as more utilities accelerate replacement programs) a lack of internal resources will threaten completion of the AMRP on the current overall schedule. Increased competition in the industry for resources may also pose cost escalation risk.

PGL Action Plan Steps

Item #	Task	Status
1	Make organizational structure changes to support establishment of Field Coordinator position.	Complete
2	Conduct training programs to ensure Field Coordinators fully understand their contractor management responsibilities.	Complete
3	Review and change contracts and commercial documents to require prompt and accurate reporting of resources and production.	Complete

4	Document quantity tracking and resource reporting processes to demonstrate monitoring of contractor data.	Complete
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The AMRP organization previously employed a single inspector assigned to each contractor crew to perform Quality Control, safety, and general management activities, but often without appropriately defined functions, producing uneven performance. The organization now employs a project management group to track projects from start to finish. Separate directors address functions related to Project Management & Controls, Engineering, Construction, and Contract Management.

In July 2015, management established the positions of project construction managers and their subordinates, field coordinators. Their primary roles involve overseeing and managing all aspects of contractor field operations. Management assigns a Field Coordinator to manage each contractor crew and to verify resources and production metrics daily. The coordinator also verifies proper work completion and other interface issues implicating safety, schedule, budget, quality, and productivity.

Management will review commercial arrangements with contractors in detail, modifying them as required to hold contractors accountable for accurately and promptly reporting resources and production. Management ensures validation of contractor metrics, confirming them routinely.

The current Construction Organizational Chart at the upper management level shows Senior Field Coordinators and Field Coordinators reporting directly to the Project Construction Manager. That manager in turn reports to the Construction Manager of each shop. Management has identified one senior to two field coordinators as the preferred ratio. The job profile for both positions includes a job summary, responsibilities, competencies, experiences, education, travel requirements, physical demands, other requirements, and working conditions.

Management, considering historical experience, has chosen to apply an effective approach of assigning one field coordinator to each contractor crew. Based on the 22 to 24 phases of neighborhood projects in 2017, the project team has identified a total of 104 field coordinators as required, with the addition of 27 more for seasonal work. The employee portion of these resources will amount to approximately 70 with the remaining supplemented by contractors during peak periods.

Multiple training sessions for Senior Field Coordinators and Field Coordinators took place between July 2015 and May 2017. First, “Construction Expectations and Organization” training included a new construction organization chart, laid out expectations from senior management and went over the new Mark and Bar work sequence. Second, “Job Expectations for Field Coordinators” training, developed with help from Ernst & Young, addressed the responsibilities of pipeline and restoration field coordinators. Third, “Restoration Overview” training covered 2016 CDOT specification changes and restoration field coordinator activity details. Fourth, a January 2017 capital construction season kickoff training session spanning two days included all construction functions and newly-hired field coordinators. Fifth, all new Senior and Field Coordinators received a Field Coordinator Binder, updated continuously and available electronically. Finally, all new hires undergo new-hire orientation training.

Management initiated a pilot program on the Mark and Bar function in the Beverly Phases 8 and 9 neighborhood project in 2016, with guidance from Ernst and Young. The program sought to begin collecting crew and quantity data. Two more pilots, one on restoration and the other one on main replacement, are underway. Management is establishing a centralized repository. Eventually, the Project Controls Group will maintain and use the repository for analytical and estimating purposes.

Contractors must provide weekly reporting of resources (*e.g.*, crew counts) and quantities (*e.g.*, length of main installed), with daily verification in the field by the field coordinator. The 2017 General Specifications include an outline of reporting requirements for contractors. The Quantity Management Procedure outlines what management does with the information contractors provide.

In order to monitor contractor work execution against plans, Project Controls prepares variance analyses, using the quantities reported. Upon noting a variance, Project Controls identifies its driver (including crew count deviations), the potential impacts, and actions to mitigate those impacts. Project Controls also uses contractor-reported information to validate the realism of forecasts. For example, if a contractor has been installing a consistent footage of main each week for a project, but will need to double the footage installation in order to meet the forecasted end date, the Project Controls team member inquires into changes needed to increase installation rates and impacts on schedule in the absence of such changes.

Expected Post-Implementation Conditions and Factors

Management has agreed that more effective monitoring of contractor resource allocation will support contractor identification of schedule performance issues, and enable timely mitigation of delays. Closer monitoring of performance will improve management's ability to enforce contract terms and conditions that address performance quality. Management believes that historical contractor unit work-hour rates on main and service replacement provides a useful valuable benchmark for rates to consider when developing internal resources to perform such work.

Summary of Liberty's Steps to Verify Implementation

In May 2016 management provided the following preliminary documents for review and comment:

- New organization charts showing the addition of Senior Field Coordinator and Field Coordinator positions reporting to AMRP Project Construction Manager
- Job Profile of Senior Field Coordinator
- Job Profile of Field Coordinator.

On December 14, 2016, Liberty met with management to discuss actions taken and review implementation progress. Liberty reviewed the following close-out documents:

- Construction organizational charts showing the addition of Senior Field Coordinator and Field Coordinator positions reporting to AMRP Project Construction Manager
- Job Profile of Senior Field Coordinator
- Job Profile of Field Coordinator.

Subsequent to the December 14, 2016 meeting, management submitted a revised implementation action plan that introduced another step in collecting and managing contractor resources and production information. On June 1, 2017 Liberty met with management to discuss action taken and review implementation progress. Liberty reviewed the following close-out documents:

- Construction Organization Chart
- Senior Field Coordinator – Job Profile
- Field Coordinator - Job Profile
- Capital Construction Training Slides
- Excerpts from 2017 General Specifications
- Quantity Management Procedure – Draft.

Management considers the following deliverables as closeout components:

- Establishment of Field Coordinator positions
- Training programs conducted to ensure that Field Coordinators fully understand their contractor management responsibilities
- Changes made to all new contracts and commercial documents requiring prompt and accurate reporting of resources and production.

Observed Conditions and Factors

Management’s understanding of the term “closely monitor” appears to apply only in a physical sense, but Liberty’s recommendation sought more than just overseeing the contractors closely on a day-to-day basis. Management can make good use of the valuable resource and production information submitted by the contractors. We acknowledge that the field coordinators need to manage the contractor performance and verify the accuracy of resource and production data. Management now receives such information from all contractors. The Project Controls Group needs to manage and analyze the data in a way that puts information to effective use on short- and long-term bases.

Liberty appreciates that management is accustomed to monitoring contractor performance in terms of lump sum or unit cost only. However, now that contractors report crew information along with the associated quantities, management has gained the opportunity to monitor contractor performance using the added dimension of unit work-hour rates. We acknowledge that sometimes contractors must work extended hours to meet the schedule, making it difficult to account for a portion of work-hour expenditures. Nevertheless, management can still benefit from establishing the historical unit work-hour rates for future job references by comparing performance among contractors. The information also has value as a target, should management choose to develop internal capabilities to perform the work involved in the future.

Implementation Complete and Satisfactory?

Management has defined the roles and responsibilities of the field coordinators, filled all vacant PGL positions, and identified up to 50 additional positions available via the contractor, as needed. The training program is comprehensive, with all field coordinators scheduled to be trained. The requirements for contractors to submit the crew and production information are incorporated into the existing contracts, and relevant data is being submitted electronically for major contractors and manually for minor contractors. It is appropriate to close this recommendation.

Remaining Gaps, Needs

Management needs to establish and monitor the unit work-hour database on contractor performance on main replacement, service replacement, and maybe also restorations.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

We planned to review (during the last quarter of our monitoring effort) contractor crew and production reports, and to discuss benefits with a field-coordinator representative. We also planned to validate the established database of contractor historical work-hours and corresponding production quantities by the appropriate units of measure. Appendix C describes our verification activities for this recommendation.

General Observations

None.

I.6 – Establishing a Resource Planning Function

Peoples Gas should establish a centralized resource planning group or function

Resource planning comprises a major and important function. The AMRP needs a group of planners with sophisticated skills. Peoples Gas should centralize this function:

- To analyze workload demands and coordinate the labor supply
- To evaluate the proper mix between internal workforce, overtime, and contractors
- To maintain the resource planning model
- To recommend staffing strategies, crew allocation, contractor management, and timing of training requirements.

Underlying Conclusions

I.1 The AMRP lacks the long-term resource plan required for optimizing long-term program performance.

A program like the AMRP requires resource plans defined by skill for each organization critical to production and to construction support. Peoples Gas has no resource plans. Some short-term planning occurs. Even that planning, however, confines itself to main and installation work performed by contractors and the work performed in the field by Peoples Gas crews. Other support groups, such as engineering and construction inspection, do not appear to use any resource planning, either short-term or long-term. One result has been understaffing.

The Company agrees that it needs long- and short-term resource plans, and that it needs to monitor performance against them. Company initiatives developed since discussions began last September between Liberty and executive management call for redefining the program organization structure, and populating it with resources identified through structured resource plans.

Peoples Gas also needs to address immediately its shortages of engineering and construction inspectors. The current practice of performing quality inspections of one contractor per quarter on gas main replacement, service installation, anode installation, cathodic protection, and directional boring does not serve sufficiently to ensure contractor quality. An enhanced contractor quality inspection program will thus also impose additional resource requirements.

I.2 Consistent with the overall AMRP strategy, the Company's short-term resource plans make an appropriate overall assignment of contractor and employee roles, but do not properly identify internal personnel to install meters and contractors to perform main replacement, service installation, and ground restoration.

AMRP resource plans must identify where the utility will use external and internal personnel. The strategy the utility used to define the overall roles of contractors and internal resources is appropriate for the short-term. However, changes in resource availability in the future may leave the Company in a reactive mode. Peoples Gas cannot rely exclusively on the short-term plans to accommodate future circumstances.

Failure to develop more substantial levels of internal workers skilled in replacing mains and installing services will force near total reliance on contractors for the life of the AMRP. Should the future bring a tighter market for resources (as more utilities accelerate replacement programs) a lack of internal resources will threaten completion of the AMRP on the current overall schedule. Increased competition in the industry for resources may also pose cost escalation risk.

I.3 The AMRP lacks a structured and analytical approach to determining optimum resource allocation.

The AMRP should, but does not, base optimum resource allocation on study and analysis of factors such as wage rates, productivity, work quality, and resource availability. Peoples Gas presently does not have the capability to perform such studies. Liberty expects that some capable managers have sufficient familiarity with the operations to perform such analysis effectively. Current limits with respect to data, however, would make any such analysis ineffective. The Company needs to begin developing this capability, and to support it through improvement in data quality and completeness.

I.5 Peoples Gas’ current resource plan assumes, probably correctly in the short-term, that there is no contractor resource availability problem, but relying on that assumption for the longer term is risky, as main replacement programs extend across the industry.

Resource plans should address how suitable staffing will be ensured long term. The next two charts show that the internal workforce is only going to perform about 10 percent of the work over a span of 20 years. The consensus within Peoples Gas is that contractor availability will never be a problem. However, Liberty believes that growth in demand for contractor resources (as natural gas use expands due to fundamental changes in price competitiveness and as other utilities tackle the massive amount of leak-prone pipe remaining in the industry) creates a real risk over time.

Chart I.7: Annual AMRP Resource Allocations

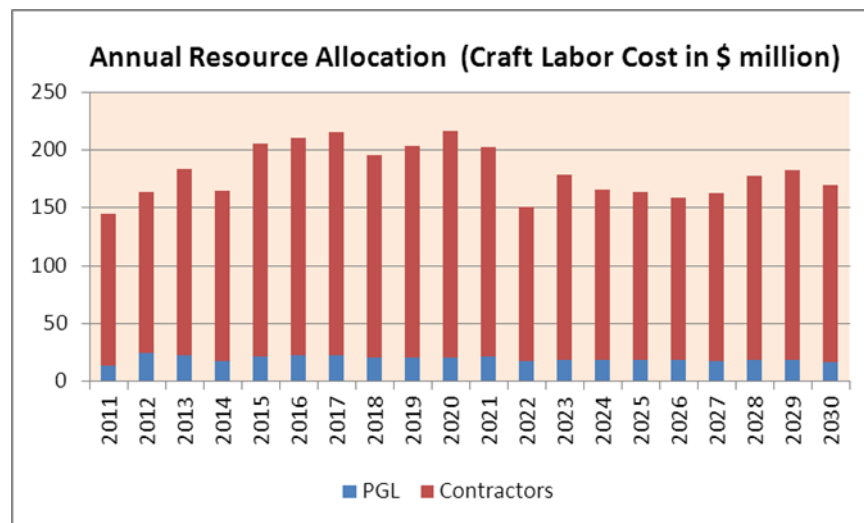
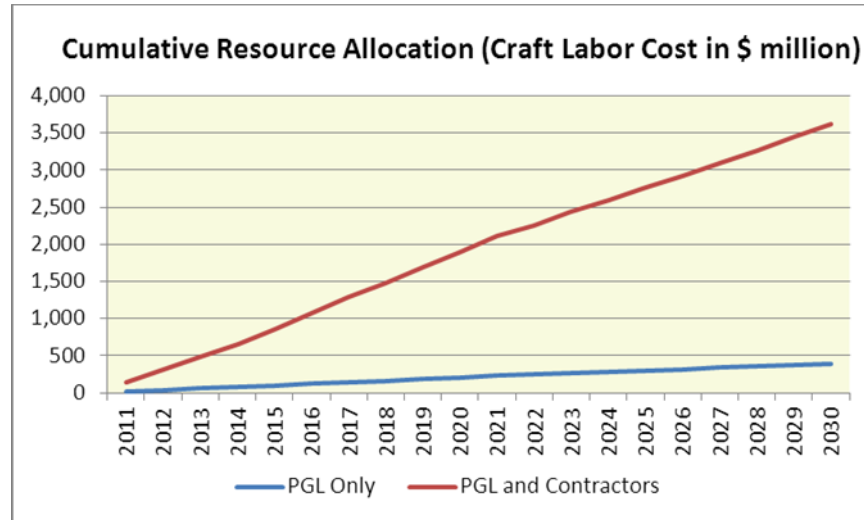


Chart I.8: Cumulative AMRP Resource Allocations



I.6 Current, short-term resource planning considers craft and engineering training.

AMRP resource plans also need to address key training and development needs. Short-term training needs are considered. When the Company develops long-term resource plans, it must consider training and development needs. The replenishing of retired craftsmen provides one crucial piece of information in the resource planning process. Trainee ability and speed to develop into full-fledged operation qualified mechanics are also important factors to be monitored and managed.

PGL Action Plan Steps

Item #	Task	Status
1	Complete the union arrangements and associated training to transfer union workers from the O&M organization to the meter move organization of Capital Construction	Complete
2	Identification of key personnel who will drive the resource planning function along with requisite skills specifications and headcount	Complete
3	Identification of tools to be used by resource planning function	Complete
4	Rework construction sequence process to include greater front-end meter move work mitigating internal resource shortfalls once distribution piping has been installed	Complete
5	Scope smaller work packages to enable better resource management	Complete

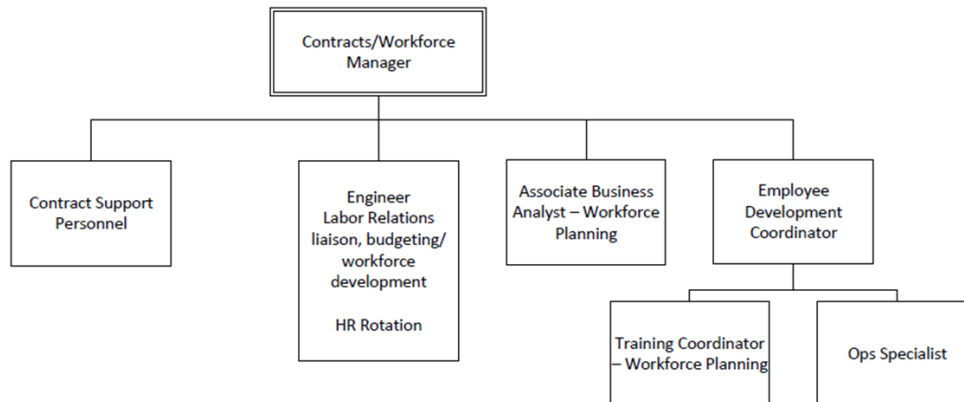
6	Develop contractual control regarding contractor resource efficiency	Complete
7	Integrate the Project Controls and O&M Long Term Planning functions in a manner that will improve resource allocation between O&M and capital construction	In Progress
8	Long term resource analysis for capital replacement project, incorporating retention/retirement rates, onboarding, training, and constraints	In Progress

With centralized resource planning a preferred approach, the possibility of other acceptable approaches to centralizing may exist. At the time of the audit, competing views existed between AMRP project management and O&M management regarding the allocation of resources (primarily for meter moves versus O&M workload). This lack of coordination in making personnel assignments combined with inefficiencies in the construction sequence process to produce delays in meter moves. Delays adversely affected restoration, produced citations from and coordination difficulties with the City, and generated customer complaints.

After the transition to WEC management, competing views between AMRP and O&M management over resource allocation have been eliminated by changes in the organization structure and relationships involving the management groups. Further collaboration with the union has resulted in an ability to transfer up to ninety union employees from O&M to AMRP work, after completion of training. This transformation has produced a field staff more focused on AMRP construction activities. Construction sequence process modifications allowing completion of more meter-move work earlier in the schedule will eliminate delays from a lack of meter-move resources. The process changes also include smaller work scopes for individual project blocks of work, to better assure all work completion under the construction permit and to reduce delays. These changes to the organization reduce needs to coordinate resources with the operations and maintenance function.

To date, management has hired 91 seasonal Project Workers with the second iteration of its seasonal hiring begun in 2016. Management hired seasonal Project Workers to focus mainly on entry level regulatory and compliance work tasks previously performed by higher qualified Operations & Maintenance bargaining-unit field personnel. The hiring of the Project Workers allowed management to reassign those Operations & Maintenance field personnel to support Capital Construction activities, including meter transfer work. The “Workforce Planning” chart below shows the functions of the group that will develop the process and procedures.

CONTRACTS WORKFORCE PLANNING



The Workforce Planning Manager has responsibility for overall development and management of Gas Operations Workforce Planning. The responsibilities include management of resources across the utility to ensure identification, prioritization, and efficient and effective resource allocation. This manager works in collaboration with the Project Management Function, which identifies the need for dedicated field resources. The Workforce Planning Manager will also provide strategic and operational leadership for planning overall resource needs and functions, serving as the Gas Operations liaison to Human Resources stakeholders and service areas engaged in Gas Operations workforce implementation strategies and processes.

Recent hires also include a Workforce Planning Analyst. The Analyst reports directly to the Workforce Planning Manager. The Workforce Planning Analyst develops and maintains workforce data models. The Analyst will provide key reports and data analysis of staffing, workforce productivity, and retention. The Analyst will assist in planning, analysis, and development of labor staffing strategies, to ensure identification, prioritization, and efficient resource allocation. The Analyst will contribute as a key member on the cross functional team between Gas Operations and Human Resources.

Management has reworked the construction sequence process to include greater front-end meter move work to mitigate internal resource shortfalls that might follow distribution piping installation. The organization completed a pilot project using the Future Meter Move Procedure for AMRP. Following pilot completion, management developed a draft procedure for Meter Transfer for post-pilot operations. The procedure captures the process of preparing for the movement of meters in advance of the gas main and service work through the Mark and Bar/Non-Mark and Bar process. The pre-work allows for improved coordination and efficiencies with internal resources and contractors when performing the meter transfer. Additionally, in instances where the front-end meter work is not the preferred method, the procedure provides guidance for the traditional Non-Mark and Bar process.

Management changes include smaller work scope for individual project blocks of work, to better assure all work completion under the construction permit. Construction Permits have a 90-day window. The shortened duration of the construction and smaller work area allow for an entire

project to be completed under the Construction Permit. Success in this regard obviates the need for service or restoration permits. The schedules for these projects allow 30 days for mains and services, 30 days for restoration and then 30 days for retirement. There is no need for service or restoration permits.

Greater attention by management in scheduling, communicating, and coordinating contractors with its own internal resources is intended to result in more efficient work processes. Management will request contractors to provide information on the use and deployment of their resources through bid review discussions, management of their work in the field and with contract controls.

To improve resource allocation between O&M and capital construction, Project Controls and Gas Operations Planning have taken a proactive approach when monitoring program productivity against resource planning. Through the evaluation of full time equivalent (FTE) and production quantities, Project Controls analyzes O&M and capital construction resources required over a two-year cycle, concentrating on the resources required for the immediate year. FTE curves will provide data required to optimize, balance, and reallocate resources where deemed necessary by both the Project Controls and O&M Long Term Planning functions. In addition, a biweekly resource meeting between Project Controls, O&M Planning, and Operations leadership and Construction leadership evaluates current FTE needs against future FTE requirements.

The resource planning model primarily addresses the labor required to complete the forecasted amount of work for the year. The model also enables identification of key positions and forecasted attrition. The full planning analysis considers operational forecast data and forecasted attrition data for key roles. Management identifies gaps in those key roles, using the results to begin the consideration of strategies to close those gaps (*e.g.*, training/qualifying of existing employees and adjusting the pipelines for new employees). Management currently uses the Utility Worker and Project Worker job titles for new and temporary union employees, but will evaluate other avenues to bring in and qualify new employees, negotiating for changes in future years, based on the needs of planned work and the anticipated attrition of employees needed to complete work.

Expected Post-Implementation Conditions and Factors

Management agrees that better resource planning should allow the AMRP capital construction effort to progress more efficiently and effectively by eliminating or mitigating conflicts with O&M labor requirements and by strategically balancing the internal and contract resource mix. Additionally, clearly defining the work scope and improving coordination efforts between contractor and internal resources should enhance efficiency and effectiveness.

Summary of Liberty's Steps to Verify Implementation

On June 1, 2017, Liberty met with management to discuss actions taken and review implementation progress. We reviewed the following close-out documents:

- Gas Operations Organizational Chart and Workforce Planning Functions
- Workforce Planning Manager - Job Profile
- Workforce Planning Analyst - Job Profile
- Resource Planning Model

- Meter Move Procedure for AMRP - Draft
- Construction Sequence
- Albany Park Interval Piping Upgrade Drawing
- Albany Park Resequencing
- Beverly Phase 3 Interval Piping Upgrade Drawing
- Beverly Phases 8 & 9 Interval Piping Upgrade Drawing
- Beverly Phase 10 Interval Piping Upgrade Drawing
- Attrition Model Sample
- Retirement Eligibility Model.

Management considers the following deliverables as closeout components:

- Identification of key personnel who will drive the resource planning function
- Modified union arrangements are rolled out
- Contractual controls are instituted in the contracts with contractors
- Construction sequence is reworked to include greater front-end meter move work
- Methods are developed to scope smaller work packages in order to mitigate schedule slippage
- Work conducted by the Project Controls and O&M Long Term Planning functions is streamlined and integrated.

Observed Conditions and Factors

Management continues to believe that it does not “control” contractor resources, who select the means and methods they employ. We accept that view under the current mode of operation, which provides for contractor performance of all main installation, services installation, and restoration. In the future, however, contractor resource availability may diminish. Given the potential for that occurrence, the Resource Planning Group needs to position itself to analyze workload demands and coordinate the internal and external labor supplies. It could also recommend staffing strategies, crew allocation, contractor management, and timing of training requirements. It could also evaluate the proper mix between internal workforce, overtime, and contractors.

Implementation Complete and Satisfactory?

Management has fully staffed the Workforce Planning Group and developed the Resource Planning Model, which is operational. Assessments of available resource capacity consider training requirements and attrition/retirement information. This recommendation has been sufficiently implemented.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

We planned to review (during the last quarter of our monitoring effort) how training requirements and attrition/retirement assumptions affect resource planning. Appendix C describes our verification activities for this recommendation.

General Observations

None.

J.1 – Implementation of Two-Pronged Scope Control Process

Peoples Gas AMRP management should promptly design and implement a two-pronged scope control process: (a) at the program level, and (b) at the individual project level.

Scope control processes should contain, at a minimum, the following features:

- A baseline definition of scope: The program master plan should frame this process, supported by associated documents such as estimates and schedules. The baseline scope serves as a control foundation only if well documented. The documentation must define underlying assumptions completely and include them in the plan.
- A process for prompt identification of proposed changes: “Chapter K: Cost Estimating” proposes a cost trend report. Those proposing or discovering potential changes air them promptly. Immediate publication of proposed changes does not wait for details, cost estimates, or other, detailed supporting information. The process places a priority on prompt identification, so that management, if it chooses, can intervene before significant time passes, and options diminish.
- Technical analysis of proposed changes: Effective control requires an objective evaluation of proposed changes. Proposed changes often come in proposals by organizations with a high level of technical expertise. Proposals through an authoritative voice can tend to cause others to take them as “given.” Providing for technical analysis by a third party of commensurate stature supports sound analysis and alternative identification, which enables best-informed decision-making.
- Cost and schedule impact of proposed changes: Cost engineering personnel must evaluate changes for cost and schedule impact, and report them to management. Sponsoring organizations often underestimate these impacts. They either lack the ability to estimate them, or do not have awareness of the full implications that proposed changes may have for the project involved. Full and correct identification of the impact may lead to withdrawal of a proposed change. Even if a change occurs, management should understand impacts fully before allowing a change to proceed.
- Documentation of management’s decision-making process: Scope changes often serve as a principal driver of project cost increases. Management should demonstrate prudent handling of such changes. Making a full and complete record of management’s actions when learning of the proposed change and of management’s considerations in approving the change supports such demonstration.

Underlying Conclusions

J.1 The AMRP has not operated to date under an effective scope control program.

Liberty found concerns with AMRP project-level scope control on two levels. First, the focus on contracts obscures management visibility with respect to changes originated through other means. For example, changes made in engineering often require incorporation into bid documents. Contract change controls will not identify them. Second, the time delay between a change and its evolution into the contract change process eliminates the possibility of analysis and mitigation. A program like the AMRP requires a formal set of processes for the control of scope at the program and at the individual project levels. Scope control processes should focus on the early identification

of potential changes, structured evaluation of the need for them, determination of their schedule impacts, and alternatives for addressing the needs underlying them. A proper hierarchy of required approval levels should exist.

The AMRP lacks these scope control attributes, instead maintaining that control of contractor change requests is sufficient. The narrow approach that AMRP management has taken does not comport with program needs or with Liberty’s experience in the industry.

Liberty found no scope control processes at the overall program level. Some scope control processes do exist at the project level, but Liberty did not find them sufficient. The AMRP does seek to control scope at the project level, but only when changes directly affect a field contract. Other project-related changes (those not associated with an already-executed contract) do not face scope control processes. Also, by definition, changes associated with an already-executed contract may not come to management’s attention until after options for addressing them are substantially restricted, if not gone entirely.

At the program level, scope changes may have been included and partially documented in cost estimate updates. Liberty, however, found no indication that they underwent analysis and approval processes.

PGL Action Plan Steps

Item #	Task	Due Date
1a	Internal review of current contract terms	Complete
1b	Project Director to form Scope Control Task Lead	Complete
2	Define objectives and requirements for the Scope Control process and procedure	Complete
3	Design the Scope Control process and procedure	Complete
4	Prepare Scope Control process and procedure	Complete
5	Approve and issue Scope Control process and procedure	Complete
6	Provide orientation and training to project personnel on Scope Control process and procedure	In Progress
7	Document completion of the recommendation implementation	In Progress

Clearly identifying program and project level scope comprises the first step in implementing a scope control process. The new cost and schedule models developed by Burns & McDonnell forms the long-term AMRP baseline program. Management develops and refines project-level scope as neighborhoods are designed into phases. Both the project level and program level scope will feed one another. As data and analysis become available, management must incorporate changes in

project level scope into the overall program scope to identify trends or change initial assumptions. To establish the scope properly, management must identify all the potential cost driver groupings.

Consistent and prompt reporting of these groupings is essential for scope control. For example, at a project level, main installation may form one of the cost driver groupings. Subgroupings that make up the main installation grouping could include, for example, contractor cost, material cost, company labor, company vehicles, restoration, and permit costs. This approach enables proper tracking and reporting of all quantities and values. As they are identified, action can be taken to rectify the problem. The establishment of the project-level process can serve as a check against the program level scope and support recommendations and adjustments, as necessary.

Management has accepted the importance of implementing a scope control process, designating the Project Controls Manager as the Scope Control Task Lead. Scope control observations can and should be encouraged throughout all stages of a project lifecycle. The early identification and ability to influence change with the least impact to overall cost and schedule of the program forms the key concept of the process. Management has developed a process of scope control, now deploying training to the appropriate team members, with a focus on proactive scope control. The following two examples illustrate proactive scope control identified in the design and construction execution phases.

Scope Creep Avoidance: An engineer reviewing comments from another local utility on main replacement drawings observed a statement that management should replace the other utilities' pipe whenever crossing their pipe. The engineer recognized that this comment would add scope to his project, and potentially lead to significant scope increases if applied to other projects. The engineer brought the comment to the attention of his engineering manager and the Project Manager. Both Managers raised the issue to their Directors, who brought the issue to the attention of the Vice President of Construction. A PGL Executive then met with the other utility's leadership, and reached consensus that the other utility did not intend to have PGL replace its pipe. Identifying this potential scope change quickly produced effective action to control program scope.

Considering Alternate Design Options: A Field Coordinator observed that a project's drawings showed main installations routing around Americans with Disabilities Act-compliant facilities, to avoid having to restore them. The Field Coordinator thought that scope could be controlled further by changing to the directional drilling installation method to pass under the facilities. He brought this idea to the attention of project management, which is now working with engineering and the appropriate City personnel to gain approval for this change in installation execution. The change would reduce the quantity of pipe installation, increase installation productivity, and alleviate overall safety concerns associated with multiple offsets and directional changes of the natural gas infrastructure.

The Change Management Procedure documents the Scope Control process. Management has conducted initial training for team members from Engineering, Contracts, Construction, and Project Management and Controls. To emphasize the importance of early identification of scope changes with the purpose of controlling, avoiding or mitigating them, management contemplates additional training with real-life scenarios during the second quarter of 2017.

Expected Post-Implementation Conditions and Factors

Scope control processes should focus on the early identification of potential changes, structured evaluation of the need for the changes, determination of their schedule impacts, and alternatives for addressing the underlying needs. A proper hierarchy of required approval levels should exist.

Summary of Liberty's Steps to Verify Implementation

On June 9, 2016, we met with the Project Management & Controls Project Director to discuss actions taken and review implementation progress. Close-out documentation reviewed included a Change Management Procedure Draft. Management then, on June 30, 2016, submitted the following documents for review:

- Task Support Document
- Capital Change Management Procedure Draft.

On September 19, 2016, Liberty met with management and reviewed the following documents:

- Program Memo – Change Management September 2016
- Construction Change Management Procedure draft, dated September 7, 2016
- Risk-Trend-Change Concept Exhibit
- Change Management Process Flow
- Change Process Examples
- Change Management Overview slides, dated September 7, 2016.

We observed to management that the scope control feature was weak. The underlying recommendation seeks to ensure the exercise of scope control to prevent unjustifiable changes. Management's progress, as reflected in these documents, follows the right track, but limits it to the project (not program) level. The recommendation reaches performance at both levels. At the time, AMRP scope and target end-dates remained open pending an ICC decision following the Stakeholder Process.

Management committed to send updates of its implementation progress, which it later did with a table contrasting differences between project-and program-level activities. On April 28, 2017, Liberty met with management to discuss:

- Background and progress update
- Change management philosophy
- Change management procedure, effective May 1, 2017
- Change management flow diagram
- Change management training for Construction managers and Field Coordinators
- Change management training for PM&C, contracts, and Construction personnel.

After this meeting, management provided descriptions of a few cases illustrating successful intervention to minimize the extent of changes, through early identification and effective communication.

Management considers the following as key deliverables to assist in developing a scope control management program:

- AMRP Schedule Model
- AMRP Cost Model
- Scope Control Plan, which was the old name for Change Management Procedure (now incorporated into the Project Execution Plan).

Observed Conditions and Factors

The purpose of management’s original Change Management Procedure was to manage change requests. This procedure focuses more on how to monitor and manage changes after they occur, as opposed to preventing changes from causing scope expansion. We expressed this concern to Peoples Gas management at our June 9 meeting. Management committed to providing a scope control procedure addressing all five essential components defined in the specific guidelines in the Liberty Audit Report; *i.e.*, the baseline definition of scope, the prompt identification of proposed change, technical analysis of the proposed change, the cost and schedule impacts of that change, and the documentation of management’s decision-making process related to that change.

The revised Construction Change Management Procedure we reviewed on September 19, 2016 and on April 28, 2017 meeting, showed major improvement. It covers crucial steps like identification, validation, analysis, control, and action. However, what remains lacking is express intent regarding management decision and intervention.

Implementation Complete and Satisfactory?

The latest version of Change Management Procedure does not adequately address all critical scope-control features. However, the two examples provided by management do illustrate that the application of scope-control practices did occur during engineering and construction phases. For practical purposes therefore, we consider the intent of this recommendation has been met.

Remaining Gaps, Needs

Management should demonstrate how scope is going to be controlled by allowing the appropriate managers to challenge or intervene. The Change Management Procedure is being revised to emphasize the prompt identification, the technical analysis, the cost and schedule impacts, and the documentation of management’s decision of any major proposed changes.

PGL Position

Management believes that the recommendation is complete.

Future Liberty Verification Activities

We planned to review (during the last quarter of our monitoring effort) examples of successful scope control scenarios and documentation of effective management decision-making. Appendix C describes our verification activities for this recommendation.

General Observations

None.

N.5 – Inclusion of Long-Term Goals in AMRP Metrics

Peoples Gas should upgrade AMRP performance metrics to include annual or cumulative progress versus the long-term (20-year) plan goals and metrics for the executive oversight group and the boards.

The preceding recommendation addressed immediate-term plans and budgets. Effective oversight of the AMRP also requires focus on how progress conforms to longer-term expectations. Over a long period, factors unique to a given year (early in the ramp up period, or extreme weather, for example) may diminish the “predictive” nature of experience over the past 12 months or so. Liberty did not find material longer-term reporting or analysis at the Executive Steering Committee or board levels. Moreover, as addressed elsewhere in this report, the original 20-year plan had not been recently updated. Peoples Gas needs to clearly establish and communicate 20-year goals, capital spending and key progress metrics, and to measure annual and cumulative project progress against the plan in regular reports to the executive oversight group and to the boards. Reporting also needs to consider effectiveness in meeting the AMRP’s overriding safety goal. How fast leak rates are falling and how much risk mitigation is occurring need to be addressed.

The discussions that began between Liberty and the Company in September 2014 have led to Company proposed improvement plans that recognize the need for long-term, as well as short-term key performance indicators, and for the need to analyze performance across durations longer than the current budget year. As is the case with Company plans to address measurement and reporting against annual targets, however, what are now fairly general statements of intent need to be translated (as the preceding recommendations observe with respect to annual measurement and reporting) into a well-defined, complete set of measures, clear responsibility for accumulating and using the information to report them, measures to ensure their accuracy, plans to make them regularly available, and, most importantly, process for using them to identify performance issues and respond to them.

Underlying Conclusions

N.8 Measurements of annual or cumulative progress versus the long-term plan goals and metrics have not been performed for the Executive Steering Committee or the Peoples Gas or Integrys boards.

Key attributes of effective AMRP oversight include identification and regular use of key performance metrics to focus on progress versus plans. Liberty did not observe such measurements in reporting to the Executive Steering Committee or the boards of directors. The AMRP original 20-year plan has not been updated recently. Without a clear, comprehensive, and regularly updated 20-year plan, senior executive and board of director oversight cannot exist at a sufficiently meaningful level. The AMRP requires clearly established and communicated 20-year goals, capital spending and key progress metrics. Measurements of annual and cumulative project progress against the plan may then be regularly reported to the Executive Steering Committee and Peoples Gas and Integrys boards.

PGL Action Plan Steps

Item #	Task	Status
1	Project Director to form Program/Project Performance Metrics improvements implementation team	Complete
2	Define objectives and requirements for the Program/Project Performance Metrics improvements process and procedure	Complete
3	Design the Program/Project Performance Metrics improvements process and procedure	No longer applicable
4	Prepare Program/Project Performance Metrics improvements process and procedure	No longer applicable
5	Approve and issue Program/Project Performance Metrics improvements process and procedure	No longer applicable
6	Provide orientation and training to project personnel on Program/Project Performance Metrics improvements	No longer applicable
7	Document completion of the Program/Project Performance Metrics improvements recommendation implementation	No longer applicable

Originally, management agreed that it should upgrade AMRP performance metrics to assess annual or cumulative progress against long-term plan goals and metrics, to enable executive oversight group and the board oversight. Since the beginning of January 2016, management had been focusing on improving its basic set of core metrics associated with the Capital Construction Program, such as the following:

- Cost per service meter
- Cost per foot of main (size)
- Cost per service (size)
- Cost and schedule variance (plan vs. actual)
- Project financial expenditures per month (plan vs. actual)
- Program financial expenditures per month (plan vs. actual)
- Construction work in progress (plan vs. actual)
- Miles of main installed
- Miles of main retired
- Number of meters installed
- Permit compliance metrics
- Crew utilization
- Safety metrics associated with OSHA reporting requirements (work-related illness and injuries)
- Program progress, cost, and schedule reporting.

Management expected that improvements in the AMRP performance framework could facilitate the use of key performance indicators (KPIs), trend summaries, alerts, and drill-down capabilities for more detailed analyses of AMRP implementation progress and targets.

Presently, finalization of the System Modernization Program (SMP) performance metrics framework remains pending a Commission decision in the ongoing AMRP/SMP proceeding, Docket 16-0376. This docket covers the cost, scope, schedule, and other areas related to Peoples Gas' SMP and the establishment of program policies and practices. Once the Commission issues its order, management will customize performance metrics required to manage the program effectively and transparently.

Expected Post-Implementation Conditions and Factors

Management agrees that providing accurate and comprehensive project performance data at all levels of the organization is critical to program oversight and the successful guidance of the program. However, management has been taking a short view of the AMRP program. Almost all existing metrics monitor annual performance, not to mention that AMRP activities are embedded within all the capital construction work. The re-established AMRP progress and performance metrics on a long-term program basis will provide executive management a new tool to oversee and ensure the fulfillment of management's commitment to remove catastrophic risks from its gas system.

Summary of Liberty's Steps to Verify Implementation

On September 7, 2016, management conducted a workshop with Liberty to discuss this recommendation in conjunction with Recommendations O.2 to O.5. Management is finalizing the new Metrics and Reporting Procedure. Specifically, Section 6.2 of this procedure lays out the steps on Collection, Analysis, and Reporting of Performance Data, and Section 6.3 the steps on the Review of Performance Data and Performance Improvement Actions.

Management has also presented Capital Monthly Report sample charts to illustrate the Neighborhood Focus on reporting AMRP annual progress on main installation, services installation, meters installation, and retirement installation. There is also an AMRP Program-to-date Table that summarizes the quantities of distribution main, HP main, services, meters, and main retired.

The following are key deliverables that management believes will complete implementation of this recommendation:

- Performance Metrics Framework improvement recommendations
- Performance Measurement process and procedure

Upon completion of this recommendation a reporting process and procedure will be implemented in the Capital Project Execution Plan ("PEP").

On September 19, 2016, Liberty met with the Project Management & Controls Project Director to review the following documentation of tasks progress to-date:

- Metrics and Reporting Procedure draft, dated September 16, 2016

- Metrics and Reporting Procedure Attachment 1 – Matrix of Project/Annual Plan/Program Recurring Reports
- Metrics and Reporting Procedure Attachment 2 – Matrix of Project/Annual Plan/Program Recurring Meetings
- Metrics and Reporting Procedure Attachment 3 – Performance Improvement Action Log
- Capital Monthly Report – August 2016.

On July 11, 2017, Liberty met with management to discuss the continuing relevance of this recommendation. Management plans to suspend any deliverables of this recommendation.

Observed Conditions and Factors

Management groups this recommendation with four others related “Reports, Analysis, and Control Skills” recommendations:

- O.2 on establishing a framework for performing improvement
- O.3 on redefining standards for program performance
- O.4 on developing a culture and capability to perform insightful analysis of program performance
- O.5 on expanding the roles of project controls professionals to perform project and program performance analysis.

While related, those four recommendations also represent essential building blocks for this recommendation. Even though they are in place now, this recommendation will not be implemented.

Implementation Complete and Satisfactory?

No. This recommendation requires reporting and analysis on a long-term total AMRP basis. We recognize that the bulk of management’s efforts should be focused on short-term (one to three year) performance requirements. Nevertheless, it remains important also to understand how those short-term results relate to long-term commitments. In fact, the short-term performance has no context in terms of adequacy unless considered within the framework of long-term objectives for public safety and schedule. Management has decided, with what appears to be the concurrence of the Stakeholder Process, that such long-term goals and tracking against those goals is inappropriate now. Because of these developments, the Liberty recommendation will not be implemented.

Remaining Gaps, Needs

None.

PGL Position

management believes that this recommendation is no longer applicable, and does not need to be implemented.

Future Liberty Verification Activities

None.

General Observations

None.

P.1 – Annual Testing of AMRP Charges

Peoples Gas should conduct a comprehensive assessment of AMRP risks associated with potential mismatches between work performed and work charged, and develop an ongoing program of annual testing designed to mitigate the risks identified

The AMRP has by now generated sufficient history to support a focused assessment of where risk exists and in what magnitudes. The Company has already addressed key areas of risk (e.g., internal labor hour charges, overheads, contractor selection, materials reconciliation, and change orders) for purposes of identifying processes and procedures to control those risks. The study recommended here should focus on what steps are appropriate to ensuring that those processes are rigorously and honestly applied. In particular Peoples Gas needs to assure the Illinois Commerce Commission and stakeholders that it will perform sufficient outside testing of the integrity of reported information that drives costs and rates.

Test designers must recognize that reliance on the project management and administration organizations should be backstopped sufficiently to give confidence that project personnel are using verifiable data, and using it objectively.

The resulting program should provide for a meaningful level of annual testing. Recognizing the long-term relationships with outsiders on which the AMRP depends, it should also operate in a way that makes all outsiders in those relationships aware that their engagement in matters with charging and billing consequence is subject to certain review at unpredictable intervals.

Underlying Conclusions

P.3 The nature and extent of ongoing AMRP work requires focused and regular attention to the verification of proper charges.

The Internal Audit Services group has done a substantial amount of work to address change orders from an administrative process perspective. While commendable, those efforts need follow up to ensure appropriate testing of adherence to them. Those efforts also need to include testing designed to provide independent verification of work performance and resource (e.g., materials and equipment and hours spent on time and material change orders) consumption data as the AMRP progresses. Such testing has not formed a significant part of audit efforts. The review of contractor selection for one year is an exception, but one that should continue to be undertaken in the future as well.

Such testing needs to include focused examinations of the relationships between work billed and work performed, and in the context of what contracts require. Regular testing by a source outside of the contractor (or vendor)/program management relationship is key in ensuring that work paid for equals work performed. That testing needs to include verification by this outside source of claims of work performed, materials and equipment used, hours spent where they, and any other relevant items, drive costs under the contractual relationships involved. It is in this important area of verification that internal audit planning and execution need to focus at this and following AMRP stages.

PGL Action Plan Steps

Item #	Task	Due Date
1	Define scope and objective of holistic cost management program	Complete
2	Develop Cost Management Plans and Sub-plans	Complete
3	Develop Cost Planning Procedure	Complete
4	Develop Cost Estimating Procedure	Complete
5	Develop Cost Tracking Procedure	Complete
6	Develop Cost Reporting Procedure	Complete
7	Develop Cost Reconciliation Procedure	Complete
8	Develop Cost Control & Change Management Procedure	Complete
9	Design training process for new plans and procedures	Complete
10	Publish procedures as part of the Project Execution Plan	Complete
11	Provide Orientation to appropriate personnel	Complete
12	Evaluate procedures	Complete
13	Modify, add, edit cost management procedures	Complete

Management proposes to address this recommendation through adoption of a holistic cost management program, applying an approach calling for proactively managing and analyzing estimated, actual, and forecast expenditures to confirm that they are accurate and reasonable. Costs management will occur at both the project and portfolio/program level with a parametric approach to cost analysis. This approach will facilitate an environment of continuous improvement based on cost analysis and forecast values for in-process and future work updated based upon the most current data.

The scope of the cost management procedure includes the following:

- Development of individual project budgets
- Development of the annual Capital Budget
- Interface with the Cost Estimating procedure for budgeting purposes and trending based upon actual expenditures
- Link to the Change Management procedure to identify anticipated changes prior to implementation and provide more accurate forecasts
- Analysis of expenditures as a function of quantities which lends itself to a cost per unit methodology
- Variance analysis of actuals compared to forecast to identify unexpected costs and when applicable implement corrective action
- Regular reporting of actuals compared to forecast on a monthly basis as well as annual and YTD (actual forecast) compared to budget
- Regular training of Controls staff as well as Project Managers and Construction personnel
- Procurement of required materials and equipment

Project Audits performed throughout the lifecycle of Capital Construction projects by internal and external parties will help ensure project implementation of risk mitigation strategies and compliance with the guidelines established in the Project Execution Plan and PGL Policies and

Procedures. Projects will be selected for internal auditing as outlined within each group's respective auditing guidelines.

Expected Post-Implementation Conditions and Factors

The testing plan should be reviewed annually to confirm that it adequately addresses testing of construction program costs.

Summary of Liberty's Steps to Verify Implementation

On April 24, 2017, Liberty met with management to discuss closure of this recommendation and to review the following documentation:

- Cost Management Procedure
- Project Cost Estimator Training
- Final Estimating Procedure
- Change Management Procedure
- Cost Management Training Plan
- Cost Management Training
- Change Management Training Plan
- Change Management Training
- Cost Analyst training sign in sheet and meeting agenda
- Project Manager training agenda and meeting invite
- Project Execution Plan.

Observed Conditions and Factors

Management began 2017 testing in March, and plans to conduct its annual testing during the spring of each year. Initial testing results identified charges out of sync with work request closures (charged after installed). Management is addressing variations as it identifies them.

Management has also developed project reporting to identify mismatches in labor hours charged and work performed, again to address them as identified. Cost Analysts will review these mismatches on a day-to-day basis, to permit correction of inaccurately charged items in a timely manner.

Management is in the process of formalizing and drafting procedures for the annual testing process.

Implementation Complete and Satisfactory?

Yes, Management has appropriately addressed this recommendation.

Remaining Gaps, Needs

This is an ongoing process that should be reviewed and adjusted annually.

PGL Position

Management agrees that this recommendation should be closed.

Future Liberty Verification Activities

None, as we have reached the end of the Phase II monitoring program.

General Observations

None.

U.4 –Complaints Group Resourcing and Performance Monitoring

Peoples Gas should adequately resource the AMRP Complaints Handling Group, and should monitor complaint resolution performance and the root causes of customer complaints, for the purpose of identifying improvement opportunities.

The Construction Complaints group has insufficient staffing, considering the current volume of pending and active complaints. The group needs additional manpower to open and assign complaints. The Company should contact customers within 24 to 48 hours to acknowledge receipt of the complaint. Additionally, management should monitor complaint resolution to ensure proper investigation of issues and effective resolution by the responsible organizations. Peoples Gas should address this problem as soon as possible.

Peoples Gas should investigate the root cause of AMRP-related customer complaints, and complaints from other stakeholders. These root cause analyses should drive improvement in policy, procedure, protocol, and communication.

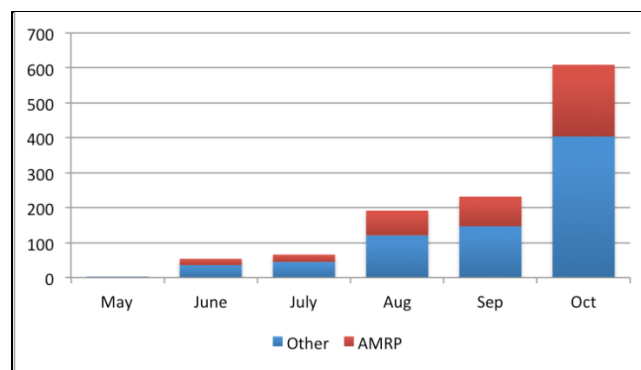
Underlying Conclusions

U.6 Peoples Gas’ AMRP complaint handling group is overwhelmed by the volume of complaints.

Peoples Gas established the Construction Complaints group (reporting to the Division Street Radio Room in Gas Operations) in 2012 to coordinate complaint resolution. Currently, this group has insufficient staff to handle the volume of complaints received. Peoples Gas policy stipulates that customers will be contacted within 24 to 48 hours of their complaints, in order to gather as much information as possible about the situation. However, the Construction Complaints Team has not met this goal.

As of October 31, 2014, 400 AMRP-related complaints remained pending. Peoples Gas received some of them in June 2014. The Company reports that those numbers have fallen by about half since then. The Construction Complaints group handles all construction complaints, including those related to the AMRP. A large number experience significant delay in being assigned for handling. Some customers who voiced complaints in June 2014 have not yet heard from a Peoples Gas complaint-handling representative.

Figure U.2: Unopened Construction Complaints (Awaiting Assignments)



A complaint may take weeks or months to resolve, depending upon its nature. As of last fall, it had taken an average of 103 days to resolve complaints. The Company reports that this duration has since fallen to 68 days. The pace of assignment and resolution is still unacceptable.

PGL Action Plan Steps

Item	Task	Due Date
1	Create and implement a new organizational structure with adequate resources for monitoring and resolving all PGL/NSG customer complaints	Complete
2	Appoint full time leaders and resources to the Customer Effectiveness team	Complete
3	Appoint full time Construction Support for Customer Effectiveness team	Complete
4	Appoint full time O&M Support for Customer Effectiveness team	Complete
5	Evaluate the current customer complaint resolution process and design a new desired state with process efficiencies, consistency and adequate information/communication with the customer	In progress
6	Document procedures for complaint resolution, including roles and responsibilities as well as reporting protocols for field support (Construction-Complete)	Complete
7	Evaluate and implement a central process or system to provide for better data analysis and oversight of all customer complaints regardless of how received or what activity it relates to	Complete
8	Organize a Cross Functional Task Force to resolve the Customer Complaint Backlog	Complete
9	Address all backlogged customer complaints	Complete
10	Communicate to customers for all 2015 carryover complaints due to restoration/weather	Complete
11	Close all remaining 2015 carryover customer complaints	Complete
12	Review effectiveness of field support organization as it relates to prompt resolution of customer complaints and ability to develop trend analysis and determine root cause	Complete
13	Develop metrics and continually reevaluate to ensure continuous improvement	Q1 2016; repeated at least annually

Expected Post-Implementation Conditions and Factors

We would expect to see: (a) a fully-staffed organization operating under clear procedures, producing sustained, substantial reductions in complaint resolution time, (b) detailed tracking of complaint sources, numbers, nature, and resolution times, and (c) a focus on identifying and addressing the root causes of any adverse trends.

Summary of Liberty’s Steps to Verify Implementation

On March 30, 2016, Liberty met with the Manager of Customer Effectiveness to discuss actions taken and to review implementation progress. Liberty requested and reviewed documentation, including:

- Proposed Field Complaints Dashboard
- Customer Letters addressing upcoming restoration (for outstanding complaints)
- Field Complaints Backlog Status Dashboard

- Construction Complaints process (future).

On June 8, 2016, Liberty met with the Vice President of Customer Service to discuss actions taken and review implementation progress. Liberty discussed and reviewed deliverables for each task, including:

- Customer Effectiveness Organization Chart
- Field Complaint Backlog Dashboard
- 2015 Backlog Restoration Letter
- Spring 2016 Restoration Letter
- Complaints Dashboard
- AMRP Construction & Communications Process
- Customer Talking Points for Pilot Program
- Daily We Care Report.

Following the meeting in early June, management provided a copy of the “Complaint Design Document” which describes management’s initial ideas for a central complaint repository. Then, on September 20, 2016, we met with management to discuss actions taken since the last onsite review and to review implementation progress. At that time, management had made no further progress on the implementation of this recommendation, stating that other priorities had precluded work on this recommendation.

On March 23, 2017 Liberty met with management to discuss progress on this recommendation. We observed no progress on the remaining task to address root cause analysis of complaints. In fact, a solution discussed last fall was since abandoned and management announced a decision in March 2017 to rely on the new Customer Information System to track and report complaints.

We met again with management on June 22, 2017 to discuss progress on this recommendation. The new customer system (Open C) was implemented during April 2017. As a result, management has decided to continue tracking construction complaints with the existing process, instead of incorporating it into the new customer system (as originally planned). Construction complaints will continue to be managed through SharePoint, retaining complaint history. Management intends to revisit its approach in the fall following the end of each construction season. The first review of the use of Open C to incorporate construction complaints will thus come late in 2017.

As part of the verification process, Liberty reviewed We Care customer satisfaction reports and complaint trends since March 2017. Customers surveyed reported satisfaction with AMRP-related service marking and meter moves. As of June 25, 2017, construction complaint response has improved, with a reported average-days-to-resolve a complaint of 30.59 (compared to 68 this time last year).

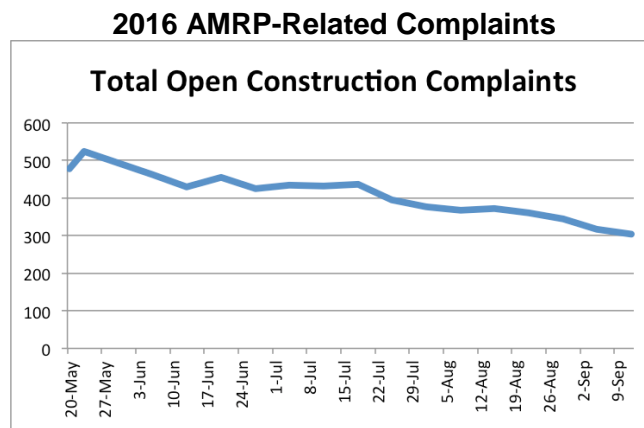
Observed Conditions and Factors

In the fall of 2015, management established a team to address the backlog of customer complaints. Liberty discussed changes in employee ability to resolve small claims. Management finally resolved the 2015 complaint backlog during the first week of September 2016.

Three dedicated resources within Construction deal with complaints. Additionally, management also hired three Customer Service Managers and three Customer Service Supervisors within the Operations & Maintenance groups. In total, nine individuals handle and resolve AMRP or Construction-related complaints. The Customer Effectiveness organization handles restoration complaints.

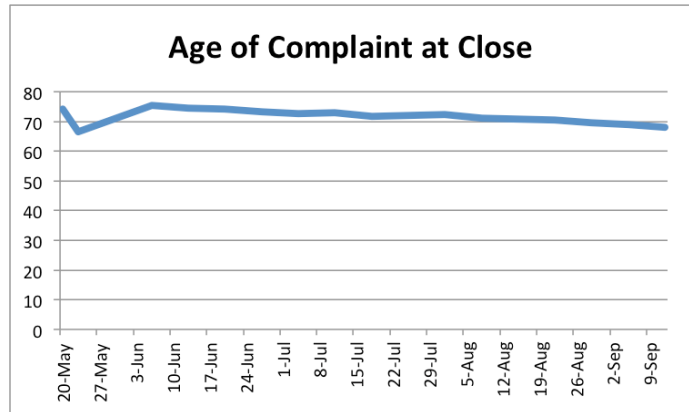
Management created the Customer Effectiveness organization to monitor complaints (Company-wide) and ensure proper resolution. Customer Effectiveness reports to the Strategy & Performance group, which reports directly to PGL’s President. Management charged Customer Effectiveness with making sure the “voice of the customer” is heard throughout management. In addition to managing customer complaints, Customer Effectiveness administers the “We Care” customer satisfaction initiative, and holds weekly “dissatisfied meetings” to discuss We Care results with all business units. We Care now surveys customers who have had a meter marking appointment, a meter moved, or restoration as part of AMRP. These surveys seek to understand better the levels of satisfaction/dissatisfaction with these processes. Currently, the weekly We Care Dissatisfied Customers meeting does not discuss Construction Complaints.

Complaint resolution progress in 2016 was slow. PGL experienced a backlog of complaints (304) and the average time to resolve a complaint was 68 days. The following chart exhibits complaint backlogs from May 23, 2016 through September 18, 2016. Management has slowly reduced the backlog of unresolved complaints from 525 (week of May 23, 2016) to 304 (week of September 18, 2016).



However, the average age of the complaints at closure during 2016 measured an unacceptable 68 days. During our meeting in September 2016, management noted a goal to resolve complaints within 30 days. The following chart depicts the average age of complaints at closure. During 2016, management did not make significant progress on reducing the average age of a closed complaint.

Customer Effectiveness has set up a SharePoint site as a central repository for customer complaints received through the We Care Program, Construction, AMRP, Customer Claims, ICC, and the Customer Contact Center. management is still developing the SharePoint site to gather customer feedback and input. Additionally, the Customer Effectiveness Group is designing methods for conducting root cause analysis of the central complaint repository.



As of March 2017, management announced a decision to use its new Customer Information System for complaint management, instead of the SharePoint site.

At our June 22, 2017 meeting to discuss progress on this recommendation, we learned that management deferred the decision to use the new Customer Information System for construction complaint management deferred. The new customer system (Open C) was implemented during April 2017. Because of the recent implementation, management decided to continue tracking construction complaints with the existing SharePoint process through the end of the construction season. This approach will retain complaint history, and reduce the training burden on the shops, who faced deployment of a new field system at the same time as the new customer system. Management will revisit this approach this fall, following the end of the construction season.

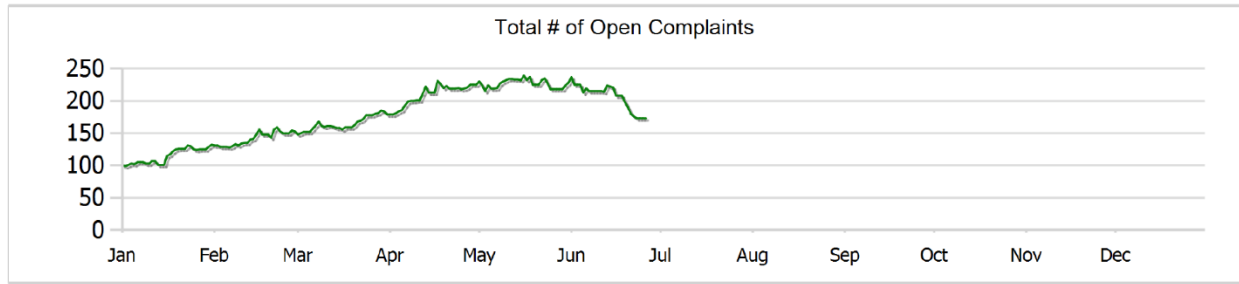
To address root cause analysis, management has begun categorizing construction complaints and investigating ways to avoid complaints. For instance, a new process initiated last fall sends postcards to customers whose property would be restored in the spring, to let them know workers would return. Additionally, management sent out a second postcard in the early spring to remind these customers. There remains no robust root cause process in place, but anecdotal discussions take place to identify trends and determine how to get ahead of potential complaints. The next step is to formalize this process.

As part of the verification process, Liberty reviewed We Care customer satisfaction reports and complaint trends since March. Customers surveyed reported satisfaction with AMRP-related service marking and meter moves. As of June 25, 2017, construction complaint response has improved, management reports the average number of days to resolve a complaint is 30.59 (compared to 68 days this time last year).

As of June 2017, the number of open construction complaints is significantly less than 2016 levels.

PGL and NSG Field Complaints Dashboard

Week of Monday, June 19, 2017
- Sunday, June 25, 2017



Implementation Complete and Satisfactory?

Management has not fully completed activities on this recommendation, but construction complaint response performance has improved over the last year, and the construction complaint response process has improved. Management has incorporated construction complaint performance into its weekly management discussions and has extended its We Care customer satisfaction measurement process to include two key AMRP construction touch points (service marking and meter changes).

Given these steps and results, Liberty concurs with the closure of this recommendation.

Remaining Gaps, Needs

Root cause analysis should be formalized, and management should finalize the construction complaint management system (SharePoint or new Customer System) to further streamline the complaint management process, and management should commit to maintaining its focus on customer service regardless of how the program may change as a result of the Stakeholder Process.

PGL Position

Management has requested closure this recommendation.

Future Liberty Verification Activities

None, because Phase II monitoring ends this quarter.

General Observations

None.

Appendix A - Phase 2 Field Audits*

Summary

Our team performed field inspections during the week of May 1, 2017 to verify and validate implementation of the recommendations involving field operations. We designed and conducted these field observations to cover employee and contractor crews performing work mainly on AMRP projects. We generally found them being performed per company specifications and procedures, and found improved quality and productivity as compared with field inspections conducted prior to preparation of our final audit report in 2015.

Background

Our team performed field inspections in 2014, noting many issues involving both internal and external crews performing work observed. These issues provided a foundation for findings, conclusions, and recommendations located mainly in Section Q of our May 2015 final report. Inspection work at that time involved several weeks spent by the two main Liberty field auditors checking the quality and productivity of work performance. That work principally involved AMRP projects, but included observations on other capital projects and O & M activities as well. Our field observation process included inspections and interviews with construction management, training personnel, and compliance personnel (CMG). Based on field observations and interviews, a series of findings, conclusions and recommendations were prepared and issued in the Phase 1 report. Management generally agreed with these recommendations, and over the past eight quarters, has been implementing them. During those quarters, our objective has been to verify and validate recommendation implementation.

Field Audit

Where we considered it appropriate, our implementation monitoring work included abbreviated field audits/inspections. We conducted these activities during the week of May 1, 2017, including each of the shop areas where contractor or employee crews were performing AMRP or other capital work. Following our field reviews of two years ago, management has changed the sequencing of AMRP work, means for contracting the work, and approaches and methods for monitoring and managing field construction work. These changes apply to AMRP projects and to other company capital construction work. We discuss some key changes below.

Mark and Bar

Management changed the “Mark and Bar” process, under which personnel locate outside meter bars and where personnel use horizontal directional drilling for new services. Employee crews now perform these activities first; previously they occurred after contractors installed medium-pressure services. The number of employee crews performing mark and bar has increased, enabling completion of meter bars and, in many instances, inside piping for single meter installations prior to replacement main and service installations. This change has caused the number of services awaiting meters to decline essentially to zero. At the same time, the number of meter bars awaiting service installation remains sufficient to permit most main and service replacements to occur at customer locations having meter bars previously installed.

Regulator Vents

Employee crews now have time to locate each meter bar properly, enabling the number of regulator vents within three feet of an ignition source or building opening to fall dramatically. Many of the vents we observed within three feet of a building opening were installed in prior years, and will be corrected before meter placement (supported by before-and-after pictures taken at each meter bar installation).

Restoration

Meters can now be hung and the premises converted to medium pressure shortly after main and service installation. This change permits initiation of restoration work in a timelier manner. Faster restoration mitigates a major source of customer complaints, and reduces restoration costs.

Construction Coordinators

A change in management of contractor construction crews resulted in the assignment of company construction coordinators to each crew. The monitoring and oversight activities of these coordinators seek to validate efficient work completion. They also examine compliance with specifications and procedures.

Contractor Safety and Quality Responsibility

Contractors have responsibility for both safety and quality. Management has added resources to ensure proper monitoring and maintenance of both.

Quality Assurance and Control Approach

Management appears to have instituted a multi-tiered quality control and quality assurance program. That approach recognizes that the company has the ultimate responsibility for quality and safety. This system starts with contractor responsibility for developing and applying a quality control and quality assurance plan. It includes field resources sufficient to examine quality and safety. Company management then confirms quality and safety via its field construction organization, followed by construction management group audits. The construction management group may also audit company crews. Other audits or reviews (*e.g.*, by business improvement and internal audit groups) may occur as well.

Overall, we observed an across-the-board improvement in the quality and efficiency of contractor and employee crews, as well as improved morale. One crew, led by a new foreman promoted from the union ranks, showed management recognition of the need to replace retiring resources with knowledgeable personnel.

Operator Qualification

All contractors must provide proof of compliance with company operator qualification (QQ) requirements and Qualification Record (QR) cards. These cards can be scanned to verify training records. On-line systems appeared effective in ensuring proper qualification of all personnel to perform their assigned work.

Technical Training Center

Management expects to complete a new technical training center before the end of this summer. We found the new facility impressive. A continued emphasis on training has the potential to make this facility among the best in class for the gas industry. Management should evaluate locating construction management group personnel at this location, to provide additional synergies from locating technical training experts nearby to answer compliance or procedure questions, and to take feedback auditors on recurring non-compliance issues.

Liberty's Field Visits

During the week of May 1, 2017, our team visited 240 job sites, with each mark-and-bar site inspection a separate job, and with a block typically considered a separate job for main or service installations. We observed mark-and-bar activities performed before any other work, in some situations months before the replacement main and service work starts. Main and service work includes main installations on each side of the street, driven largely by the City's broad prohibition of horizontal directional drilling under streets. Following main installation, by direct burial or by directional drilling where permitted, crews install services. Where the double decking approach is not utilized, these service installations generally occur through directional drilling. At various points in the process, the use of an underground camera ensures that directional drilling has punctured no sewer mains or laterals. Crews perform considerable pot-holing (*i.e.*, digging small openings to physically verify underground utilities) to minimize conflicts with or damage to other facilities.

Typical installations follow completion of main on a block with pressure testing, after which "gassing-in" may occur. After running each service line, pressure testing precedes gassing-in via a connection to the new main. The last activities of the process include gassing-in the customer, cutting off the low-pressure service, and abandoning the low-pressure main in place. Gassing-in the customer may entail installation of some interior piping, hanging the meter, purging the lines, relighting the gas appliances and (finally) removing the old meter. When the sequence proceeds as planned, a seamless change-over can occur in a short amount of time. Representatives must visit each customer converted, checking all interior piping checked for leaks.

The next table summarizes our June 2017 inspections.

Liberty Field Inspections of Gas Distribution Main Replacement Program and Other Capital Work

Shop/Activity	<i>Week of May 1, 2017</i>			
	Contractor Mains	Contractor Services	PGL Main Crews	PGL Service Crews
	HDD/Pres Test/Open Cut/ GPS Marker Ball/OQ/PGL Const Rep	HDD /Camera /Install / Test/ Marker Ball/OQ/ PGL Const Rep	Tie-ins/Gas in/ Insertion/OQ	Mark & Bar /Inside Piping /Service Cut-off/ Install/Retire Meter & Regulator/OQ
Central Shop	3	18	-	17 - (All M&B)
North Shop	15	12	-	62 - (57-M&B), (3-C/O), (2-IP)
South Shop	5	7	2	100 - (80-M&B), (3-C/O), (4-IP), (13- M&R)
Totals	23	37	2	178

Abbreviations: M&B = Mark and Bar, C/O = Cut offs, IP = Inside Piping, M&R = Meter and Regulator

Issues Found During June 2017 Liberty Inspections

We found comparatively very few issues during the June 2017 inspections. Principal causes of significantly reduced problems in the field include the new tiered quality control process and the training that the field coordinators and inspectors received. These measures have improved the ability to find and correct deficiencies and to mitigate their recurrence through feedback methods. Our review of construction management audits of employee and contractor crews showed a continuing drop in deficiencies and a feedback system that seeks correction of the root causes of problems.

We did find, however, some issues during the June 2017 field inspections:

1. Mark and Bar inspection: observed Service Regulator Vent terminus within three feet of structure opening at 3707 N. Bernard – North Shop (possibly from earlier installation)
2. Mark and Bar inspection: observed Service Regulator Vent terminus within three feet of structure opening at 3740 N. Bernard – North Shop (possibly from earlier installation)
3. Meter/regulator service transfer inspection: observed partially buried existing meter at 10629 S. Artesian, employee crew excavated, finding no leak/corrosion on meter (possibly from earlier installation)

4. Mark and Bar inspection of contractor 12” diameter plastic insertion project along S. Crandon: observed Service Regulator Vent termini within three feet of structure openings at 6947-49 Crandon, 7001, 7037, 7142 S. Crandon – South Shop (4 issues)
5. Inspection of North Shop contractor service installation project along N. Harding: observed service installed at 4142 N. Avers within a vehicle traveled alley lacking vehicle damage protection.
6. Inspection of South Shop contractor service installation project: observed two partially buried meter sets at 10624 S. Campbell and at 2645 W. 107th St.; PGL was notified and excavated the meters, finding no leaks or corrosion problems (possibly from earlier installation).
7. Inspection of North Shop contractor main and service installations: observed Service Regulator Vent terminus within three feet of structure opening at 2944 W. Eastwood.
8. Inspection of contractor project at 85th & Kedzie and 84th Place installing services: observed no pre-Mark and Bar meter/Regulator bars installed and no service brackets installed on finished, installed new HDD service lines; checked with on-site construction coordinator who stated that there were no brackets in stock for new service lines without a mark and bar previously installed. (Non-AMRP project).
9. During this same project, observed that contractor installed a “kill and drill” HDD service line; the existing service line was cut off, (a Mulcare insert stopper was installed in the existing service line entering the foundation wall and the new HDD service line was installed up to the foundation wall in the same opening as the Mulcare stoppered service line). No contact had been made with the occupants of the home, and crew did not know if they would be home. An employee crew would have to follow up when the occupants came home to install the meter bar and regulator and restore gas service.

Together, these instances involve eight new, non-compliant conditions, five possible existing or prior conditions, three regulator vents less than 3’ from an opening, and several partially buried meters (probably by customers). The current noncompliance issues involved: (a) a meter or service bracket missing, (b) not contacting a customer on service termination, (c) need for installation of vehicle protection on meter sets on an apartment building, and (d) 5 vents within three feet of an opening. The three percent noncompliance rate we observed (less than one percent if the five vent line issues arose from prior installations) shows significant improvement over our 2015 field inspections.

Note: See Recommendations Q.1 through Q.6 in the final Phase 2 Report for specific instances of implementation of recommendations pertaining to prior field construction quality and compliance deficiencies.

Appendix B: Recommendation Status

Rec. #	Recommendation	Previous Status	Current Status
C.1	Peoples Gas should include as an element of the neighborhood work planning process an evaluation of the merits of taking an exception to the double decking approach	Accepted/ Closed	Accepted/ Closed
C.2	Peoples Gas should more thoroughly study and report on the causes of extremely high reports of contactor damage incidents	Accepted/ Closed	Accepted/ Closed
C.3	Peoples Gas should undertake measures to verify the operability of external service shutoff valves	Accepted/ Closed	Accepted/ Closed
C.4	Peoples Gas should examine the ability to address low pressure and single-contingency outage risks in the neighborhood program	Accepted/ Closed	Accepted/ Closed
C.5	Peoples Gas should test both services and mains to 100 psig	Accepted/ Closed	Accepted/ Closed
C.6	Analyze and report on the precise nature and numbers of corrosion leaks, and determine whether protected and coated steel mains are experiencing corrosion leaks	Accepted/ Closed	Accepted/ Closed
D.1	As part of the new planning effort now underway, Peoples Gas should provide a clear and unambiguous description of the AMRP, including quantities for all parameters important to management of the project	Accepted/ Closed	Accepted/ Closed
D.2	Peoples Gas should accompany regularly reported performance data with insightful analysis in order to make the data immediately meaningful to management oversight and supportive of timely and responsive improvement and corrective initiatives and activities	Accepted/ Closed	Accepted/ Closed
D.3	Peoples Gas should provide a realistic schedule assessment based on an effective program plan	Stakeholder Process	Stakeholder Process
D.4	Peoples Gas should prepare a soundly derived, detailed resource plan and provide for full coordination between the annual budget and resulting resource requirements	Accepted/ Closed	Accepted/ Closed

D.5	In light of apparent decreases in productivity, Peoples Gas should promptly complete an analysis of productivity associated with the installation of meters	Deleted	Deleted
D.6	Peoples Gas should promptly complete a new program cost estimate consistent with good estimating practices	Accepted/ Closed	Accepted/ Closed
E.1	Peoples Gas should complete a full replacement of the plan for management (the project execution plan) addressing all key elements of AMRP management and control	Accepted/ Closed	Accepted/ Closed
E.2	Current developmental plans for a new Project Execution Plan should specifically address prior failures and how they will be avoided in the new plan	Accepted/ Closed	Accepted/ Closed
E.3	Peoples Gas should prepare a long-term AMRP management resource plan that specifically addresses (a) requisite skills needed both on an immediate and on a longer-term basis; (b) current gaps in internal capabilities; (c) the optimum balance of owner versus contractor personnel; (d) acquisition and development of resources; and (e) succession plans	Stakeholder Process	Stakeholder Process
E.4	Peoples Gas should move toward a project organization that makes significantly more use of dedicated resources under a strong project manager approach	Rejected/ Closed	Rejected/ Closed
E.5	Peoples Gas should prepare a specification for a new program management function, correcting the weaknesses in the current process	Accepted/ Closed	Accepted/ Closed
E.6	Peoples Gas should assign a project manager to most, if not all, AMRP neighborhood projects	Partially Rejected/Closed	Partially Rejected/Closed
F.1	Peoples Gas should develop, staff, and implement a data quality control program	Accepted/ Closed	Accepted/ Closed
F.2	Peoples Gas should develop a database of the soils data already collected and populate it further with soils data taken at all new excavations	Accepted/ Closed	Accepted/ Closed
F.3	Peoples Gas should conduct a structured study of alternative criteria and weightings for the Main Ranking Index and for the neighborhood approach	Accepted/ Closed	Accepted/ Closed

F.4	Should Peoples Gas not change the current criteria and weightings, then the utility should develop additional measures to reduce leak rates further	Deleted	Deleted
F.5	Peoples Gas should determine on a system, segment and neighborhood basis the level of acceptable risk and metrics that will support appropriate adjustments in replacement rates	Accepted/ Closed	Accepted/ Closed
F.6	Peoples Gas should develop a cost model that addresses O&M costs associated with AMRP and related work	Accepted/ Closed	Accepted/ Closed
G.1	Peoples Gas should develop a new Cost Plan Model that includes comprehensive measurement bases and critical assumptions regarding scope, quantities, productivity, labor costs, unit costs, and regulatory requirements; a reserve should be included as part of the overall program costs	In Progress	Accepted/ Closed
G.2	Peoples Gas should establish a Cost Trend Program to monitor potential, major cost-affecting items	Accepted/ Closed	Accepted/ Closed
H.1	Peoples Gas should develop a Scheduling Master Plan	Accepted/ Closed	Accepted/ Closed
H.2	Peoples Gas should develop a complete project schedule for every new project, and it should address all aspects of the work required, from engineering to construction and through completion	Accepted/ Closed	Accepted/ Closed
H.3	Peoples Gas should resource-load schedules to address all physical work resources (including internal workforce and contractors) and construction inspectors	Accepted/ Closed	Accepted/ Closed
H.4	Peoples Gas should regularly perform schedule variance analyses to identify recurring or systemic issues, and plan corrective actions	Accepted/ Closed	Accepted/ Closed
H.5	Peoples Gas should complete promptly its efforts to ensure that construction schedules become quantity-based for both the internal workforce and the contractors	Accepted/ Closed	Accepted/ Closed
I.1	Peoples Gas should develop a long-term resource staffing plan that reflects the numbers, skills, and experience needs of all key positions	Merged	Merged

I.2	Peoples Gas should develop the in-house capability to replace gas main and install services on a larger and more long-term basis	In Progress	Accepted/ Closed
I.3	Peoples Gas should act immediately to address the need for sufficient internal resources to perform back end AMRP work as planned and scheduled	Accepted/ Closed	Accepted/ Closed
I.4	Peoples Gas should bring enhanced productivity measurement and management to resource planning	In Progress	Accepted/ Closed
I.5	Peoples Gas should more closely monitor contractor resources and production	In Progress	Accepted/ Closed
I.6	Peoples Gas should establish a centralized resource planning group or function	In Progress	Accepted/ Closed
I.7	Peoples Gas should evaluate regularly the performance (<i>e.g.</i> , wage rates, quality, productivity, expertise, safety, dependability) between the internal and external workforce	Accepted/ Closed	Accepted/ Closed
J.1	AMRP management should promptly design and implement a two-pronged scope control process: (a) at the program level, and (b) at the individual project level	In Progress	Accepted/ Closed
K.1	Peoples Gas should establish a cost estimating capability by formulating a clearly communicated cost estimating philosophy, formalizing a cost estimating process, preparing procedures, and developing effective tools	Accepted/ Closed	Accepted/ Closed
K.2	Peoples Gas should maintain and keep updated a set of historical databases that address cost estimating variables	Accepted/ Closed	Accepted/ Closed
K.3	Peoples Gas should perform project cost estimate reconciliations to understand major cost deviations, analyze performance and document lessons learned	Accepted/ Closed	Accepted/ Closed
K.4	Peoples Gas should expand the development of cost estimates at the individual project level and at the program level	Deleted	Deleted
K.5	Peoples Gas should establish a centralized cost estimating organization to maintain and sharpen the cost estimating skills	Accepted/ Closed	Accepted/ Closed
L.1	Peoples Gas should implement a holistic cost management program	Accepted/ Closed	Accepted/ Closed

L.2	Peoples Gas should establish a structured, well defined approach to managing AMRP costs at three levels: the long-term total program outlook, the individual project level, and the annual budget view	Accepted/ Closed	Accepted/ Closed
L.3	Peoples Gas should define appropriate roles for cost management professionals, including all activities, responsibilities, and accountabilities important to holistic cost management	Accepted/ Closed	Accepted/ Closed
L.4	Peoples Gas should establish a cost support organization that: (a) resides organizationally at a level and in a place consistent with treating cost management as a high program priority, (b) serves the cost management needs of all levels of management, (c) develops a force of skilled cost professionals and assures those skills are continuously improved, and (d) has overall accountability for the development and implementation of the cost management program	Accepted/ Closed	Accepted/ Closed
L.5	Peoples Gas should provide training for managers, supervisors and cost support personnel in cost management techniques consistent with the holistic approach	Accepted/ Closed	Accepted/ Closed
L.6	Peoples Gas should continue aggressively to pursue the recommendations made by Liberty in discussions leading to the interim report	Deleted	Deleted
M.1	Peoples should develop a formal strategy that assures the Company gets above-average terms and below-average pricing in view of the long-term opportunities afforded by the AMRP	Accepted/ Closed	Accepted/ Closed
M.2	Peoples Gas should regularly include in program monthly reports information showing procurement fulfillment and past due rates	Accepted/ Closed	Accepted/ Closed
M.3	Peoples Gas should develop a formal strategy that assures the Company gets optimum terms and pricing in view of the long-term opportunities afforded to contractors by the AMRP	Merged	Merged
M.4	Peoples Gas should determine those contract administration tasks that it considers required, and assure that the Program Management Office executes those tasks	Accepted/ Closed	Accepted/ Closed

M.5	Peoples Gas should apply a program of enhanced management oversight to the contract change process	Accepted/ Closed	Accepted/ Closed
M.6	The Program Management Office should implement enhanced analysis of its results in managing contract changes	Accepted/ Closed	Accepted/ Closed
M.7	The Supply Chain and Program Management organizations should require contractors to provide key data that supports their plans and bids	Accepted/ Closed	Accepted/ Closed
M.8	The Program Management Office should link the results of its contractor evaluation program to future bid evaluations and awards	Accepted/ Closed	Accepted/ Closed
N.1	Peoples Gas should clearly define and document the AMRP governance roles of the Executive Steering Committee with mission statements, charters, and roles and responsibilities for project oversight, monitoring and decision authority	Accepted/ Closed	Accepted/ Closed
N.2	Peoples Gas should promptly execute its current plans to provide for more regular and effective oversight of AMRP and for follow-through and corrective actions to address performance shortfalls	Accepted/ Closed	Accepted/ Closed
N.3	Peoples Gas should substantially enhance the completeness and accuracy of AMRP performance information provided to the boards of directors, and ensure its consistency with information used by AMRP program management and provided to the small executive group with designated responsibility for program oversight	Accepted/ Closed	Accepted/ Closed
N.4	Peoples Gas should expand top-level AMRP performance metrics and reports to include more actionable information, and to compare actual performance with plans and budgets meaningfully	Partially Rejected/Clo sed	Partially Rejected/Clo sed
N.5	Peoples Gas should upgrade AMRP performance metrics to include annual or cumulative progress versus the long-term (20-year) plan goals and metrics for the executive oversight group and the boards	In Progress	Accepted/ Closed
N.6	Peoples Gas should employ outside assistance in designing and implementing the initiatives it committed to undertaking to improve AMRP management, control, and oversight	Rejected/ Closed	Rejected/ Closed

O.1	The AMRP Program Management Office should overhaul its approach to reporting, with emphasis on defining and meeting the needs of managers and staff	Accepted/ Closed	Accepted/ Closed
O.2	Management should establish a framework for performance improvement based on analysis of project performance and corrective actions	Accepted/ Closed	Accepted/ Closed
O.3	In the course of its current improvement initiatives, Peoples Gas should redefine and reestablish its standards for program performance	Accepted/ Closed	Accepted/ Closed
O.4	Program Management Organization should establish a culture and a regular, defined, comprehensive program that provides insightful analysis of program performance, and should acquire the capability to perform such analyses	Accepted/ Closed	Accepted/ Closed
O.5	Peoples Gas should expand the role of its project controls professionals to allow for more analysis of project progress and performance and, in turn, support of management by facilitating corrective action	Accepted/ Closed	Accepted/ Closed
P.1	Peoples Gas should conduct a comprehensive assessment of AMRP risks associated with potential mismatches between work performed and work charged, and develop an ongoing program of annual testing designed to mitigate the risks identified	In Progress	Accepted/ Closed
P.2	Peoples Gas should provide for dedicated, executive level sponsorship of the three-year materials and equipment control initiatives program and provide a regular method of reporting progress to the Illinois Commerce Commission	Accepted/ Closed	Accepted/ Closed
P.3	Peoples Gas should promptly: (a) correct the gap that exists with respect to ensuring the accuracy of material and equipment costs charged to the AMRP, (b) develop a method for reliably and accurately determining independently the magnitude of error in AMRP material and equipment costs being included in rate recovery, and (c) devise and implement a similarly independent testing program to verify that no material risk of similar error exists with respect to AMRP costs subject to rate recovery	Accepted/ Closed	Accepted/ Closed

Q.1	Peoples Gas should address a number of construction standards and should enhance training, documentation, and auditing in a number of areas related to construction standards	Accepted/ Closed	Accepted/ Closed
Q.2	Peoples Gas should adopt measures to ensure consistent use of construction inspection checklists, develop a structured program for analyzing the information they produce to identify and respond to field performance issues disclosed, and clearly empower inspectors to halt unsafe work	Accepted/ Closed	Accepted/ Closed
Q.3	Peoples Gas needs promptly to conduct short-term and long-term analyses of its requirements for skilled and experienced field resources, develop incentives for moving personnel into new positions and incenting senior workers to remain, and ensure that training and development efforts anticipate (and not merely react to) vacancies	Accepted/ Closed	Accepted/ Closed
Q.4	Identify and pursue means to increase the stability in and the numbers of field supervision and inspection personnel	Accepted/ Closed	Accepted/ Closed
Q.5	Clarify responsibilities for key field roles and institute training programs to support them more fully	Accepted/ Closed	Accepted/ Closed
Q.6	Peoples Gas should examine the benefits of equipping technicians with sub-meters accurate GPS devices in areas that have lines of sight to satellites	Accepted/ Closed	Accepted/ Closed
R.1	Peoples Gas should establish a formal continuous improvement program under the Impact Team to promote a culture of and an emphasis on seeking innovations to improve efficiency in the installation of mains, services, and meters	Accepted/ Closed	Accepted/ Closed
R.2	Peoples Gas should assign a project control engineer or cost analyst to each of the three Shops to handle the analysis of all AMRP construction work performed by the internal workforce and contractors	Partially Rejected/Cl osed	Partially Rejected/Clo sed
R.3	Peoples Gas should assign a single manager to coordinate AMRP-level permitting improvement initiatives and to monitor and measure permitting for the duration of the program	Accepted/ Closed	Accepted/ Closed

S.1	Peoples Gas should invigorate the commitment to safety and permit compliance through the designation of an executive level “champion,” and institute a comprehensive communications program, set aggressive goals and performance targets, perform regular measurement, perform root cause analysis, and develop responsive action plans	Accepted/ Closed	Accepted/ Closed
S.2	Peoples Gas should more closely examine the root causes and develop a responsive action plan to improve employee accident rates	Accepted/ Closed	Accepted/ Closed
T.1	Peoples Gas needs to continue to focus on improving communications and relationships with the City and with its Department of Transportation, but must recognize that it will take improved permitting and work performance to create and sustain relationships at the level needed to optimize AMRP performance	Accepted/ Closed	Accepted/ Closed
T.2	Peoples Gas should expand the scope of AMRP project schedules to incorporate permitting requirements	Accepted/ Closed	Accepted/ Closed
T.3	Peoples Gas should develop a database of permit applications	Accepted/ Closed	Accepted/ Closed
T.4	Peoples Gas should work with the Chicago Department of Transportation to determine which existing and potential reports from the Department’s system are available and which could be provided to Peoples Gas	Accepted/ Closed	Accepted/ Closed
T.5	Peoples Gas should improve the database of rail crossing permits	Accepted/ Closed	Accepted/ Closed
T.6	Peoples Gas should improve its database of citations	Accepted/ Closed	Accepted/ Closed
U.1	Peoples Gas should alter the AMRP Communications Plan	Accepted/ Closed	Accepted/ Closed
U.2	Peoples Gas should standardize the process to set AMRP customer appointments	Accepted/ Closed	Accepted/ Closed
U.3	Peoples Gas should ensure that the Customer Information System fully supports AMRP communications processes	Accepted/ Closed	Accepted/ Closed

U.4	Peoples Gas should adequately resource the AMRP Complaints Handling Group, and should monitor complaint resolution performance and the root causes of customer complaints, for the purpose of identifying improvement opportunities	In Progress	Accepted/ Closed
U.5	Peoples Gas should measure on a regular basis: (a) customer satisfaction with AMRP, and (b) the effectiveness of AMRP Communications and Customer Service	Accepted/ Closed	Accepted/ Closed
V.1	Peoples Gas should work promptly to identify the AMRP reporting changes that it proposed to implement near term, and tailor them to meet the reporting cycles and content this chapter describes as appropriate for supporting the monitoring needs of the Illinois Commerce Commission	Deleted	Deleted

Appendix C: Recommendation Verification

Liberty’s work for this quarter included verification activities on roughly one half of the recommendations closed in previous quarters. This appendix includes an updated summary discussion of verification activities for 52 recommendations. These updates come in the form of “Final Liberty Verification Activities” sections, which we have added to the reports we prepared for the quarter during which we determined the underlying recommendation to be implemented. This new material is shown in green boxes in the summaries below. The remaining portions of those original reports remain unchanged.

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Final Recommendation Verification Summary				
No.	Recommendation	Status	Verification Status	Remarks
C.1	Double decking approach	Complete	Verified	Yearly check on economic breakpoint
C.2	Damage prevention improvement	Complete	Verified	Should improve over time
C.3	External shutoff valves	Complete	Verified	Periodic check on annual data
C.4	LP and single-contingency outage risks	Complete	Verified	Yearly modeling
C.5	Test mains and services to 100 psig	Complete	Verified	New standard and procedures in place
C.6	Number of corrosion leaks	Complete	Verified	Yearly check on leaks
D.1	Clear description of AMRP	Complete	Verified	
D.2	Insightful analysis of performance	Complete	Verified, except for: (a) Performance analysis skills not fully developed	Analyses lacking or superficial; Should be able to improve over time
D.3	Schedule assessment	Complete	Not Reviewed	
D.4	Resource plan and budget / resource plan coordination	Complete	Verified, except for: (a) Resource planning model to include contractors	PGL unable to include contractors in Model in time for Liberty's verification; Some contractor resource planning information unavailable; Model has the capability to include contractors
D.5	Meter installation productivity	Deleted or Combined		

D.6	New AMRP estimate	Complete	Verified	
E.1	Full replacement of the plan for management	Complete	Verified	
E.2	New PEP to address prior failures	Complete	Verified	
E.3	Long term resource plan	Complete	Not Reviewed	
E.4	Dedicated resources and strong PM approach	Rejected		
E.5	Prepare spec for a new PM function correcting weaknesses	Complete	Verified	
E.6	Assign Project Managers for neighborhood projects	Rejected		
F.1	Data QC program	Complete	Verified	Data QC procedure imbedded in standards
F.2	Soils database	Complete	Verified	May not provide any meaningful data
F.3	Neighborhood risk ranking	Complete	Verified and changed in 2016	Two-year offset to see meaningful changes
F.4	Alternative to Neighborhood Risk Ranking Change	Deleted		Not necessary since F.3 implemented
F.5	Risk ranking metrics	Complete	Verified	Needs checked after offset period for F.3
F.6	O&M cost model	Complete	Verified, except for: (a) Annual update of O&M Cost Model	Cost Model just got developed; First annual update scheduled to be implemented in 2018

G.1	Cost plan and model	Complete		
G.2	Cost trend program	Complete	Verified, except for: (a) Launching Cost Trend Program	Cost Trend Program just got developed; Will implement in second half of 2017, but not in time for Liberty's verification
H.1	Scheduling master plan	Complete	Verified	
H.2	Integrated project schedules for all new projects	Complete	Verified	
H.3	Resource-load schedules for physical workers and inspectors	Complete	Verified, except for: (a) Miscommunication on Resource Loading into Schedule (b) Field coordinators not resource-loaded into schedule	(a) Physical resources not loaded in schedule due to unforeseen difficulties and complexities; (b) PGL does not plan to load field coordinators in schedule
H.4	Schedule variance analysis to identify issues	Complete	Verified, except for: (a) Performance analysis skills not fully developed	Analyses did not focus on identifying schedule variance root-cause issues; Should be able to improve over time
H.5	Quantity based schedules	Complete	Verified, except for: (a) Contractor schedules not yet quantity-based	PGL did not implement quantity-based contractor schedules in time for Liberty's verification; Presently, contractor quantities monitored separately from schedule
I.1	Long term staffing plan	Deleted or Combined		
I.2	In-house labor capability	Complete	Verified	On-going and to be evaluated annually
I.3	In-house labor for AMRP back end	Complete	Verified	Process modified and additional staffing provided

I.4	Enhanced productivity considerations in resource planning	Complete	Verified, except for: (a) Performance analysis skills not fully developed	Analyses lacking or superficial; Should be able to improve over time
I.5	Closely monitor contractor resources and production	Complete	Verified	
I.6	Establish a resource planning function	Complete	Verified	
I.7	Comparative performance of internal and external workforce	Complete	Verified	
J.1	Scope control for program and project levels	Complete	Verified	
K.1	Structure cost estimating process and capability	Complete	Verified	
K.2	Cost estimating database	Complete	Verified	
K.3	Reconciliation of project cost estimates	Complete	Verified, except for: (a) Improvement in cost estimate reconciliation process	Cost estimate reconciliation did not focus on identifying root-cause issues or lessons learned; Should be able to improve over time
K.4	Expand development of project and program estimates	Deleted or Combined		
K.5	Central cost estimating organization	Complete	Verified	
L.1	Holistic cost management program	Complete	Verified	
L.2	Cost management at program, project, and annual levels	Complete	Verified	

L.3	Define cost management roles	Complete	Verified, except for: (a) Performance analysis skills not fully developed	Cost analysis not insightful; Should be able to improve over time
L.4	Establish a cost support organization	Complete	Verified	
L.5	Cost management training	Complete	Verified	
L.6	Pursue Liberty pre-report suggestions	Deleted or Combined		
M.1	Strategy to leverage long term procurement opportunities	Complete	Verified	
M.2	Include procurement fulfillment in monthly reports	Complete	Verified, except for: (a) New metrics not available in monthly status reports	PGL wanted to wait for more data collection; Company plans to include metrics in the fourth quarter of 2017
M.3	Strategy to leverage long term contractor opportunities	Deleted or Combined		
M.4	Define required contract admin tasks	Complete	Verified	
M.5	Enhanced oversight of contract change process	Complete	Verified, except for: (a) Contract changes not on Contractor Scorecard (b) Implementation of internal audits delayed (c) No provisions for management oversight in change control process	(a) PGL did not want to include Contract Changes until further evaluation for 2018 Scorecard; (b) Audits had to be delayed due to the majority of the procedures not officially released (still in draft form); (c) PGL intended to exercise management oversight via delegation of authority, not

				quite the intent of Liberty’s recommendation.
M.6	Enhanced analysis of contract change process effectiveness	Complete	Verified, except for: (a) Contract change analysis inconsistent with recommendation	Contract change analyses not insightful; Should be able to improve over time
M.7	Requirements for contractor data	Complete	Verified	
M.8	Link contractor evaluation to future bid awards	Complete	Verified, except for: (a) Inclusions of cost and schedule performance in subsequent bid evaluations	PGL did not want to change criteria until further evaluation for implementation in 2018
N.1	Governance role of Executive Steering Committee	Complete	Verified	
N.2	More effective oversight of AMRP	Complete	Verified, except for: (a) Unable to validate management oversight	Information supplied by the Company and discussion with PGL management did not support effective oversight
N.3	Performance reporting to support executive oversight	Complete	Verified	
N.4	Include actionable information in top-level reports	Rejected		
N.5	Include performance versus long-term goals in metrics	Complete	Not Reviewed	
N.6	Employ outside assistance to facilitate the change process	Rejected		
O.1	Base reporting on managers' needs	Complete	Verified	

O.2	Link analysis of performance to improvement	Complete	Verified	
O.3	Redefine performance standards	Complete	Verified, except for: (a) Finalization of performance metrics framework	PGL unable to complete the selection of all the essential performance metrics in time for Liberty’s verification; The Company committed to finalize the framework in second half of 2017
O.4	Establish culture and capability for insightful analysis	Complete	Verified, except for: (a) Performance analysis skills not fully developed	Analyses not insightful; Should improve over time
O.5	Expand role of project control professionals	Complete	Verified	
P.1	Comprehensive assessment of AMRP risks	Complete	Verified	
P.2	Dedicated executive level sponsorship	Complete	Verified	
P.3	Enhancement of material & equipment management	Complete	Verified	
Q.1	Enhancement of management and training of construction standards	Complete	Verified	All major contractors’ databases integrated into PGL system
Q.2	Enhancement of field inspection functions	Complete	Verified	Current system has shown improvement in quality
Q.3	Management of senior skilled field resources	Complete	Verified	New training for first level supervision instituted, see Q.4 and Q.5

Q.4	Stability of field inspection and supervision personnel	Complete	Verified	Although no new HR policies, PGL has instituted additional training for new supervisors
Q.5	Responsibilities and training of key field personnel	Complete	Verified	Issues resolved
Q.6	Benefits of upgrading technician equipment	Complete	Verified	
R.1	Continuous improvement program for installation of mains, services, and meters	Complete	Verified	
R.2	Assign a project control engineer to each shop	Rejected		
R.3	Single manager to coordinate permitting improvement initiatives	Complete	Verified	
S.1	Safety and compliance champion	Complete	Verified	New safety committees and additional emphasis on safety
S.2	Reduce employee accident rates	Complete	Verified	Accident rates being reduced
T.1	Improving relationship with city and CDOT	Complete	Verified	Relationship has improved
T.2	Incorporate permitting in schedules	Complete	Verified	
T.3	Database of permit applications	Complete	Verified	
T.4	CDOT reports	Complete	Verified	



T.5	Improvement of rail crossing permit database	Complete	Verified	
T.6	Improvement of citation database	Complete	Verified	
U.1	Alter the AMRP communication plan	Complete	Verified	
U.2	Standardize appointment process	Complete	Verified	
U.3	Support of AMRP communication process by Customer Info System	Complete	Verified	
U.4	Resource for handling complaints	Complete	Verified at the time the recommendation closed (6/30/17).	Complaints are down this year and response time has improved.
U.5	Customer satisfaction and effectiveness of customer communication	Complete	Verified, except for: (a) customer satisfaction measurement of restoration-related work	Peoples paused satisfaction measurement of restoration activities last fall and did not restart in time for Liberty to verify.
V.1	Implement improved ICC reporting	Deleted or Combined		



C.1 – Double Decking

Peoples Gas should include as an element of the neighborhood work planning process an evaluation of the merits of taking an exception to the double decking approach.

Double decking as a default option clearly makes sense for Peoples Gas. The planning process, however, needs to include an element that verifies its superiority over other options in individual cases.

Underlying Conclusions

C.4 Departing from the more typical approach of a single main to serve customers on both sides of the street makes sense under the conditions that Peoples Gas faces, but deploying the strategy without exception would not promote optimization.

The “double decking” that Peoples Gas employs substantially increases some aspects of material and construction costs, but generally responds effectively to the cost penalties that would apply to the use of a single main (serving both sides of the street). A single main would require opening the paved portion of public rights-of-way, because the City of Chicago will not allow directional drilling of services under the street. A separate main serving each side of the street also offers future advantages (e.g., avoiding disruptions when future in-street work by others takes place). Finally, minimizing work in the streets mitigates the amount of public disruption that a program as massive as the AMRP inevitably must produce.

The Company, however, should not conclude that new, double decking makes more sense in all cases. Examining particular circumstances of each street as part of neighborhood work planning, rather than a universally applied rule, should dictate the final choice. For example, it would appear likely that some existing center-of-the street mains could remain in place, while being upgraded to higher pressure. A 6” replacement project performed in 2006, but left to operate at low pressure offers a case that would merit consideration. It takes case-by-case analysis to determine whether doing so would prove more expensive than replacement again with double-decked pipe.

PGL Action Plan Steps

This recommendation now contains 6 steps, all of which management has completed.

Item #	Task	Status
1	Update the model with the current construction rates (main/service installation & restoration)	Complete
2	Update the model with the 150’ asphalt rule	Complete
3	Document the update/review process	Complete
4	Review attributes of the AMRP Neighborhoods under design	Complete
5	Make the decision on whether it is necessary to approach the city	Complete
6	Review and update the model/documented process	Complete

Expected Post-Implementation Conditions and Factors

Management should be evaluating the need to “double deck” mains on both sides of the street on a continuing basis. A primary reason for this requirement is that the city does not allow PGL to use directional drilling techniques under city streets. As noted in task C.1.5, management may find it necessary to revisit this requirement in the future (see General Observations for a potential HDD trial).

Summary of Liberty’s Steps to Verify Implementation

None except for the review of the model that has been performed as part of this closeout

Observed Conditions and Factors

Liberty observed that in one particular case, double decking was specified in an alley that did not have the same cost basis as city street and thus a single main would have been appropriate.

Implementation Complete and Satisfactory?

This recommendation is considered complete based on the tasks listed and the current schedule of completion plus the responses to data requests.

Remaining Gaps, Needs

The cost model needs to update yearly with new cost information and/or changes in city requirements.

PGL Position

Management agrees that this recommendation should be implemented.

Future Liberty Verification Activities

None

Final Liberty Verification Activities

In early 2017, Liberty requested data on current conditions, as compared with those existing at the time we prepared the underlying recommendation. We reviewed the percentages of single decking in 2015, 2016, and proposed 2017 levels. We found the model management developed and uses sufficient to establish a sound basis for determining where double decking proves advantageous. We discuss the output of the model in the *General Observations* section that follows.

General Observations

Management has run its cost model for 2016. Based on the current requirements of the 150-foot Chicago DOT repaving rule and other costs, management determined that the break point for double decking on a cost basis is six services. Management has determined to double deck streets with more than six services; those with fewer will employ a single main. Management has proposed to discuss with CDOT a trial to drill directionally under smaller side streets (in lieu of open trenching). This technique can avoid curb improvements required by the Americans with

Disabilities Act (ADA). The most current CDOT specifications have reduced the number of ADA curb improvements on each intersection from four to two, provided only one crossing is being made.

The next figure summarizes the Double Decking Model currently used. It shows that for eight services, the cost between the two options is essentially identical. Management prefers double decking, because it keeps mains and services out of the streets, thus avoiding in-street conflicts with other utilities (*e.g.*, sewer, water, electric).

Project Cost Summary		
Total Footage	600	
Number of Services	8	
	Single Install	Double Deck
Main Cost	\$ 21,791	\$ 43,583
Service Cost	\$ 39,643	\$ 17,409
Restoration Cost	\$ 190,010	\$ 92,000
Total	\$ 251,445	\$ 152,992

Assumptions:

For Double Deck: Twice as much main will be installed for 2" & 4" pipe
 A long sided service is about 80'. A short sided service is about 30'
 Restoration cost is included in the main and service installation cost
 Grinding and Resurfacing Street is based on length x width
 Width of street = 66'

C.2 – Third Party Damage

Peoples Gas should more thoroughly study and report on the causes of extremely high reports of contractor damage incidents.

The Company should perform a structured and analytically-based study of the cause and the safety risks imposed by contractor-caused damage. It should complete such a study within six months, and report its results to the Illinois Commerce Commission. The study should incorporate any proposed changes to prevention and mitigation efforts.

Underlying Conclusions

C.5 A number of other safety, reliability, and testing issues need to be considered in conjunction with or on top of current Peoples Gas practices in AMRP planning or execution.

Peoples Gas experiences an extraordinarily high rate of contractor-caused damage counts. The Company expresses a high degree of confidence that: (a) reporting distinctions account for its high numbers compared to those of others, and (b) it operates effective prevention and mitigation programs to address such damage. Replacement due to pipe condition, not third-party damage, comprises the scope of this engagement. Therefore, Liberty has not examined the validity of these two Company observations. However, confusion in break and repair numbers reported in Chapter F of this report and recognition that contractor damage presents both large safety risks and high costs warrant mention of this issue. The number of damage counts warrants attention by Peoples Gas and their causes need improved transparency to the Illinois Commerce Commission.

PGL Action Plan Steps

Item #	Task	Due Date	Actual
1	Establish Third Party Damage Prevention Improvement Committee - System Integrity Group, in partnership with Gas Operations management	12/31/15	Complete
2	Third Party Damage Recommendations – Third Party Damage Prevention Improvement Committee to design, prepare, and issue procedures, guidelines, communication, training, or other measures aimed at reducing third party damages	01/31/16 and on-going	Complete
3	System Integrity Group to review and assess current locating practices and watch and protect program, and recommend enhancements for implementation prior to next year’s construction season	03/01/16	Complete
4	System Integrity Group to review, assess, and analyze resource needs	03/31/16	Complete
5	Near miss quarterly report	04/01/16 and annually	Complete
6	Near miss root cause analysis report	07/01/16 and annually	Complete

Expected Post-Implementation Conditions and Factors

Peoples Gas should see a decrease in the number and seriousness of contractor damages to their system as a result of improved staffing, more effective follow up, and institution of near miss reporting and root cause analysis.

Summary of Liberty's Steps to Verify Implementation

On June 8, 2016, Liberty met with management to discuss progress on this recommendation. In conjunction with these conversations Liberty reviewed close-out documents provided by management, including:

- Damage Prevention Committee meeting agendas
- 2016 Damage Prevention Report (updated weekly)
- Watch and Protect Daily Report
- 2016 YTD Near Misses Report

Observed Conditions and Factors

Peoples Gas has completed all six tasks of this recommendation intended to enhance and improve tracking and reporting of its contractor-caused damage rates. These steps addressed needs analysis, near miss reporting, and root cause investigations.

Liberty believes that with the additional focus on third party damage, Peoples Gas should be able to reduce the number and the consequences of these incidents.

Implementation Complete and Satisfactory?

Yes, management has met the intent of this recommendation. It is therefore appropriate to close this recommendation.

Remaining Gaps, Needs

None

PGL Position

Management believes it has fully implemented this recommendation.

Future Liberty Verification Activities

Data on damages and near miss reports will be provided annually, and reviewed for completeness to determine whether there continue to be systemic causes for some of the damages and if these causes can be addressed and eliminated.

Final Liberty Verification Activities

Third-party damage incidents comprise the current top cause of incidents for natural gas distribution systems.² This recommendation called for the development of a “near miss” program and for additional resources to minimize all types of damages (first party by PGL, second party by contractors, and third party by others - - all commonly called third party damage, or “TPD”). An enhanced emphasis on preventing damage should provide safety, risk reduction, and financial savings in the long run. The number of “hits” per 1,000 locates has fallen from historical highs, but appeared to have “plateaued.” The lack of continuing improvement calls for a program designed to identify recurring causes and near miss reviews, to take advantage of lessons learned. Thus, Liberty reviewed year-end data for 2016, and quarterly TPD improvement committee minutes and near miss reports. The 2016 data showed a significant improvement. The data showed that PGL was approaching the national average, but remained higher than utilities in Illinois, as in other states.

Applicable metrics include damages per 1,000 locate/mark-out ticket. The next table summarizes 2015 performance against this important metric. PGL’s 5.9 rate for 2015 fell significantly in 2016 to 3.6, but remained comparatively very high. The range for the country ran from zero in Rhode Island to 3.2 in Missouri.

TPD Rates

State	2015 TPD
PGL	5.9 EST
IL	1.64
CA	0.7
NY	0.68
MA	0.21
WA	0.91
TX	1.56

Management Gas has also started tracking near misses, below are the near misses from 2016.

² References: commongroundalliance.com/dirt-2015-interactive-report for 2015 and PH2 DR 239 for 2016 PGL

PGL Near Misses in 2016

PGL Near Misses	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Locates Taking More Than 48h to Complete (USIC)	88	92	176	53	126	148	119	429	529	1,035	262	106	3,163
Locates Taking More Than 48h to Complete (URG)	6	30	81	85	101	42	783	390	1		10	55	1,584
Excavator Digging Before Dig Date	17	24	10	23	16	30			30	14	19	10	193
Excavator Not Protecting Locate Marks			15	3	4	2				95	25	15	159
Excavator Digging Outside Area Listed on Dig Ticket		9	18	15	29	42			9	10	1	1	134
Locates Taking More Than 48h to Complete (PGL)	14	19	13	45	20	20							131
Not Hand Digging Within 18" of Locate Marks						3				94	26	17	140
Not Beginning Work Within 14 Days of Dig Ticket		5								90	26	18	139
Directional Boring Not Specified on Dig Ticket		2			1				13				16
Excavator Digging Without Dig Ticket			3	3	2	4							12
Not Potholing for Directional Drilling			1						11				12
Weekend or Holiday Used as Dig Day									11	1			12
Excavator Has Not Secured Their Own Dig Ticket													0
Total Near Misses	125	181	317	227	299	291	902	819	604	1,339	369	222	5,695

General Observations

Having implemented improved damage prevention and near miss tracking data, management now needs to analyze the data for root causes to determine if additional measures can further reduce damages and near misses. The following chart shows a downward trend in damage rates. However, substantial room for improvement remains. For example, urban utilities in New York have a substantially better damage rates (less than half the PGL rate).

2006 - 2014 Hits/1000

Year	Total Damages (Hits)	Total Locates	Hits/1,000
2006	1,044	69,885	14.9
2007	1,027	92,459	11.1
2008	943	92,765	10.3
2009	724	93,046	7.8
2010	735	91,201	8.1
2011	913	115,626	7.9
2012	1,156	161,666	7.2
2013	1,042	169,355	6.2
2014	1,099	176,226	6.2

C.3 – External Shutoff Valve Operability

Peoples Gas should undertake measures to verify the operability of external service shutoff valves.

Peoples Gas should also institute a program designed to determine the locate-ability and functionality of existing external service shutoff valves. Liberty specifically recommends a random survey of 1,000 services believed to be controllable through outside shutoffs. The survey should only include areas not scheduled for near-term neighborhood work under the AMRP. Should the survey identify location or operability problems with more than 10 percent of the services surveyed, Peoples Gas should expand the survey size to 5,000 services. If surveying identifies more than a small number of valves as not findable or not operable, then Peoples Gas should define, resource, and carry out a corrective action program.

Underlying Conclusions

C.5 A number of other safety, reliability, and testing issues need to be considered in conjunction with or on top of current Peoples Gas practices in AMRP planning or execution.

Peoples Gas believes that the current number of shutoffs and turn-ons performed in their normal course of business provides sufficient number of shutoff valve operations to validate that the installed valves are performing as required and that the number of valves that are inoperable or cannot be located is a small number. Based on the data supplied, only 1.3% of the shutoffs performed required a physical cut in the service while 98.7% were effected using either a curb box valve or the valve located on the riser.

PGL Action Plan Steps

This recommendation required one subtask, which has already been performed. Management had provided data already collected to verify implementation of this recommendation.

Expected Post-Implementation Conditions and Factors

The Company now monitors and will continue to monitor the performance of shutoff valves when they have discontinued service to a customer. Below is the data from 2015 on the low level of shutoff valve malfunctions and thus management has demonstrated that there is not a material performance concern in the field, thus obviating the need for a special study.

Shutoff Method

Number of visits	Locked at B-box	Locked at Riser	Physical Cuts	Grand Total
1	86.1%	91.9%	40.9%	87.8%
2	8.7%	5.4%	19.0%	7.5%
3	2.4%	1.3%	15.3%	2.1%
4+	2.8%	1.4%	24.8%	2.6%
Grand Total	86,603	56,736	1,865	145,204
% of Overall Shutoffs	59.6%	39.1%	1.3%	100.0%

Management will continue to track and report on the number of shutoff valves that malfunction annually.

Summary of Liberty’s Steps to Verify Implementation

The data provided above shows that this program was already undertaken and that it will be reviewed annually.

Observed Conditions and Factors

We found management already tracking inoperable shutoff valves and that it is not a problem nor does another study need to be performed.

Implementation Complete and Satisfactory?

Yes, this recommendation is considered implemented and verified and thus can be closed out.

Remaining Gaps, Needs

None

PGL Position

Management agrees that this recommendation has been fully implemented.

Future Liberty Verification Activities

Data provided by management confirms the problem has been resolved and is being properly tracked. No further verification is planned.

Final Liberty Verification Activities

At the time of our audit report, management was not testing or recording the number of issues that it experienced with service shutoff valves. We proposed an inspection program, but management countered with an approach that involved checking the number of times shutoff valves failed during service cut-off or cut-on procedures. We found this approach acceptable, provided that management documented the number of failures yearly. We sought to determine whether management continued to provide the 2016 shutoff valve data, similarly to what was done for 2015. The next table compares the 2015 and 2016 data:

2015 DATA		Shutoff Method		
Number of visits	LOCKED AT BBOX	LOCKED AT RISER	PHYSICAL CUTS	Grand Total
1	12907	11934	276	25117
2	1225	688	86	1999
3	428	193	68	689
4 +	666	267	153	1086
Grand Total	15,226	13,082	583	28,891
2016 DATA				
Number of visits	LOCKED AT BBOX	LOCKED AT RISER	PHYSICAL CUTS	Grand Total
1	8475	6972	335	15782
2	808	424	102	1334

3	233	116	38	387
4 +	267	127	47	441
Grand Total	9,783	7,639	522	17,944

The definitions for the different columns are:

- Locked at Bbox (Bbox refers to a “buffalo box,” used to access the underground valve)
 - Shutting the gas service valve off underground and applying a locking device.
- Locked at Riser
 - Shutting the gas service valve off at the riser and applying a locking device.
- Physical cuts
 - Performing excavation and physically disconnecting the gas service to the building.

A Locked at Bbox and Locked at Riser are both considered service shutoffs.

Thus, the number of shut off valve problems in 2016 ran at just under three percent. The corresponding figure for 2015 was just over two percent.

General Observations

None

C.4 – Low Pressures

Peoples Gas should examine the ability to address low pressure and single-contingency outage risks in the neighborhood program.

Peoples Gas should conduct a structured analysis of where low operating pressure and single contingency outage threats exist and match those locations to neighborhoods planned for work in the near term. To the extent that these two threats prove material in any neighborhood, Peoples Gas should consider the benefits of addressing them more promptly by moving the neighborhood involved up in priority order.

Underlying Conclusions

C.5 A number of other safety, reliability, and testing issues need to be considered in conjunction with or on top of current Peoples Gas practices in AMRP planning or execution.

Peoples Gas experiences an extraordinarily high rate of contractor-caused damage counts. The Company expresses a high degree of confidence that: (a) reporting distinctions account for its high numbers compared to those of others, and (b) it operates effective prevention and mitigation programs to address such damage. Replacement due to pipe condition, not third-party damage, comprises the scope of this engagement. Therefore, Liberty has not examined the validity of these two Company observations. However, confusion in break and repair numbers reported in Chapter F of this report and recognition that contractor damage presents both large safety risks and high costs warrant mention of this issue. The number of damage counts warrants attention by Peoples Gas and their causes need improved transparency to the Illinois Commerce Commission.

Similarly ensuring the operability of service valves has important safety and operations implications. The lack of a structured program for assessing operability does not conform to good utility practice.

Addressing system weaknesses identified through analysis of operating pressure and of single contingencies that can produce widespread outages comprise key elements in ensuring the provision of reliable and adequate services. The neighborhood construct work has the potential for resolving pressure and single-contingency issues, but it is not clear that Peoples Gas considers those issues directly in planning.

Limiting testing to current operating pressures on systems that generally should support operation at higher pressure unnecessarily constrains possible future upgrades, considering the difference in test requirements to verify operability at higher pressure.

PGL Action Plan Steps

Item #	Task	Due Date	Revised Date
1	Facilitate biweekly system status meeting (revision)	11/05/15	Complete
2	Facilitate weekly cold weather system status meetings during the winter months (revision)	01/04/16	Complete
3	Develop a live model that captures the day to day state of the system (revision)	04/01/16	Complete

4	Train shop engineers on how to use the live model to identify low pressure risks during a shutdown study	06/01/16	In Progress
5	Review and update engineering design standards defining limitations of temperature/pressure dependencies	08/01/16	In Progress
6	Produce a quarterly report to show low pressure and single contingency areas in comparison to the baseline	10/1/2016	In Progress
7	Develop the process and document a strategy to identify any deviations from the plan	10/1/2016	In Progress
8	Produce a project phasing summary sheet for the white paper to specify the temperature/pressure dependencies	12/1/2016	In Progress

Expected Post-Implementation Conditions and Factors

Before the onset of cold weather, management should have a contingency plan in place to address incomplete main replacement or pressure upgrade projects in neighborhoods with single source feeds.

Summary of Liberty’s Steps to Verify Implementation

The low-pressure plan will be reviewed in the 3Q16 and the 4Q16 depending on the onset of cold weather and cessation of construction. This plan review will highlight the areas that may have possible low pressures and single source supplies within some neighborhoods undergoing upgrading and main replacement.

Observed Conditions and Factors

Liberty has requested and received preliminary procedures and screen shots of an example of the new software representation of contingency planning to address changes in the implementation of neighborhood main replacement program due to unforeseen circumstances. These data requests confirm that contingency planning procedures are workable and will provide the needed information to ensure all customers will receive reliable gas service if there is a change in the construction schedule.

Implementation Complete and Satisfactory?

Yes, Liberty considers this recommendation complete. Liberty will revisit this recommendation later in the year, after the construction season and with the onset of cold weather, to validate contingency planning outcomes.

Remaining Gaps, Needs

Fine-tuning of the report may be necessary to provide an additional level of confidence that there will be no low-pressure areas due to partial main replacements or upgrades.

PGL Position

Management concurs with the closure of this recommendation.

Future Liberty Verification Activities

The low-pressure plan will be reviewed in the 3Q16 and the 4Q16 depending on the onset of cold weather and cessation of construction. This plan review will highlight the areas that may have possible low pressures and single source supplies within some neighborhoods undergoing upgrading and main replacement.

Final Liberty Verification Activities

When management cannot complete a main replacement project before the onset of cold weather, partial replacement may cause certain customers to have low pressure during the winter. Management has stated that it models for these types of potential outcomes, and may modify the project to ensure all customers with main or pending main replacements have adequate pressures for the high-load, winter months. We determined that no areas of low pressure caused by partial main replacements existed during the 2016-2017 winter.

General Observations

None

C.5 – Testing New Facilities to 100 psig

Peoples Gas should test both services and mains to 100 psig.

Peoples Gas should test both service and main pressures to 100 psig on all new installations and develop methods to retest previously installed services to 100 psig, to give the system the ability to operate at a higher pressure in the future.

Underlying Conclusions

C.5 A number of other safety, reliability, and testing issues need to be considered in conjunction with or on top of current Peoples Gas practices in AMRP planning or execution.

Peoples Gas wrote a new procedure, TEG 1030 to test mains and services to a sufficient pressure to allow for operation at 60 psig (MAOP) for all new mains and services and for those existing services and mains that may be retested in the future due to maintenance or other work. Peoples Gas did not agree to retest all existing mains and services previously installed under this program or other programs. Also, Peoples Gas did not provide a finite date that this new procedure went into effect. The actual procedure allows for a range of pressure testing, 90 to 105 psig which is acceptable.

PGL Action Plan Steps

Item #	Task	Due Date
1	Implement TEG 1030	Completed

Expected Post-Implementation Conditions and Factors

We would expect testing to be in accord with TEG 1030.

Summary of Liberty’s Steps to Verify Implementation

Liberty will conduct field observations as part of its implementation monitoring. Those observations will verify that test pressures above 90 psi, so that the MAOP of the new mains and services will be 60 psi.

Observed Conditions and Factors

TEG 1030 requires all testing at a 90 psi minimum.

Implementation Complete and Satisfactory?

This recommendation is considered complete and implemented. management, however, should consider ensuring that records reflect all of the current MAOPs on the system with plastic and steel medium pressure installed before 2015 listed at 25 psig or less and medium pressure installed after January 2015 listed at 60 psig.

Remaining Gaps, Needs

None

PGL Position

Management agrees that this recommendation has been fully implemented.

Future Liberty Verification Activities

To be performed during field visits

Final Liberty Verification Activities

Management changed the testing pressures on all new services and mains in 2015 to 90 psi to accommodate 60 psi delivery pressures, if their systems need to be updated from the normal lower pressures. During the 2017 construction season, Liberty observed the test pressures used, finding no concerns.

General Observations

Management implemented this recommendation in 2015. Management does not plan to conduct pressure testing on mains and services installed prior to the adoption of TEG 1030 with the 90 psi minimum pressure.

C.6 – Corrosion Leaks

Analyze and report on the precise nature and numbers of corrosion leaks, and determine whether protected and coated steel mains are experiencing corrosion leaks.

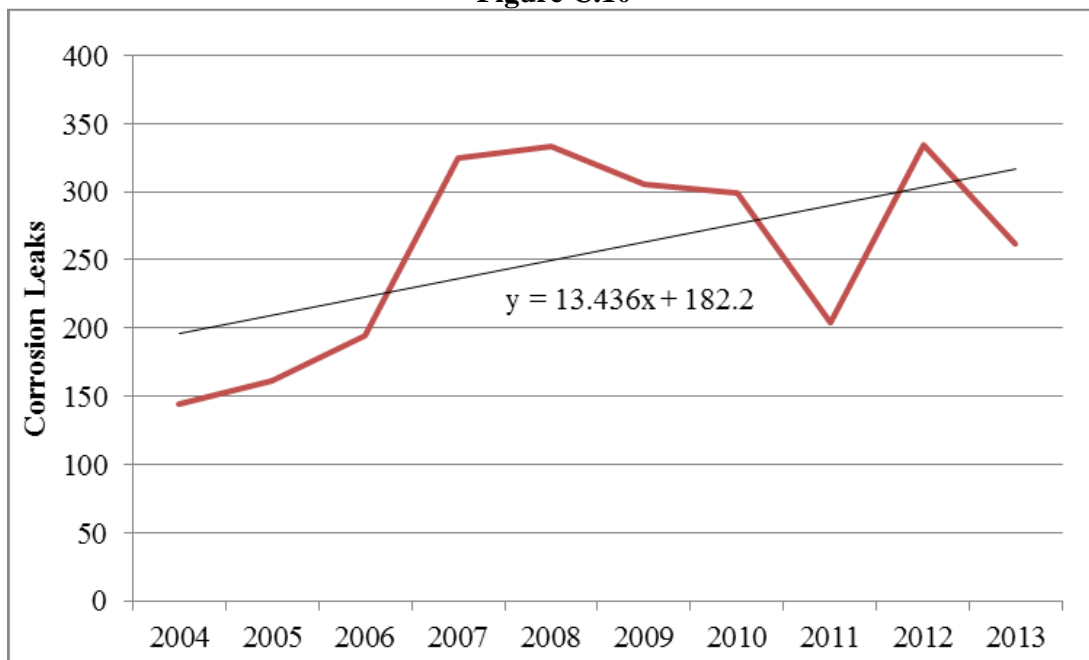
Reporting problems may explain anomalous data about corrosion leaks. In any event, Peoples Gas needs to verify sources of leaks in order to assess properly needed responses.

Underlying Conclusions

Peoples Gas reports a number of corrosion leaks that do not comport with materials common in its system.

Peoples Gas reports no bare steel main, but does report corrosion leaks. One would not expect reporting of leaks on plastic, cast iron or ductile iron to use corrosion as the classification. Liberty thus interprets the reported corrosion leaks as coming on bare steel services or on protected coated steel mains/services. The number of corrosion leaks shown in Figure C.10 causes concern. Peoples Gas believes that some of these corrosion leaks comprise pitting on cast iron, not cathodically protected steel mains.

Figure C.10



Another concern is that Peoples Gas reports 104 corrosion leaks on mains. Unless established otherwise by Peoples Gas, this observation means that Peoples Gas' protected coated mains are corroding. The industry does not usually experience a significant number of corrosion leaks on protected coated steel main, nor does the industry typically classify leaks on cast or ductile iron as corrosion. Graphitization is a form of cast iron corrosion; however, it is unusual for gas distribution companies to classify leaks on cast iron as corrosion.

PGL Action Plan Steps

Item #	Task	Due Date	Revised Date
1	Director Gas Operations & Maintenance to form team to review Leak Data	12/31/15	Complete
2	Define objectives and requirements for the Leak Data process and procedure improvements (if identified)	1/15/16	Complete
3	Design the Leak Data process and procedure improvements (if identified)	1/30/16	Complete
4	Prepare Leak Data process and procedure improvements (if identified)	2/15/16	Complete
5	Approve and issue process and procedure (if identified)	2/28/16	Complete
6	Provide orientation and training to project personnel on procedure	3/15/16	Complete
7	Document completion of the recommendation implementation (if identified)	4/1/16	Completed

Expected Post-Implementation Conditions and Factors

The number of corrosion leaks on cathodically protected mains and services should decrease due to proper reporting.

Summary of Liberty’s Steps to Verify Implementation

On June 8, 2016, Liberty met with management to discuss progress on this recommendation. In conjunction with these conversations Liberty reviewed close-out documents provided by management, including:

- Design the Lead Data process and procedure improvements
- Orientation and training material on the new procedures

Discussions with management and examination of the documentation confirm that management completed the six key tasks for this recommendation.

Observed Conditions and Factors

Management must determine when it is appropriate to deliver refresher training on the proper completion of leak tickets.

Implementation Complete and Satisfactory?

Management has completed implementation of this recommendation.

Remaining Gaps, Needs

None

PGL Position

Management agrees with the closure of this recommendation.

Future Liberty Verification Activities

In early 2017, Liberty will obtain the year-end number of leaks on cathodically protected mains and services to verify successful implementation.

Final Liberty Verification Activities

We reviewed the corrosion-leak data management supplied, finding considerable numbers of corrosion leaks on cathodically protected mains, which indicated a problem. Management's explanation showed a significantly-lower number of leaks reported on cathodic protected mains than we observed. The reason was management's inclusion in the metric of leaks on fittings and some cast iron materials. Management agreed to perform the same analysis on the 2016 leak data, which we examined in early 2017. As in 2015, the number of actual corrosion leaks on cathodically protected mains was considerably less than the number of corrosion leaks reported (only 39 for 2016).

General Observations

Management has had problems with leak reporting in the past. Continued emphasis on proper leak-cause reporting may carryover, and improve other leak reporting issues.

D.1 – Developing a Clear AMRP Description and Quantities

As part of the new planning effort now underway, Peoples Gas should provide a clear and unambiguous description of the AMRP, including quantities for all parameters important to management of the project.

Part Two of this report addresses the requirements of effective plans. Such parameters include, at a minimum, all production quantities, labor hours and costs corresponding to production quantities, definition of “AMRP projects,” key milestones, details for support functions, and resource requirements and plans.

Underlying Conclusions

D.1 Current AMRP plans do not provide for sufficient program definition and the program has not been supported with sufficient assembly and analysis of performance information.

The AMRP should operate under a comprehensive and credible long-term plan that addresses all major components in a complete and consistent fashion. Liberty found that the AMRP does not have an integrated, up-to-date, sufficiently comprehensive program plan. Such a plan should clearly state critical assumptions. Liberty found critical planning assumptions neither well defined nor well documented. The kind of plan that the AMRP requires includes the provision of suitable contingencies for growth and other uncertainties. Liberty found no provision for contingencies or allowances to address the change and growth that are all but inevitable for a program of the AMRP’s scope, complexity, and duration. Program management does not address these matters on a long-term basis, but confines contingency use to annual planning, and even in that case, largely limited to contractor work.

The program management organization does not have detailed information about progress to date. Performance data is not consistent, fully reliable, or well-suited to the analysis that a program such as the AMRP requires. Past performance does not undergo rigorous and continual analysis to ensure optimization. Liberty has not found detailed, meaningful analysis of performance for the purpose of identifying improvement opportunities. Neither did Liberty’s field work disclose substantial documentation of corrective actions taken to address performance issues. Scope change typically has a significant impact on programs like the AMRP. There should exist clear documentation of the degree to which scope evolution has affected the program. Scope growth, particularly in terms of expanding project requirements has had an impact on the AMRP. That impact is not well-documented or quantified. The absence of data produces an inability of program management and senior leadership to isolate AMRP activities and costs from those of other work commonly managed with AMRP projects.

The following conclusions provide more detail regarding these general conclusions, and other areas material to the definition and status of the AMRP.

D.2 Peoples Gas has not sufficiently defined AMRP scope.

The AMRP represents a massive commitment by the Company. Its reporting, both internally and externally, must be crystal clear. At the present time, the nature of this commitment does not appear to be universally understood internally. Moreover, scope is often reported as mixed with other (e.g., QIP, but non-AMRP) projects. Senior Integrys executive management expressed to Liberty

the intent to establish a “world class” approach to AMRP management. Liberty considers that commitment as appropriate, if the Company is to optimize program performance. It certainly makes sense to apply such an approach to capital projects other than AMRP as well. Nevertheless, AMRP reporting cannot be confused with other projects. The commitments are substantial, and must be reported separately and clearly.

PGL Action Plan Steps

Item #	Task	Due Date
1	Develop RFP for consulting firm	Complete
2	Send out RFP	Complete
3	Review RFP / Select firm	Complete
4	Initial team meeting	Complete
5	Interview / Information Gathering	Complete
6	Draft Cost Model and Schedule deliverables due to Peoples Gas	Complete
7	Peoples Gas review of draft results and critique sent back to consultant	Complete
8	Final Cost Model and Schedule due to Peoples Gas	Complete
9	ICC report submission deadline	Complete
10	Define overall AMRP program scope and existing quantities	Complete
11	Generate year 1 schedule, cost, and forecast	Complete
12	Generate 2-, 5-, 10-, and 20 year preliminary schedule	Complete

This recommendation appears simple and straightforward, but encompasses more than just an administrative objective. It addresses a significant issue, given the AMRP’s safety implications. Liberty made this recommendation in response to confusion as to just what constituted various reported quantities. Various reports mixed AMRP and non-AMRP quantity and other measurements, making it unclear just what the data meant. The ensuing discussion of Recommendation N.4 illustrates the continuing nature of this mixing.

In order to manage a project, one must have a well-defined idea of that project’s dimensions. These become the standards against which progress and performance are measured. If the standards change, or if the way data is reported changes, it becomes impossible to measure progress or performance on a consistent and meaningful basis. That lack of a consistent baseline was the case at the time of the audit.

Preparation of a new AMRP estimate became a key initiative undertaken by new management. To be meaningful, such an estimate requires “a clear, unambiguous description of the AMRP, including quantities for all parameters important to management of the project.” Therefore, essential completion of implementing this recommendation logically precedes a new estimate (Recommendation D.6). Accordingly, management suggested, and Liberty agreed, that this recommendation would be closed with the issuance of the new estimate’s scope statement, which would presumably be prepared by the estimate’s author, Burns & McDonnell (B&M). When it was published, however, the new estimate did not contain anything termed as a “scope statement,” nor did it include content that could be deemed “a clear and unambiguous description.”

Management then prepared the following definition:

The accelerated main replacement program (“AMRP”) program is the replacement of materials prone to leakage, relocation of meters from inside customers’ facilities to outside or to a central, accessible location, when feasible, and upgrading the system from low pressure to medium pressure (“MP”), including the installation of high pressure (“HP”) facilities to support the upgrade. The planned quantities over the life of the program are:

Main Install – MP (miles)	3,073
Main Install – HP (miles)	42
Services Install (each)	323,803
Meters Install (each)	665,375
Main Retire (miles)	2,364

The quantities of the preceding table were not those included in the B&M report.

Expected Post-Implementation Conditions and Factors

One should expect quantities on a program such as the AMRP to evolve with time, which makes such changes understandable. Nevertheless, clearly and unambiguously describing the AMRP, its quantities, and all parameters remains important to managing the program.

Summary of Liberty’s Steps to Verify Implementation

On March 29, 2016 we met with the AMRP Project Director to discuss actions taken and review implementation progress. We reviewed close-out documents provided by management, including:

- AMRP Cost Estimate Model 2015
- AMRP Schedule Model 2015
- AMRP Program Estimate – 2016
- AMRP Program Schedule – 2016.

Observed Conditions and Factors

Management has a new estimate but, since that time, also has a new set of quantities. This begs the question as to the basis for the current estimate, which indicates continuation of the original uncertainties that led to the recommendation. The principal questions concern what the correct quantities are, what the correct estimate is, and whether the two are consistent. Management has not demonstrated concern about such issues, which permits ambiguities to continue.

For purposes of fulfilling this recommendation, the definition provided by management is simple and minimal but sufficient.

Implementation Complete and Satisfactory?

Yes.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

Management will update Liberty based on pending feedback from ICC Stakeholder Workshop Process at the end of September 2016, or as determined by the timing of the Commission’s Order in the docketed matter resulting from the workshop process.

Final Liberty Verification Activities

The Stakeholder Process has addressed changes to the scope of the initially designed AMRP. Replacing initial goals and definitions with a broader system-improvement initiative may remove clear, direct linkages to the old AMRP. One challenge will be to ensure that clear public safety goals, which formed the core justification for the original AMRP, do not become diluted. At the time of this report, SMP scope and timeline remained subject to a pending ICC final order that will presumably consider safety and overall goals.

The AMRP sought to eliminate leak-prone pipe within a defined timeframe. This commitment had already led to hundreds of millions of dollars of expenditures. Important issues for resolution include: (a) ensuring that the scope of the program remains clearly focused on removing the highest-risk pipe, (b) replacing a long-term timeframe with a series of short-term goals so that project progress can be measured, (c) providing clear, measurable goals for elimination of leak-prone pipe, and (d) considering similarly specific leak-reduction goals.

General Observations

None.

D.2 – Insightful Analysis of Performance

Peoples Gas should accompany regularly reported performance data with insightful analysis in order to make the data immediately meaningful to management oversight and supportive of timely and responsive improvement and corrective initiatives and activities.

Chapter O: Reports and Analysis addresses reporting requirements. For the present, this chapter has cited a number of examples of reporting gaps or weaknesses. Program management and executive oversight depend on candid and insightful reporting of performance. Managers and executives cannot provide effective oversight and instigate efforts to improve performance when they receive inadequate information. Those charged with management and oversight have no material use for meaningless data or information and analysis upon which they cannot act. What has become a long-term set of performance reporting issues needs to be corrected with communication.

Underlying Conclusions

D.1 Current AMRP plans do not provide for sufficient program definition and the program has not been supported with sufficient assembly and analysis of performance information.

The AMRP should operate under a comprehensive and credible long-term plan that addresses all major components in a complete and consistent fashion. Liberty found that the AMRP does not have an integrated, up-to-date, sufficiently comprehensive program plan. Such a plan should clearly state critical assumptions. Liberty found critical planning assumptions neither well defined nor well documented. The kind of plan that the AMRP requires includes the provision of suitable contingencies for growth and other uncertainties. Liberty found no provision for contingencies or allowances to address the change and growth that are all but inevitable for a program of the AMRP's scope, complexity, and duration. Program management does not address these matters on a long-term basis, but confines contingency use to annual planning, and even in that case, largely limited to contractor work.

The program management organization does not have detailed information about progress to date. Performance data is not consistent, fully reliable, or well-suited to the analysis that a program such as the AMRP requires. Past performance does not undergo rigorous and continual analysis to ensure optimization. Liberty has not found detailed, meaningful analysis of performance for the purpose of identifying improvement opportunities. Neither did Liberty's field work disclose substantial documentation of corrective actions taken to address performance issues. Scope change typically has a significant impact on programs like the AMRP. There should exist clear documentation of the degree to which scope evolution has affected the program. Scope growth, particularly in terms of expanding project requirements has had an impact on the AMRP. That impact is not well-documented or quantified. The absence of data produces an inability of program management and senior leadership to isolate AMRP activities and costs from those of other work commonly managed with AMRP projects.

D.3 The collection, maintenance, and presentation of AMRP performance data falls well below standard.

The quality of the data, after more than four years, does not serve a program of any substantial size, let alone a multi-billion-dollar super-project like the AMRP. Basic data remains fragmented, inconsistent, dated, and in some cases in error. Assembly of data sets often requires more than one source, with the result that anyone trying to analyze performance, whether internal or external to Peoples Gas, cannot be sure of the validity of the data.

Costs are not presented in a manner that facilitates analysis. Planned quantities, except in a few instances, are not presented nor compared to actuals. Labor data, perhaps the most important management parameter, is lacking. That lack substantially constrains management’s ability to gauge the potential impact of added resources. Productivity in most areas cannot be determined in helpful ways. Moreover, some critical data, including the retirement data cited by management as the most important measure, is in error, and has not undergone updating for two years.

PGL Action Plan Steps

Item #	Task	Status
1	Establish a cross-functional core team tasked to identify the scope of desired metrics, points of data collection, data management systems, and the individuals responsible for analytic evaluation.	Complete
2	Team issue a report on the above noted data elements, and recommendations for improvements or modification	Complete
3	Generate core performance reports.	Complete
4	Establish training requirements for staff.	Complete
5	Re-charter core team to identify the next level of analytics value. Include participants from WEC peer projects.	Complete
6	Team recommendations on improvements.	Complete
7	Implement improved reporting	In Progress
8	Perform internal and/or WEC peer to peer reporting and analysis audits.	In Progress

Management is upgrading data quality standards and metrics. The primary goal of these efforts is to use these metrics and standards to assess program effectiveness and efficiency. The critical function of data analysis is dependent on the establishment of these foundational elements. Key staff tasked with analysis and reporting functions will be sourced for their expertise and in some cases their skills developed through supplemental training provided either in-house or by external third parties. While these staff members have the primary role to analyze and report on data and related metrics, the entire team will be expected to be able to process, verify, and question data analytics results and trends. Taken together, these aspects of the proposed data-driven management approach will help management stay updated on program performance and be able to deploy corrective actions as necessary. Plans regarding specific roles, training curriculum, analysis criteria, and other elements of this ongoing effort are in the process of being developed.

Data-Driven Management

Management will improve the format, content, intelligent analytics, and therefore management value of reports. Going forward, management will make greater use of monthly and annual forecasting to more accurately predict, plan, and schedule work activities. Management recognizes that quality forecasting will improve timely and productive inflight corrective adjustments. This activity will take place in two phases. Phase I will focus on high value near term core analytics to maintain on-going activities. Phase II will be a second pass deeper dive into additional analytics and data evaluation that can further benefit the program. While this improvement plan is presented in terms of two discrete phases, in practice the new leadership team has been retooling reporting activities on an on-going basis.

Performance Metrics

Management agrees that it should upgrade AMRP performance metrics to include annual or cumulative progress versus the twenty-year long-term plan goals and metrics for the executive oversight group and the boards of PGL and WEC.³ Given the substantial length of the program, neither life of project nor short-term metrics can be successfully used in isolation. For example, evaluation of resources that the project will need over five or ten years would be a great fit with life of project profiles. This data may provide valuable insight to proactively project hiring and training needs. At the other extreme, short-cycle profiles of weekly or monthly overtime worked by each crew may be essential to assessing crew utilization and productivity, as well as supervisor coaching opportunities. Many other project management requirements can be met with weekly or monthly production or financial reporting. Management believes the improved data sets and reports containing core metrics are up and running, with the breadth of actionable insights growing month by month.

Below is a sample of the core metrics that will help guide the program. Depending on the internal audience and business need, the data may be consolidated or broken down by district office, contractor, neighborhood, or project manager. Furthermore, the data would routinely illustrate variances between the original budget values, monthly revised forecasts, and actual values.

- Miles of main installed
- Miles of main retired
- Number of meters installed
- Customer satisfaction ranking
- Leak rates
- Permit compliance metrics

³ Regrettably, this may not be the case. There is a clear trend towards a total near-term focus via rolling three year windows. While this can be an appropriate construction management approach, the intention to downplay any long-term public safety, cost and schedule goals is troubling. The Company appears to have stakeholder support for this short-term approach; hence, we have not withheld approval of associated recommendations, despite our conviction that the selected approach will prove ineffective.

- Work completion rates
- Aging reports on project close-out
- Restoration quality rankings
- Crew utilization and over-time values
- Crew / contractor metric on hits to third-party infrastructure
- Suite of safety metrics associated with observations, first-aid cases, and other OSHA values
- Engineering design quality metric
- Contractor change order metrics
- Crew / contractor quality and performance metrics

Management will use the metrics above to drive business decisions associated with many aspects of the capital construction program, including:

- Program progress, cost, and schedule reporting
- Safety reporting for individuals, shops, crews, and contractors
- Contractor performance and alignment with PGL goals
- Evaluation of project management, crew, and contractor performance
- Engineering quality, compliance with standards, and efficiency
- Performance compared to third party expectations
- Customer satisfaction with internal and contractor crews
- Root cause analyses
- Materials management and waste tracking
- Capital utilization efficiency
- Regulatory reporting

Management recognizes that a solid program to collect, store, manage, and utilize project data is essential to high quality project management. The Company will link the above data and metric methodologies with an engaged and supportive executive team to guide the AMRP.

Management understands that program management and executive oversight depend on candid and insightful reporting of performance, as stated in Liberty's report. Producing data without connecting the data to insightful observations substantially limits management's ability to effectively execute the program. To ensure that the reports are inclusive of the metrics needed to complete a useful evaluation of the metrics and data, a cross-functional team has been established consisting of the Vice President of Construction, the Directors of Construction and the Project Controls Manager.

Management, to enhance project reporting for the company, has tailored reporting to meet the needs of managers and staff and are intended to inform implementation teams and management of project progress and project issues. As a result of this focus for reporting, the management team has made greater use of weekly, monthly and yearly forecasting.

Training has been developed to ensure these reports are being utilized to their potential. The goal of this training is to provide participants with fresh ideas and the right tools to make better business decisions through analysis performed on available business data. The training will increase

analytical competency for PGL personnel, mainly targeting participants from construction and project management. The class builds on a solid mathematical background and helps participants to absorb tools and techniques to analyze data in a meaningful way.

For task items no. 5 through no. 8: the Capital Construction team is continuously seeking feedback on the format and content of the Capital Construction Reports. In addition to the internal discussions regarding these reports, management has most recently engaged members of its peer utilities to obtain relevant feedback from individuals who have a fresh and outside perspective informed by deep industry experience in managing large capital programs. Their review extended to areas of the reports such as the format, layout, content, and how effective they perceived the presentation of data to be, in the current version of these reports. The comments received thus far is summarized in the Reporting Peer-to-Peer Review and Comments Log. As feedback continues to be sought, the resulting comments will be logged and addressed as best fits the needs and context of the program at PGL.

With regard to program performance reporting and metrics, it is important to note that as part of an ongoing ICC Docket proceeding, Management expects an early 2017 ruling on the content and frequency of program performance reporting to the ICC. Management expects this Ruling to impact program reporting going forward. In addition to the reporting that we expect the ICC to require, management may also commit to other, more detailed reporting to respond to City information requests. Management will update Liberty as and when any changes are finalized.

Expected Post-Implementation Conditions and Factors

The development and deployment of a structured reporting mechanism will provide current, valid, and insightful data for timely and effective decision making. Improving the value of reported performance data will have near and long-term benefits for decisions that affect program success. Combining quality project reporting with active, engaged, and thoughtful oversight is critical and it provides the support the project execution team needs to be successful.

Summary of Liberty's Steps to Verify Implementation

On December 14, 2016, Liberty met with management to discuss actions taken and review implementation progress. Liberty reviewed the following close-out documents:

- PGL Analytics Training
- Reporting Peer-to-Peer Review and Comments Log
- PGL Capital Construction Projects Monthly Status Report – Month Ending March 2016
- PGL Capital Construction Projects Monthly Status Report with AMRP Focus – Month Ending March 2016

Subsequent to the December 14, 2016 meeting, management submitted the following documents for review:

- PGL Capital Construction Projects Monthly Status Report – Month Ending October 2016
- PGL Capital Construction Projects Monthly Status Report with AMRP Focus – Month Ending October 2016

Management considers the following deliverable as closeout components:

Development and implementation of Phase I and Phase II monthly / weekly reports that address safety, company performance, contractor performance, customer satisfaction, and financial performance which provide timely and insightful business management information.

Observed Conditions and Factors

As we have noted in our evaluation of other recommendation responses, the concept of insightful analysis is difficult to grasp and much more difficult to implement. Management's thinking has evolved considerably in this regard and we expect the results to be better than similar organizations. Although early responses to this recommendation tended to focus on data, the shift to analysis, as was the intent of the recommendation, is clearly being met. In this regard, the proposed training, scheduled for 1Q17, takes center stage. The initial plans are, to us, an excellent initiative that we have not seen elsewhere.

Implementation Complete and Satisfactory?

Yes. Liberty believes that the intent of Recommendation D.2 has been met and that management is well on the road to producing industry-best capabilities in performance analysis and improvement. As expected, this has been an evolutionary process, and it is now accelerating to fruition.

Remaining Gaps, Needs

The key element of management's plan is the training, which is scheduled for completion in the 1Q17. The planning material for the training program, and the personnel slated to be trained, make success a high probability.

Despite our belief that management is on the right track, we would be remiss in ignoring the problematic results achieved by the project so far. We refer specifically to the construction reports for October 2016, which show a questionable level of progress. Replacement quantities are running far below the sustained levels achieved by prior management. Most concerning is a safety record that should be viewed as unacceptable by every level of management. Yet we see little in the way of analysis of these major issues nor does there appear to be any meaningful response by management.

The message is clear: while the right process steps are being taken, this is not yet translating into results and management needs to be more aggressive in achieving results.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, Liberty will review the results of the training program as well as the ways in which the results of that training are being reflected in program management.

Final Liberty Verification Activities

On May 31, 2017, Liberty met with management, who demonstrated that it clearly understands and agrees with the intent of this recommendation, and continues to develop and improve its analysis capabilities. We noted in the close-out of Recommendation O.4 that the proposed training proved to be a major disappointment, not living up to the high expectations suggested by the specification for that program. Nevertheless, management remains on the right track and is progressing sufficiently.

General Observations

None.

D.4 – Detailed Resource Plan

Peoples Gas should prepare a soundly derived, detailed resource plan and provide for full coordination between the annual budget and resulting resource requirements.

The lack of a resource plan precludes effective spending plans and subsequent analysis of program schedules and performance. The gap was evidenced in 2014 when management sought contractor action to mitigate schedule delays, but did not have a sound basis to judge original contractor staffing plans and subsequent contractor staffing increases. The same problem existed with Peoples Gas engineering and crafts.

Underlying Conclusions

D.1 Current AMRP plans do not provide for sufficient program definition and the program has not been supported with sufficient assembly and analysis of performance information.

The AMRP should operate under a comprehensive and credible long-term plan that addresses all major components in a complete and consistent fashion. Liberty found that the AMRP does not have an integrated, up-to-date, sufficiently comprehensive program plan. Such a plan should clearly state critical assumptions. Liberty found critical planning assumptions neither well defined nor well documented. The kind of plan that the AMRP requires includes the provision of suitable contingencies for growth and other uncertainties. Liberty found no provision for contingencies or allowances to address the change and growth that are all but inevitable for a program of the AMRP's scope, complexity, and duration. Program management does not address these matters on a long-term basis, but confines contingency use to annual planning, and even in that case, largely limited to contractor work.

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D.7 Peoples Gas has not mustered sufficient resources to support the AMRP in the last two years, as evidenced by significant under-spending versus the annual budget.

The AMRP lacks the resource plan it needs for planning and performance assessment purposes. Absent the type of assessments such a plan would support, Liberty concluded that recurring under-spending against annual estimates and performance at the back-end of the process (e.g., meters and retirements) provide primary indicators that Peoples Gas has not applied sufficient resources to sustain progress at targeted levels.

At the present time, the only visible resource reporting comes in the form of a homogenized chart of all resources presented under the title of “jobs created” in the monthly progress report. We have never seen project resources described or presented in such a manner. Such reporting may serve other purposes, but it serves no evident program management purpose, particularly given its status as the only resource metric provided. Further, the AMRP has no plan against which one can compare actual staffing. Absent such comparisons, management cannot effectively determine whether the data presented is bad or good in terms of optimizing program performance.

PGL Action Plan Steps

Item #	Task	Status
1	Define organizational structure and fill key positions	Complete
2	Transition from Jacobs Engineering to internal and alternative third party resources	Complete
3	Assess current internal and third party AMRP resources	Complete
4	Evaluate long term staffing needs of the program	Complete
5	Establish Workforce Planning Department	Complete
6	Develop a Resource Plan and model	Complete

Management has taken the initial steps to prepare an AMRP resource plan by conducting several resource analyses of the areas of work force constraints. The first analysis completed was an overall work and productivity analysis. The second analysis completed was a workload analysis of the field workforce requirements of the AMRP for 2015 and 2016. Both of these work force analyses allowed management to model various options to solve for short term staffing needs for field resources, as well as to provide the data input for an integrated resource planning model.

Management has taken the steps noted below as part of the analysis and study activity to prepare the AMRP resource plan:

- Assessed Current Internal and Third Party AMRP Resources: Prior to the acquisition, Management was in the process of hiring a Workforce Planning Manager to help perform the analysis and strategy for the staffing of the project and management. Beginning from the closing day of the acquisition, new PGL leadership conducted sessions with all employees to introduce the team, review the corporate culture and the overarching goals of the organization, and interact with employees at the main office and shop locations. Subsequently, the Vice President of Construction began a process of participating in weekly construction meetings, reviewing organizational structure and job responsibilities of internal and external resources, reviewing construction reports, and evaluating alternatives and opportunities for improvement. Consistent with Liberty’s recommendations and WEC Energy Group Inc.’s historical practice of in-house management of capital projects, management determined that it should end the services arrangement with Jacobs Engineering and move management of the AMRP in-house.

PGL notified Jacobs Engineering in July of 2015 that the Company was ending the employment agreement with Jacobs. The separation was fully transitioned by October of 2015. During the transition period, PGL directly hired approximately 17% of the Jacobs’

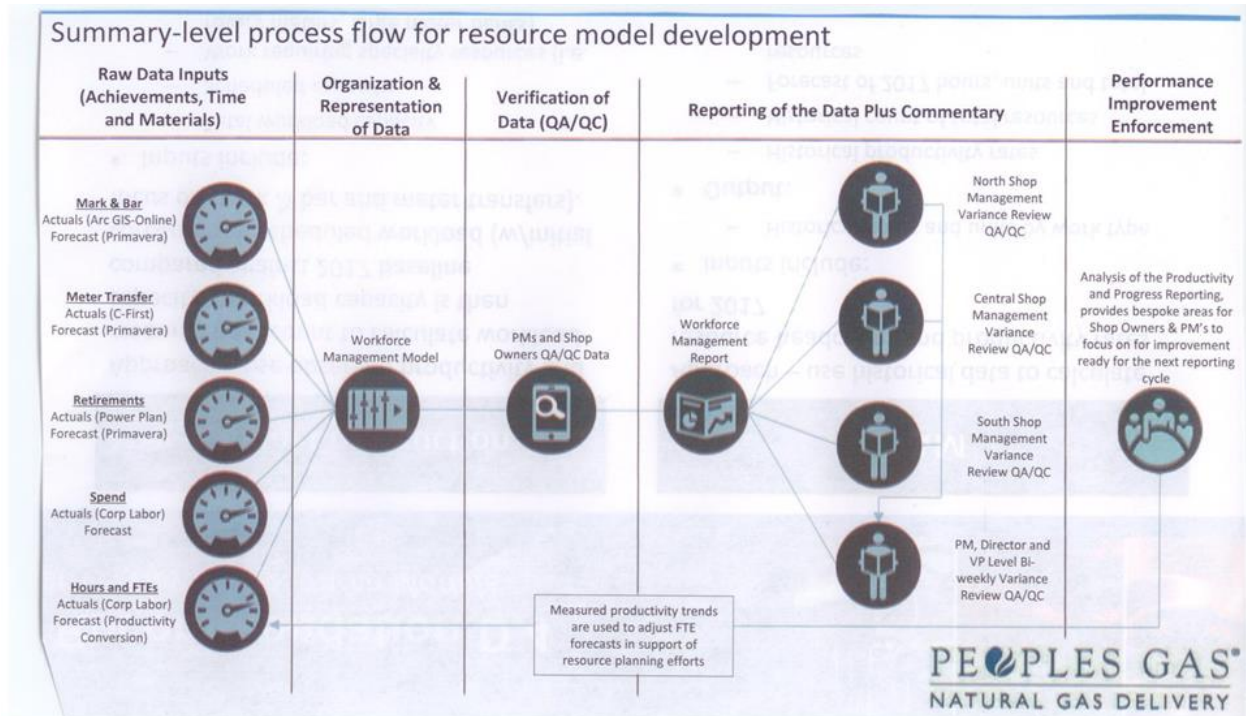
employees. Approximately 50% of the Jacobs' employees moved to another contracting firm and continued their work for PGL. The remainder of the Jacobs' staff was released from their duties. Retainage of some of the Jacobs' staff allows management the time necessary to identify and post positions, interview, and complete the hiring process. Over time, as staff is hired internally, existing contractors will be phased out.

- **Defined Organizational Structure and Recruited Key Positions:** The new Construction organization, of which AMRP will be a part going forward, is headed by the Vice President Construction with four directors reporting: Director Engineering, Director Construction, Project Director, and Director Contracting. Identifying resource needs, assessing the organizational gaps, and prioritizing the sequence of filling these positions were dependent on several factors. For example, positions where leadership gaps were identified, or the work force guidance provided by the role was critical, were addressed first. This led to selection of the directors of engineering, construction, contracts, and project management and controls.
- **Transitioned to in-house Program Management:** PGL management received input on individual Jacobs' team member performances, and prioritized their value to the project. Management made direct offers of employment to select high value Jacobs' employees. Management determined that having certain Jacobs' employees (e.g., inspectors) continue to support AMRP through other contractors would be appropriate. Management advertised remaining positions to which internal and external candidates can apply.

The second phase involved the directors and the Vice President of Construction developing prioritizations for all positions and assigning a phased ranking which corresponded to the waves of job postings and the filling of these positions. The selection process also recognized when capable, well-performing contract resources were in-place, so as to focus on other gaps and to re-evaluate those roles at a later date for consideration to bring inhouse. Management delayed the organizational assessment until leadership positions listed above were filled and the new leaders could effectively contribute to the organizational gap assessment.

- **Evaluated long term staffing needs of the program:** management evaluated the current state of resources post in-house management transition and modeled the long term (three to five-year) workforce needs of the program. The workforce model includes retirement impacts and retention rates. Management then developed appropriate staffing plans based on these evaluations and model outputs.

Management has secured the service of PricewaterhouseCoopers (PwC) to assist in developing tools for resource modeling under the direction of PGL. It was completed in the fourth quarter of 2016. The model is designed to balance all forecast work against internal and external resources. It also incorporates factors such as workforce age, years of service, retirements vs. availability of new recruits. The summary-level process operates as follows:



There are several main features within this model:

- The “Workforce Management Data Tree” (not shown) displays the data sources that feed into the bi-weekly workforce management model, which produces the workforce planning for Full Time Equivalents, Spend, Hours and Units completed.
- The “Workforce Management Lifecycle” depicts the resource planning processes involved surrounding the bi-weekly workforce management reporting, to assist the construction shops track their productivity and plan for the upcoming periods.



A dedicated resource plan for 2016 is in use. The 2016 plan provides resource analysis while still being developed to provide more detail to assess specific skills needed, training requirements, and contractor resources needed long term.

This model is maintained by the Work Planning Group, which has been formed to manage overall internal resources more effectively. The Manager of Workforce Planning is responsible for the overall development and management of PGL Gas Operations Workforce Planning. Responsibilities include the following: management of resources across the utility to ensure identification, prioritization, efficient and effective resource allocation, provide strategic and operational leadership for planning overall resource needs for the company, and function as the Gas Operations liaison to Human Resources stakeholders and service areas engaged in Gas Operations workforce implementation strategies and processes. The Workforce Planning Department is established, but not fully staffed.

Management expects periodic adjustments to the resource plan and model as well as adjustments to optimize organizational design.

Expected Post-Implementation Conditions and Factors

The development of an AMRP resource plan will facilitate resource planning and performance assessment activities. The Company seeks to align actual work and resource scheduling with the plans/budget, and improve performance at the back-end of the process, which include meters and retirements, by optimizing resource allocations to sustain progress at targeted levels.

The plan and model are intended to serve as tools to provide strategic direction and recommendations based upon model outputs and analysis. Furthermore, the plan and model will help minimize the risk of under or over staffing of resources by assessing and balancing needs going forward.

Summary of Liberty's Steps to Verify Implementation

On September 19, 2016, we met with management to provide an implementation status. The AMRP Project Manager indicated that management was having a difficult time filling the position of the Manager of the Workforce Planning Department. Management was in search of a qualified resource expert nationally. Two separate candidates turned down offers. Management will continue to try to fill this position aggressively. Management also had problems filling the manager's assistant position.

On March 20, 2017, management conducted for us a Resource Management Workshop on-site.

We discussed the following topics:

- Resource Model Overview – Capital Construction Work and O&M Work
- Process of Capital Construction Resource Model
- Uses of Capital Construction Resource Model output

On March 22, 2017, we met with management to discuss actions taken and review implementation progress. Liberty reviewed the following close-out documents:

- Job Profile of Manager of Workforce Planning
- Workforce Management Data Tree
- Workforce Management Lifecycle

Management will deem this recommendation complete when deliverables and applicable program management procedures and organizational elements for workforce model and resource planning

are approved and published, and all managers have been informed of their role in the process and management's expectations for their compliance.

The following are key deliverables for the development of the AMRP detailed resource plan:

- Organization Structure – Capital Program Delivery
- Resource Analysis & Workforce Constraints
- AMRP Internal & Third Party Resource Assessment
- AMRP Workforce Model & Resource Plan.

Observed Conditions and Factors

Management adopts different approaches to plan for capital construction and O&M work. Pertaining to AMRP is the capital construction version. Observed productivity and resource headcount is used to calculate workload capacity, which is then compared against the 2017 baseline construction scheduled workload, with initial focus on mark & bar and meter transfers. Inputs include total workload capacity, scheduled capacity and work requiring specialty resources. The parameters include productivity rates and specific resource requirements based on specialty workload. The output is the calculated amount of total resources to complete scheduled work. Calculated totals are compared against available resource totals to identify opportunities to balance available resources versus workload demands. The results are depicted in the Capital FTE Planning Dashboard. Progress and productivity reporting can be drilled down to the shop level for further analysis. It should be noted that the internal workforce availability feature is currently managed separately and not integrated in this Workforce Management Model yet.

Implementation Complete and Satisfactory?

Yes. During the discussions with management personnel, it appears that all essential features, such as workload forecast, workforce availability, initial and refresher training, anticipated retirement, historical retention rates, have been considered.

Remaining Gaps, Needs

Vacant positions in Workforce Planning organization need to be filled. Eventually, the model should also include contractor resources.

PGL Position

Management agrees that the recommendation is ready for close-out.

Future Liberty Verification Activities

Liberty will review the resource model and plan in the second quarter of 2017. We will validate that all the essential features are designed appropriately to support short-term projects as well as annual budget requirements.

Final Liberty Verification Activities

On May 31, 2017, Liberty met with management for a verification meeting. Management provided an overview of the Resource Model and the resource planning process. The Model is divided into a Capital Construction component and an O&M component. The approach to planning Capital Construction resources uses observed productivity and resource headcount to calculate workload

capacity, which management then compares against annual baseline construction scheduled workload, based mainly on quantity. The approach to planning O&M resources uses historical data to calculate resource headcounts and productivity rates for the year.

The process of resource planning based on productivity metrics was thoroughly explained. The resource model output of the West Humboldt Park neighborhood project was used to illustrate the short-term planning function, resulting in allocating appropriate added resources to the Central Shop. Each Shop maintains a daily construction roster that lists resource name, title, job types, and cost areas. The resource requirements are planned for the project lifecycle and offer consistent information for annual budget preparation. The Resource Model also supports long-term AMRP work based on attrition/retirement counts, ICC ruling, negotiations with the union, and training requirements.

Liberty considers the implementation of this recommendation verified.

General Observations

None.

D.6 – New AMRP Program Cost Estimate

Peoples Gas should promptly complete a new program cost estimate consistent with good estimating practices.

Chapter K: Cost Estimating discusses estimating requirements. The new estimate should include sufficient consideration of escalation and allowances for uncertainty and growth.

Underlying Conclusions

D.1 Current AMRP plans do not provide for sufficient program definition and the program has not been supported with sufficient assembly and analysis of performance information.

The AMRP should operate under a comprehensive and credible long-term plan that addresses all major components in a complete and consistent fashion. Liberty found that the AMRP does not have an integrated, up-to-date, sufficiently comprehensive program plan. Such a plan should clearly state critical assumptions. Liberty found critical planning assumptions neither well defined nor well documented. The kind of plan that the AMRP requires includes the provision of suitable contingencies for growth and other uncertainties. Liberty found no provision for contingencies or allowances to address the change and growth that are all but inevitable for a program of the AMRP’s scope, complexity, and duration. Program management does not address these matters on a long-term basis, but confines contingency use to annual planning, and even in that case, largely limited to contractor work.

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PGL Action Plan Steps

Item #	Task	Due Date
1	Develop RFP for consulting firm	Complete
2	Send out RFP	Complete
3	Review RFP / Select firm	Complete
4	Initial team meeting	Complete
5	Interview / Information Gathering	Complete
6	Draft Cost Model and Schedule deliverables due to Peoples Gas	Complete
7	Peoples Gas review draft results; send critique back to consultant	Complete
8	Final Cost Model and Schedule due to Peoples Gas	Complete
9	ICC report submission deadline	Complete

10	Define overall AMRP program scope and existing quantities	Complete
11	Generate year 1 schedule, cost, and forecast	Complete
12	Generate 2-, 5-, 10-, and 20 year preliminary schedule	Complete

PGL retained Burns & McDonnell to complete a new AMRP cost estimate. The old estimate had become completely ineffective well before the change in management. Conclusion D.9 of Liberty’s report discusses that issue. Discussions with old management and Jacobs, the author of the old estimate, made clear that the estimate was no longer meaningful, which management generally acknowledged.

B&M completed and PGL submitted the new estimate model and report to the ICC and made them available to stakeholders in November 2015. We understand it was presented to the Stakeholders in February. Liberty received a courtesy presentation and copy of the model’s output. Liberty’s goal is to monitor recommendation implementation, rather than to conduct a detailed review of the estimate model. We did, however, engage in fairly high level discussion with PGL and B&M, in order to assess whether the general dimensions of the work products appeared to conform to the type of estimate our recommendation encompassed.

Those discussions exposed a lack of consensus among PGL and the B&M team about one element of the new model’s output. That element had the effect of reducing the magnitude of the model’s output of estimated program costs. Discussions at that time appeared to indicate a large potential impact from this element – perhaps in the general range of \$1 billion. PGL and B&M agreed to resolve the questions raised.

Several weeks later, we received management’s “Close-Out Proposal” form for this Recommendation D.6. The form indicated that the recommendation requirements had been satisfied with the issuance of the B&M model. In a subsequent meeting with management, we stated that considering the model outputs sufficient to close out Recommendation D.6 would require resolution of the questions raised at the earlier meeting that included B&M. Management provided a new explanation for the estimate adjustment and further explained that the impact was a small fraction of the billion dollars discussed at that prior meeting.

Expected Post-Implementation Conditions and Factors

The final, explanation of the estimate model element in question concerns an assumption that total program schedule duration can be shortened due to improvements resulting from replacing some AMRP pipe (earlier than otherwise would occur in the planned sequence of work) necessary to coordinate with public project needs. In prior estimates, such work was assumed to displace and hence delay a corresponding quantity of planned AMRP work. Management now assumes that the originally planned work will also be done at the same time. This means that costs for the advanced work will face less escalation. The net impact reduces the project estimate by about \$200 million.

Summary of Liberty’s Steps to Verify Implementation

On March 29, 2016 we met with the Project Management & Controls Project Director to discuss actions taken and review implementation progress. We reviewed close-out documents provided by management, including:

- AMRP Cost Estimate Model 2015

- AMRP Schedule Model 2015
- AMRP Program Estimate – 2016
- AMRP Program Schedule – 2016.

Observed Conditions and Factors

We found management’s approach and actions sufficient, assuming that the model reflects how the program will be managed, but it is not clear that this is the case. For example, are the annual production quantities: (a) the original AMRP planned quantities only, or (b) do they include an assumed amount of advanced public improvement work? The concern is whether management has prepared an estimate on one basis, but plans to manage the program on another basis. As noted earlier, we have uncertainty about management’s sensitivity to such questions. Absent of clarity, uncertainty remains with respect to what specifically will be measured against firm, clear targets.

Such uncertainties risk complicating management’s monitoring and management of the program and reducing the clarity and usefulness of public reporting to the Commission and stakeholders. While we did not perform a detailed review estimate, the questions that arose during our limited discussions of the estimate model do give reason to question what more detailed assessment might reveal. However, the fundamental program uncertainties now being addressed by the Commission and stakeholders make such an expanded review premature at this time. Should certainty surrounding basic program parameters (*e.g.*, scope, pace of high-risk pipe elimination, the cost/value relationship, and total duration) arise in the few months, however, management, the Commission, and stakeholders will be best served by the establishment of firm, measurable targets, standards, estimates, and schedules that are consistent, fully understood by all, and subjected to clear reporting content and cycles.

Implementation Complete and Satisfactory?

Yes. The recommendation called for a new estimate and, although the process that eventually unfolded ran far from what we had anticipated, the end product has been produced. It is therefore appropriate to close this recommendation.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

We planned a management update based on pending feedback from ICC Stakeholder Workshop Process at the end of September 2016, or as determined by the timing of the Commission’s Order in the docketed matter resulting from the workshop process.

Final Liberty Verification Activities

The Stakeholder Process has addressed a move away from a single, long-term estimate of program costs in favor of short-term (presumably three-year) rolling spending plans. Such a move

recognizes that costs will not necessarily remain consistent year-to-year for the entire life of the project, but instead will vary based on the amount and type of work scheduled in each three-year cycle. While total long-term costs remain unknown under such an approach, management still needs to focus on the ability to achieve public safety goals, when and if reestablished, and the expected end-date for the overall program. Commission oversight, Company reporting on agreed metrics, and continued stakeholder involvement will be essential to maintaining control of this very large program in the absence of a total project cost estimate.

The objective of this recommendation was the new estimate that management committed to prepare, and that was satisfactorily done.

General Observations

None.

E.5 – New Program Management Specification

Peoples Gas should prepare a specification for a new program management function, correcting the weaknesses in the current process.

In designing a new program management organization and process, the following attributes should form a part of the specification:

- *High level, full time, on-site program management:* The large number of AMRP resources in Chicago demands that the program manager and the bulk of the Project Management Office be located there full time.
- *Unquestioned executive support,* whether a strong or weak approach applies: Whatever approach is adopted requires the unquestioned support of executive management.
- *Owner expertise:* To lead, at least guide, or at least actively participate in, all core functions. The level of owner participation can remain flexible, but what stands as critical is reinforcing the perception that the owner leads the effort, and has skills as strong as anyone else on the project. A mere figure-head or peripheral role will not work effectively.
- *Permanent, as opposed to transient, identity:* A project usually has a transient identity, reflecting its comparatively short life and the temporary nature of most positions. That transient identity places limits on the kind of people willing to work on the project and the kind and number of people that management will hire. However, at a duration of twenty years, the AMRP can hardly be viewed as “temporary.” Acting in accord with a belief that it is, produces a naturally weaker approach to staffing.
- *An integrated organization or not – no halfway:* Peoples Gas has taken a split approach to its role in the program management. Liberty recommends active participation and a strong leadership role for the owner. An integrated organization can accomplish this result. However, doing it halfway, with limited positions, limited owner skills, or limited owner authority, can prove worse than using an organization and a management role completely provided by a contractor. At least in that case, accountability remains clear.
- *Accountability for performance:* Accountability and the ability to enforce it at both the program management and functional levels is important. Accountability for performance will not alone prove sufficient for strong performance but it certainly is necessary.
- *Strong technical and analytical skills in management controls in the Project Management Office:* Strong technical and analytical skills on the part of controls personnel often comprise the greatest asset an executive oversight and program manager can have.

Peoples Gas should test its AMRP organization development plans and activities by providing candid and full answers to questions like:

- To what extent must AMRP compete or beg for resources?
- To what extent does the AMRP have to rely on part-time or non-dedicated resources?
- Are lines of accountability and authority clear?
- Is the owner clearly in charge?
- Is the owner fully involved?

Underlying Conclusions

E.6 The current approach and organization for program management produces too little authority and engagement by internal management resources.

Concern arises from the fact that Peoples Gas has managed the AMRP as a “project”; *i.e.*, treating the program as temporary and its people as engaged in transient assignments. A quality, dedicated workforce will become far easier to build, should Peoples Gas treat the program as it should; *i.e.*, as a massive, long term initiative.

PGL Action Plan Steps

Item #	Task	Due Date
1	Ensure inclusion of program management specification in the revised Capital Construction PEP.	Complete

Expected Post-Implementation Conditions and Factors

A clear and appropriate specification for program management and operation in accord with its requirements and expectations.

Summary of Liberty’s Steps to Verify Implementation

On March 29, 2016 Liberty met with the Project Management & Controls Project Director to discuss actions taken and review implementation progress. Liberty reviewed close-out documents including the current PGL Organization Chart and a draft Table of Contents for the revised Project Execution Plan (PEP).

Observed Conditions and Factors

The document provided by the Company in response to this recommendation lists five actions that Management believes improve upon past weaknesses in the project management function. As in our discussion of Recommendation E.4 above, Liberty agrees that these are positive steps. On that basis, we have closed this recommendation.

Implementation Complete and Satisfactory?

Yes.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that this recommendation has been implemented.

Future Liberty Verification Activities

We planned for management to provide a status update, including a discussion on the five actions taken to improve the program management process.

Final Liberty Verification Activities

On April 27, 2017, Liberty met with management. The Vice President of Construction gave an update on the five major actions taken to improve the Project Management Process:

- High-level, full-time, on-site program management
- Unquestioned executive support
- Owner expertise
- An integrated organization
- Accountability for performance.

He observed that program management specification details lie implicit in the development of the revised Project Execution Plan (PEP). This Plan is a living document, linked to all the newly approved procedures in various sections. Our work confirmed sustained implementation of this recommendation.

General Observations

The connection between this recommendation and Recommendation E.4 means that developments with respect to the latter's implementation could affect actions with respect to this one.

F.2 – Soils Database

Peoples Gas should develop a database of the soils data already collected and populate it further with soils data taken at all new excavations.

The development of a soil database should serve, when reasonably populated, as a factor in determining replacement priorities, particularly for highest-priority segments identified through the Main Ranking Index. When data population reaches a level supporting defensible correlations between soil conditions and risk, Peoples Gas should determine whether and how to turn the data into a quantifiable ranking factor, or alternatively, how to apply it judgmentally in driving replacement priorities.

Underlying Conclusions

F.4 *Not including soils data in risk modeling fails to address a factor material to failure risk.*

Peoples Gas recognizes that the development of a soil database could serve, when populated with a reasonable sample size, as a factor in determining replacement priorities, particularly for highest-priority segments identified through the Main Ranking Index. Peoples Gas has accepted this recommendation and intends to develop and implement a plan to take soil samples associated with corrosion-related system repairs to look for geographic trends and potentially use for system risk management and replacement prioritization.

PGL Action Plan Steps

Initially, management misunderstood this recommendation, believing it to require additional excavations. Liberty did not intend additional excavations. Based upon discussions with Liberty, management agreed to implement the recommendation as follows:

- Take soil samples associated with repairs for leaks caused by corrosion; include soil resistivity and ph.
- Collect the soil data and annually conduct geographic analysis of soil readings compared to leaks caused by corrosion.
- Seek to identify any geographic trends in the data.
- Identify any models developed by other urban gas utilities with similar systems.

Item	Task	Due Date	Revised Date
1	Director, Gas Operations Planning, to form Soils Database implementation team	11/30/15	Complete
2	Define objectives and requirements for the Soils Database process and research other utilities' work on soils analysis	11/30/15	Complete
3	Design the Soil Database development and analysis process	12/31/15	Complete
4	Prepare Soil Database procedures	12/31/15	Complete
5	Approve and publish Soils Database procedure	12/31/15	Complete
6	Provide Soils Database orientation and training to effected personnel	12/31/15	Complete
7	Roll out Soils Database	12/31/15	Complete
8	Perform GIS Analysis of collected Soil Data	12/31/15	Complete
9	Document completion of the recommendation implementation	12/31/15	Complete
10	Perform annual GIS Analysis of collected Soil Data (to be conducted by 12/31 in future calendar years)	12/31/16	On Going
11	Database review and analysis (annually)	12/31/16	On Going

The first 9 of the 11 proposed subtasks concern base implementation and the remaining two are ongoing implementation tasks. Management completed the nine by the end of the first quarter 2016. These subtasks included establishing a database of existing soils information from records of previously performed leak or main repairs or replacements (including defining the information needed), reach out to other similar utilities to determine if they have soil databases and how they are used, prepare procedure for the newly developed soils database process, analyze the soils data via GIS, and continue to gather soils information from new repairs or replacement of mains and services.

Expected Post-Implementation Conditions and Factors

The soils data base may assist management in locating hot spots or areas that should have a higher priority in the neighborhood main replacement model.

Summary of Liberty’s Steps to Verify Implementation

Liberty examined written documentation demonstrating the completion and rollout of the database and procedures.

Observed Conditions and Factors

Liberty confirmed that the database is in operation and supported by procedures regarding its use for analysis.

Implementation Complete and Satisfactory?

Yes.

Remaining Gaps, Needs

None

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

At year-end 2016, we plan to verify that the GIS has been populated with the prior year’s soils data.

Final Liberty Verification Activities

Liberty recommended that management continue to evaluate its ability to use soils data to identify areas more prone to leaks and other threats. Management did not agree, but proposed to plot soil data obtained from openings on a leak map to assess possible correlations between soils and leaks. Management’s plots of data obtained during leak excavations again found no correlation, as has been true in the past.

General Observations

None

F.3 – Alternative Risk Ranking Criteria and Weightings

Peoples Gas should conduct a structured study of alternative criteria and weightings for the Main Ranking Index and for the neighborhood approach.

It is time for Peoples Gas to engage in a structured, comprehensive, and analytically-driven review of other weighting, parameters, and additional inputs to its Main Ranking Index and its neighborhood rankings. For example, the repair rates for pre- and post-1920 cast iron are equalizing. Eliminating that distinction and giving greater emphasis to small-diameter cast iron mains may prove warranted. The Company also needs to address the bias that its zonal approach creates in favor of larger neighborhoods. Normalizing the lengths of small-diameter cast iron may prove beneficial. Another element of the review should be to consider leak history, as opposed to open leaks alone.

Underlying Conclusions

F.5 Despite the improvements that replacement has brought, the failure to achieve a decrease in leaks raises questions about effectiveness in identifying the highest-risk pipe and slating it for replacement.

The failure of leaks to trend significantly downward for a number of years calls into question the process used to select highest-risk mains. After so many miles of main replacement, one would anticipate a large reduction in leaks. The data simply do not show such reductions. Even after considering Company adjustments for third-party damage leaks and normalizing for degree days, Peoples Gas has experienced only a nominal reduction in hazardous or potentially hazardous leaks (Grade/Type 1 & 2) over the last several years. Several outside consultants have concluded that the Company measures the correct parameters. That conclusion points to the weightings being used in the models that drive replacement as a subject for evaluation. The Main Ranking Index model weightings have not changed over a number of years.

The neighborhood ranking calculation significantly weights the amount of small diameter and pre-1920 pipe in each neighborhood. It thus tends to favor larger over smaller neighborhoods, with all else being equal. The combined amount of small diameter and pre-1920 pipe comprises a full 40 percent of the neighborhood risk ranking. This emphasis causes the initial selections for work in each shop area (in the first five-year program increment) to consist primarily of the largest neighborhoods in each shop area. The selected areas also include those neighborhoods that have not had many replacements, because the miles of pre-1920 small diameter main remaining is the largest driver on the ranking scheme. Medium pressure ductile iron mains get the next-largest weighting. Meanwhile, unrepaired leaks and inside meters contribute the least to neighborhood risk rankings. Neighborhoods with the highest leak rates may fail selection for the first five-year window simply because they are physically small, do not contain a large percentage of pre- 1920 cast iron mains, or do not have much small diameter main.

Leak rates fell in the early years of cast and ductile iron replacement. The pace of reductions were consistent with a conclusion that considerable reduction in risk was occurring. A downward trend continued following the introduction of the Main Ranking Index in the mid-1990s. The risk reduction line has now flattened (or slightly increased), even as more leak prone and higher risk segments undergo replacement.

The current risk models continue to target what certainly used to comprise the highest risk segments; *i.e.*, small diameter pre-1920 cast iron segments (due to their highest break potential). The once considerable amounts of such pipe, especially the smallest diameters, however, have fallen considerably, as replacement programs have continued to target them. A going-forward replacement rate of over 100 miles per year will continue their rapid elimination. However, the reduction in risk that each mile replaced from here forward will produce will continue to diminish, if one makes the logical assumption that the remaining segments pose less failure risk than those already replaced.

Cast and ductile iron remain at far greater risk of failure than do modern materials, such as plastic and cathodically-protected steel. At the same time, elimination of the most risky cast iron and ductile iron segments reduces their risk relative to other system components. Note that the number of mains scoring near 6 under the Main Ranking Index continues to decrease. That number currently consists of less than 20 segments and less than 1 mile of mains. Between 2003 and 2013, the number of miles of small-diameter (8" and less) cast iron main decreased from 1,323 miles to 1,032 miles (22 percent in 11 years). The next table (from PHMSA yearly reports) shows the miles of cast iron remaining in the distribution system at year-end.

F.6 The weight given to pre-1920 main may no longer support greatest risk reduction per mile replaced.

Leak rates for pre-1920 cast iron mains decreased steadily and substantially from 1995 through 1999. By contrast, those rates have remained essentially flat during from 2010 through 2013. Hazardous leaks (Type 1) have increased, but declines in non-hazardous leaks (Type 3) have essentially offset the increase.

A number of factors complicate reaching definite conclusions about causes of leak-rate changes in the past ten years or so. The number of miles replaced in more recent years decreased, with uncertainty about rate recovery. Most recently, the extreme cold of the 2013/2014 winter brought increased frost-cracking potential for brittle cast iron mains. Peoples Gas still replaces segments having a Main Ranking Index ranking of 6 or greater (and 5 for certain conditions). The rankings that drive neighborhood work tend to emphasize small mains installed prior to 1920, because they are the most leak-prone.

Peoples Gas last commissioned a focused review of its risk-ranking effectiveness in 2007. The outside firm conducting the review observed continuing leak reductions, and discussed the merits of examining a date of 2038 or later for replacement completion. A fundamental premise of the finding of effectiveness at that time has no longer applied for a number of years. Liberty believes it is time to re-examine the weightings used to rank risk. In particular, the Company should consider the weight that small-diameter, pre-1920 cast iron mains should receive.

Pre-1920 and post-1920 main repair rates are approaching each other. Targeting pre-1920 cast iron main for replacement may not be yielding the largest reduction in leak rates. Rather, leak history in a neighborhood may offer a prioritization criterion for main replacement neighborhoods. Normalizing leaks, both repaired and open, per the number of feet or miles of main to be replaced in each neighborhood would also tend to produce the greatest reduction in risk per foot replaced.

PGL Action Plan Steps

Item	Task	Due Date	Revised Date
1	Define objectives and requirements for the Prioritization Model improvement process	11/30/15	Complete
2	Analysis of Data	11/30/15	Complete
3	Prepare revised Prioritization Model and Neighborhood Approach	12/31/15	Complete
4	Approve and issue process and procedures for Prioritization Model and Neighborhood Approach	12/31/15	Complete

Management also now includes the UMRI, a risk ranking method it has used on individual segments for a number of years.

Management indicated plans to run the new neighborhood risk ranking system every year, with the 2015 results being used to determine which neighborhoods will undergo replacement in 2016. Every 2 years the criteria and ranking will be evaluated for effectiveness (see Recommendation F.5 for additional input on these metrics).

Expected Post-Implementation Conditions and Factors

The neighborhoods that are at the highest risk should be prioritized for main replacement, regardless of size, because the new model normalizes the risk ranking for size.

AMRP Neighborhoods Plan

As of: 12/2015

2015 Construction			2016 Construction			2017 Construction			Future* (In Design)		
Neighborhood	Original Rank	New Rank	Neighborhood	Original Rank	New Rank	Neighborhood	Original Rank	New Rank	Neighborhood	Original Rank	New Rank
Portage Park (Remaining Work)	1	23	Portage Park (Remaining Work)	1	23	Albany Park	4	13	W. Morgan Park	73	2
South Austin	2	154	South Austin (Remaining Work)	2	154				W. Beverly	76	3
South Shore (Remaining Work)	3	144	South Shore (Remaining Work)	3	144				Mayfair	30	4
Beverly	7	66	Beverly (Remaining Work)	7	66				Bowmanville	58	6
									Morgan Park (WOF)	15	10
									Cragin	45	12
									W. Humboldt Park	82	15
									Stony Island Park	59	17
									Magnolia Glen	152	18
									Schorsch Village	37	19
									Avalon Park	55	20
									Norwood Park East	106	22
									Marynook	107	49

The following neighborhoods were in various stages of the design phase prior to the updated Neighborhood Ranking Model and were not cancelled:

- South Shore
- Portage Park
- South Austin
- Beverly
- Albany Park

* Future neighborhoods will be ready for construction by the Construction Date provided by the Planning Group

The following neighborhoods had started the drawing creation stage of design prior to the updated Neighborhood Ranking Model and were subsequently canceled.

- Brighton Park
- Jefferson Park
- South Chicago

Original Rank	New Rank
13	88
8	51
6	46

Summary of Liberty's Steps to Verify Implementation

Liberty discussed the new methods with management and reviewed the specific changes proposed. Liberty also compared neighborhood scorings under the old and new methods.

Observed Conditions and Factors

Liberty confirmed that the new MRI uses normalized metrics, so that large neighborhoods are not over-weighted when compared with smaller, but higher risk neighborhoods. Also, since much of the leak prone pre-1920 mains have been replaced, the weighting of this component has to be changed.

Implementation Complete and Satisfactory?

Implementation is satisfactory and the original replacement plan for 2017 has been changed based on the new priorities from the model. Liberty considers this recommendation implemented.

Remaining Gaps, Needs

Ongoing implementation should include three actions, which Liberty will monitor as part of our continuing work:

- Include the date the risk ranking will be finalized for incorporation into the next replacement cycle, the timeframes for performing engineering on the results of the risk ranking, and the timeframes for when construction will begin in those selected neighborhoods.
- Identify the amount of holdover construction from the previous model for the 2016 construction season.
- Identify a specific date to evaluate the effectiveness of the new model, before the criteria of the model is changed using metrics from Recommendation F.5 plus other input.

PGL Position

Management agrees that the old model was weighted to larger neighborhoods.

Future Liberty Verification Activities

We planned to review the new model's application and actions on the three added steps identified above as part of continuing implementation monitoring.

Final Liberty Verification Activities

This recommendation was implemented and no validation/verification is necessary. Previously-planned verification activities were not necessary.

General Observations

The time to institute a change in priority is determined by the time to complete engineering. Therefore, a significant time lag exists between model change and actual construction.

F.5 – Risk Metrics

Peoples Gas should determine on system, segment, and neighborhood bases the level of acceptable risk and metrics that will support appropriate adjustments in replacement rates.

Peoples Gas needs to develop a set of forward-looking metrics that will predict changes in risk level with replacement. Doing so will allow it to adjust replacement rates to meet future increases and decreases in the risk level. Peoples Gas should determine an acceptable risk level for each segment and neighborhood, and use that level to design a plan and schedule of main replacements to reach it.

Peoples Gas has not determined an acceptable level of risk for the general public, its customers and individuals working on the gas system. This tolerable level of risk needs to be determined so that both main-replacement risk models can be operated to reach the desired level. The acceptable level will not be static, but will change year to year, based on the mains already replaced, the activity of the prior year, and the continuing aging of mains not yet replaced.

Underlying Conclusions

F.7 Peoples Gas does not employ a meaningful metric that can directly relate costs expended to risk mitigation accomplished; Liberty continues to work with the Company to determine one.

Liberty examined the potential for identifying a metric that could directly and simply address effectiveness in identifying: (a) the right mains and services to replace, and (b) cost-effectiveness of replacements in relation to that identification. Such a metric would measure cost-effectiveness in terms of success in risk mitigation produced. Peoples Gas does not use such a metric. The recommendation implementation monitoring process that will follow this report should include efforts to develop such a metric.

A primary difficulty in defining a meaningful metric arises from the time lag between installation of new mains and retirement of the mains being replaced. Lags approaching one year can occur. For example, before retiring the old main, Peoples Gas must move all customers to a new, higher-pressure main. Thus, delays in locating and installing a few - perhaps even one - new meters delays retirement. The accounting process also delays recording retirements already physically accomplished. Updating property and tax records produces discontinuity in measuring the effects of replacement work.

PGL Action Plan Steps

This recommendation now contains 5 tasks all of which should have been completed by the end of the third quarter of 2016.

Item #	Task	Due Date	Revised Date
1	Define metrics to be monitored		Complete
2	Documentation of the metrics		Complete
3	Approve and issue process procedure		Complete

4	Provide Risk Level and Metrics Procedures orientation and training to project personnel		Complete
5	Document completion of the recommendation implementation		Complete

Expected Post-Implementation Conditions and Factors

Management should be replacing the highest risk mains and services and thus the overall risk factors should be reduced and improvements via reduction in leaks, incidents and other factors should occur.

Summary of Liberty’s Steps to Verify Implementation

Liberty worked with management to develop the proposed risk metrics. Management has slightly modified what Liberty proposed.

Observed Conditions and Factors

Liberty had previously suggested that the neighborhood risk model be modified, which management did, thus making changes in risk measurable as the new model takes effect. Changes in the model take several years to implement (due to the need to re-engineer the mains being replaced). The effects of a change in the model in one year will therefore not become apparent for at least two years. Checking and possibly modifying the risk model needs to remain an on-going process, because, as the highest risk mains are replaced, lower risk mains will remain and their conditions may change over time.

Management established the Risk Level and Metrics procedures in September 2016. These metrics have been designed, and full implementation will occur at year-end when all 2016 data is in hand. Orientation and training has already begun.

Implementation Complete and Satisfactory?

Yes, this recommendation is a long-term recommendation and as such needs to be continually evaluated and checked. In the future, as additional higher risk mains and services are replaced, there may need to be some modification of the risk metrics being measured. Management needs to continue to evaluate the current neighborhood model on a yearly basis and determine if there needs to be change in either risk metrics being measured or the model itself, to reduce risk as fast as possible.

Remaining Gaps, Needs

None

PGL Position

Management agrees with the closure of this recommendation.

Future Liberty Verification Activities

The Risk Level and Metrics Procedures of Step 4 have been designed. Full implementation will come when all 2016 data becomes available. We will confirm implementation at that point.

Final Liberty Verification Activities

We observed that management developed metrics to normalize the risk data for neighborhoods and to account for main and service replacements under the AMRP and other programs. The metrics generated from 2016 data should be reviewed by management to determine if another main replacement model adjustment (see recommendation F.3) is necessary to improve the risk reduction in the future.

General Observations

Liberty and management have worked together to develop some acceptable metrics to determine if the current weighting and parameters being used to prioritize neighborhoods are maximizing risk reduction for the dollars spent. Below are the ‘new’ metrics that management will use to determine if the risk model needs further refining.

Metrics:

1. Company overall average leak rate (both replaced and to be replaced mains, LPP [leak prone pipe]) using current leaks
2. Company overall average leak rate using only LPP pipe and current leaks
3. Neighborhood average leak rate using only remaining LPP and current leaks
4. Normalized neighborhood historic average leak rate using leaks on LPP for the past two years, on a rolling basis (normalized for weather, incorporating all class two leaks except third party damage).

F.6 – O&M Cost Model

Peoples Gas should develop a cost model that addresses O&M costs associated with AMRP and related work.

This model needs to permit detailed forecasting, estimating, and analysis of operations and maintenance cost changes occurring as a function of investments made to replace main under the Main Ranking Index, and of investments made to serve the purposes of the neighborhood approach.

Underlying Conclusions

F.9 Peoples Gas does not have a reliable method for identifying the operating and maintenance costs associated with AMRP, pressure increase, or meter relocation work.

Peoples Gas has confirmed that it does not have current data or analysis addressing operations and maintenance cost changes as a function of investment in work covered by the Qualifying Infrastructure Plant Surcharge. Peoples Gas has agreed to the development of a cost model that will incorporate this capability.

PGL Action Plan Steps

1	Form cross-functional team from Operations and Project Controls	Complete
2	Review and compare original model vs. current state	Complete
3	Develop criteria and cost components	Complete
4	Develop O&M Model	Complete
5	Documents process and roll out of model	Complete

As part of the original program development, a cost model was created in 2009 to quantify the impact of the program on operations and maintenance of the gas distribution system at Peoples Gas. In 2016 Peoples Gas had a team of cross functional employees reassess the original cost model and incorporated lessons learned to-date into a new version of the cost model. The evaluation found that the original categories in the 2009 version included categories for vaults and regulator stations; the team in the review found that the impacts were very minor and that the impacts due to valves and corrosion had a greater impact. The team also wanted to include poor supply impacts due to the cost and impact on customers. These changes were incorporated into the model.

The new model includes those costs directly attributed to the replacement of the cast and ductile iron low pressure system. The costs were broken into 10 different work types and several sub-types.

The 10 work types are:

1. Leak Survey
2. Leak Repairs/Rechecks

3. Inside Safety Inspections
4. Emergency Response
5. Valve Inspections
6. Valve Remediation
7. Corrosion Inspection
8. Corrosion Remediation
9. Lost Gas
10. Poor Supply

The model addresses cost and labor impacts. Some attributes yield cost savings, such as fewer required Inside Safety Inspections (ISI), and others lead to cost increases in areas such as valve inspections.

Management will review the model annually to address any new impacts that need to be incorporated into the model. The forecasted changes in work load are also used in modeling labor impacts for workforce planning.

This model is maintained by the Distribution Planning department, and all training has been completed as part of the development of the model.

Expected Post-Implementation Conditions and Factors

The new cost and schedule models will be a critical component of the Integrated Project Controls (IPC) program management approach for AMRP. The new cost model is intended to update comprehensive measurement bases and critical assumptions regarding scope, quantities, productivity, labor costs, unit costs, and regulatory requirements. In addition, the new cost model will include updated O&M costing assumptions, parameters, and inputs that will be used to recalibrate predicted O&M cost decreases from the 2009 O&M model, resulting primarily from systems improvements such as reduced leaks, reduced inspections and reduced lost gas. Furthermore, the new cost model will improve cost escalation estimation methodologies as well as improve determination of program allowances for future AMRP growth or uncertainty at the project and program level. The new cost model coupled with the IPC enhanced cost management approach will facilitate ongoing projections of final AMRP costs with a high degree of confidence, addressing the material levels of uncertainty associated with the program.

Summary of Liberty's Steps to Verify Implementation

On March 22, 2017, we met with management to discuss actions taken and review implementation progress. Liberty reviewed the following close-out documents:

- O&M Cost Savings Model including the bases and calculations of the major components
- Management considers the following deliverable as closeout components:
- AMRP Cost Savings Model

Observed Conditions and Factors

The O&M Cost Savings Model shows the final cost impact on an annual basis upon completion of the AMRP project. From the summary table, the net annual decrease is calculated to be 208,000 work hours. Assuming a wage rate of \$60/work-hour, the net annual cost savings amounts to \$12.5

million. Some tasks, such as leak survey for mains, distribution valve inspections, permitted and non-permitted distribution valve remediation, gas ops valve inspections, etc., will actually increase by about \$1.4 million. This will be offset by a reduction of \$13.9 million by the following work tasks: leak repairs, leak rechecks, in-service inspections, emergency responses, poor supplies, corrosion service inspections, corrosion main inspections, corrosion service work and corrosion main work. This annual impact during the implementation of the project is dependent upon the rates of the work types, material replaced, and percentage of meters relocated.

Implementation Complete and Satisfactory?

Yes. Liberty acknowledges that the structure and methodology behind this version of Cost Savings Model is sound and logical. With better historical data and close monitoring, this tool can provide valuable information for effective cost management and resource planning.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

None. This model will be updated on an annual basis.

Final Liberty Verification Activities

On May 31, 2017, Liberty met with management, determining that we could not verify this recommendation, because the next update is scheduled for 2018.

General Observations

None.

G.1 – Cost Plan and Model

Peoples Gas should develop a new Cost Plan Model that includes comprehensive measurement bases and critical assumptions regarding scope, quantities, productivity, labor costs, unit costs, and regulatory requirements; a reserve should be included as part of the overall program costs.

A first deliverable of this Model will be the new Total Cost Estimate. For Peoples Gas to be able to project final AMRP costs on a continuous basis, it has to establish a new capability to estimate on an almost real-time basis the total program costs. Liberty understands that a new AMRP cost forecasting model will be developed by the Planning and Forecasting Manager. Features important to consider in development of that model include a number of elements that will assist in making the cost plan a sound, comprehensive baseline for continually measuring performance.

Key parameters to measure at the program level include:

- Cost Metrics (input related)
 - Program-to-date costs by year expended
 - Potential cost impacts from Cost Trend Program
- Production Metrics (output related)
 - Program-to-date miles of main installed
 - Program-to-date miles of main retired
 - Program-to-date services installed
 - Program-to-date meters moved/installed
 - Program-to-date pressure regulator stations installed
- Productivity Metrics (output versus input)
 - Average cost per mile installed
 - Average cost per mile retired
 - Average cost per service installed
 - Average cost per meter moved
 - Average cost per pressure regulator station installed.

A comprehensive cost plan should incorporate the following elements:

- Effective cost control tools
- Specifically defined tools for each key element of the AMRP project costs
- Ability to promptly identify and respond to cost issues during the course of each project, facilitating corrective action and providing meaningful and timely forecasts
- Agreement among the team on the structure and viability of the tools and resulting reports
- Understanding by the managers regarding the tools and commitment to their use
- Ability to document that AMRP project costs were prudently managed during the life of the program.

Such a plan should take the following approach:

- Senior Management communicates cost management expectations
- Responsible manager assists in developing the cost element plan
- The cost element plan is evaluated
- Performance is measured by compliance with the cost management plan.

The plan should seek to establish:

- Accountabilities for specific cost elements
- Tools to be utilized, including how and when
- The tasks required of the manager, cost analysts, and others
- Data and reports, including when prepared and to whom distributed
- Analytical expectations
- Corrective action responsibilities.

Other guidelines for developing the cost plan include:

- The plan should identify tasks that represent a disproportionate cost risk or otherwise require special treatment (this identification should include tasks that have a relatively high work-hour budget)
- An assigned cost analyst should prepare the cost element plan with input received from all involved managers
- The cost element plan should undergo review and approval by AMRP project manager before its inception
- The cost element structure should be simple, and consist of one to two pages.

Important features of the cost element structure include:

- Breaking the AMRP down into specifically identified cost elements
- Structuring the elements in accordance with their control characteristics
- Elements that might include engineering, planning and support functions, materials, mains, services, meters and regulators, other construction items, such as intra-stations, city gate stations, and pressure regulator stations, for example
- A total population of 8-12 elements, of various size and importance
- Element features that define the following:
- A cost estimate, including its basis and assumptions
 - The manager responsible for the costs associated with the element
 - A cost engineer or cost analyst assigned to track and analyze its associated costs
 - Its control category based on its controllability and the sophistication of control demanded:

A = High importance – maximum control activities

B = Either less important or less controllable, but still significant and some degree of special attention is appropriate

C = Inconsequential – hence ignore.

The plan should also include a Cost Element Database having the following characteristics:

- The cost element database serves as the repository for all of cost element information
- The database structure supports collection of cost estimates and documentation of changes to them
- The sum of the cost elements at any point in time produces the “defined cost.”

Each element falling into Category A or B elements (as described immediately above) requires a cost management plan with the following characteristics:

- The plan can be anywhere from one to a few pages, and may include supporting attachments.
- It defines the specific actions that will be taken to manage costs.
- It is both a tutorial and a procedure.
- It is likely to include key metrics and specifically what is to be done with them, required reports by contractors and others, a requirement for monthly analysis by the cost engineer, specific actions required of the manager, and update requirements for the model.
- Plans should be maintained and updated in a cost management manual.

One suggested approach for the AMRP would develop Individual Cost Management Plans to focus on the major cost elements:

- Main Installation
- Service Installation
- Meter Installation
- Other Construction Items
- Engineering
- All Other Support Groups
- Materials.

These major cost elements focus on cost issues common to all projects or phases of a project, producing a template like that shown in the next illustration.

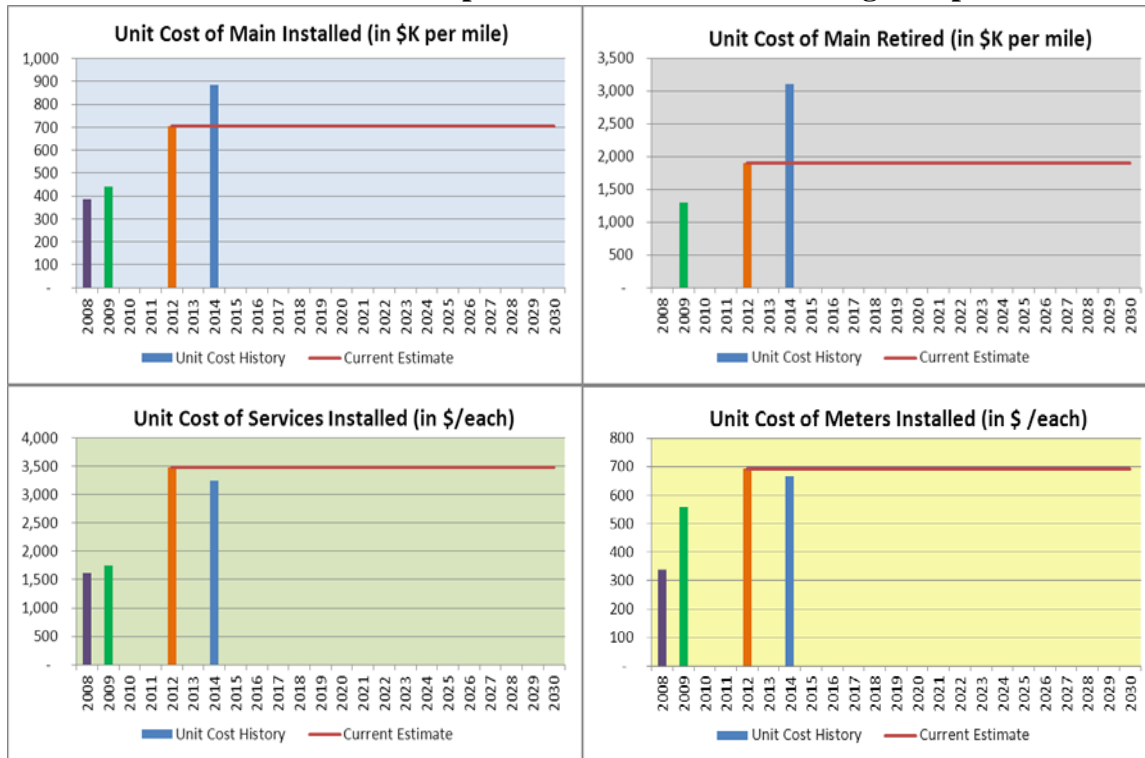
Illustration G.6: Cost Element Template Example

	Main Installation	Service Installation	Meter Installation	Other Construction Items	Engineering	All Other Support Groups	Materials
	Category A	Category A	Category A	Category B	Category B	Category B	Category B
Project A							
Project B							
Project C							
Project D							
Project N							

Management should prepare and continuously maintain a detailed cost management plan for each element.

Monitoring proves essential to making a cost plan function optimally. Given the AMRP’s long duration, management should monitor annually the following areas: unit cost of main installed, unit cost of main retired, unit cost of services installed, and unit cost of meters installed. The following charts show examples of monitoring depictions.

Illustration G.7: Depictions of Annual Monitoring Components



Explanations of the source of data on the preceding charts include:

- 2008 – Historical data up to that year
- 2009 – Original AMRP Total Cost Estimate (\$2.63 billion)
- 2012 – Current AMRP Total Cost Estimate (\$4.45 billion)
- 2014 – Actual based on completed projects.

Note that unit costs in the 2012 Current Total Cost Estimate would provide the monitoring base until management completes a new Total Cost Estimate.

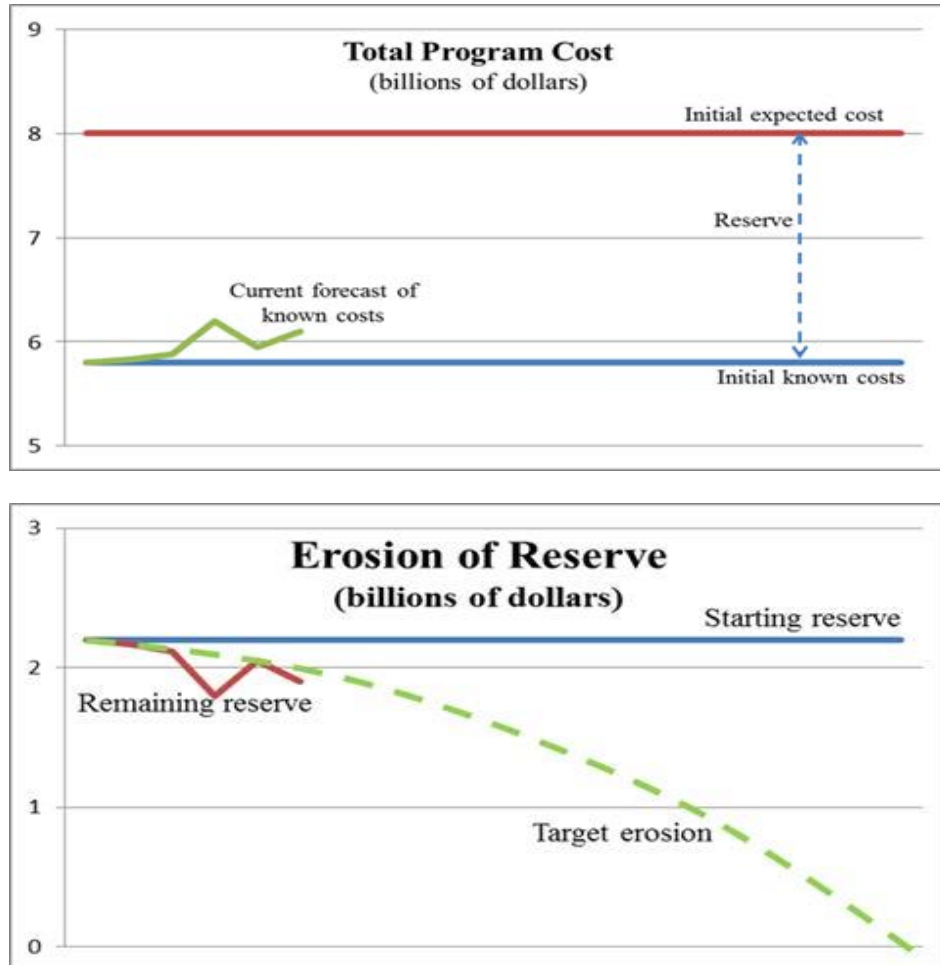
Other important elements in tracking total AMRP costs should include:

- The defined and expected costs become the standards for tracking program costs
- As the defined costs change, the amount of reserve remaining erodes, and the pace of such erosions becomes a key metric
- Expected costs may undergo periodic revision if and as the pace of erosion becomes too fast or too slow

- The key metrics can be displayed over the full 20 year period, but a shorter window can be selected to supplement the long-range view as warranted.

The next charts show simplified, hypothetical means for depicting erosion in the cost plan.

Illustration G.8: Depicting the Erosion of Program Reserve



Two important aspects should apply with respect to model updates:

- The model produces real-time cost forecasts; *i.e.*, changes in the defined program costs as they are revealed
- The assigned cost analysts or cost engineers initiate model changes, based on reconciled cost trends and monthly analysis of cost elements.

After completing the current work to establish a new final AMRP cost estimate, Peoples Gas needs to develop an effective cost forecasting capability, in concert with the cost management program.

Underlying Conclusions

G.1 The AMRP does not have a long-term cost plan that provides a credible estimate of final program costs; management is only now creating the modeling capability to produce such an estimate.

The original (2009) Cost Plan contained sufficient detail, and used appropriate assumptions to establish production quantities and unit costs. The 2012 estimate updated total program costs, but its \$4.45 billion estimate used 2012 dollars. The use of 2012 dollars significantly understates expected final costs. The AMRP needs a new cost plan that will provide a current final cost estimate. An effort to provide such an estimate collapsed in mid-2014.

We found, as Peoples Gas has acknowledged, that it could not provide a meaningful total estimate of AMRP costs without first developing new cost modeling capability. Sound estimates comprise a critical element in effective management of AMRP costs. Peoples Gas has embarked on efforts to develop that model. It needs to complete model development, and estimate work expeditiously. Moreover, the results of the modeling effort need to address more than the direct costs of AMRP work. Peoples Gas also needs to develop the modeling capability to address the ongoing O&M costs and savings over the long term. The Planning and Forecasting Manager has responsibility for cost model development.

G.2 AMRP estimates break program costs down into suitable major categories by year, but management does not use that breakdown to inform cost tracking at either the program-wide or project-specific levels.

Managers cannot manage what they do not monitor, and cannot monitor what they do not measure. Cost tracking needs to provide information at a significantly enhanced level of detail.

G.3 The AMRP program's lack of reserve to cover cost growth fails to reflect potential cost exposure.

Best cost estimating practice regards contingency or reserve as a necessary part of a total cost estimate. Cost estimates need to recognize uncertainties that make full cost driver definition imprecise. A specific portion of funding should be earmarked to account for unforeseeable elements of cost. Hence, owners often add contingency or reserve to an estimate to provide for uncertainties in defined scope and in internal and external cost drivers.

A traditionally derived contingency amount will likely prove inadequate in forecasting the costs of a major, long-term program. Liberty therefore favors the term “reserve” or “management reserve” to account for the many uncertainties that exist within and outside program scope as currently defined. Scope changes will almost inevitably occur, and likely have substantial impacts. This broader definition allows a more robust portrayal of forecasted final costs.

G.4 Management does not compare AMRP costs and performance with what others in the industry have experienced.

Major main replacement work has become more common in the industry. It is useful to examine the performance of others, in order to provide a benchmark for gauging one's own approaches,

methods, practices, and results. The AMRP appears to use no organized or documented approach to meeting this need. Instead, project management simply cites the experience of Jacobs Engineering, which leads and staffs most of the Project Management Office, as providing insight into other companies’ efforts, making such comparisons unnecessary in its view.

In the development of the revised Total Cost Estimate, Peoples Gas did make use of some industry data; i.e., a conversion factor published by the Handy Whitman Construction Trend of Utility Construction – North Central Region to price out most of the major commodities. The next table summarizes that information.

Table G.5: Handy Whitman Index Data

Handy-Whitman Cost Index	2010, Jan 1	2012, Jul 1	Factor
Mains, Steel	656	826	1.2591
Mains, PE (polyethylene)	482	521	1.0809
Services, PE	501	536	1.0699
Meter, Materials	257	271	1.0545
Meter, Installation	708	923	1.3037
Regulator Materials	406	438	1.0788
Regulator Installation	692	889	1.2847
Regulator Stations	567	700	1.2346
City Gate Stations	568	704	1.2394

G.5 Peoples Gas does not sufficiently understand and quantify major cost drivers.

A cost driver is an activity or component that adds significant cost to a project or program. Periodic cost analysis of actual data can yield relationships or linkages between events and contributions to cost increases. Examples of such contributors include contractor change orders, restoration contractor costs, material pricing, changes in City requirements, labor costs, and escalation. Cost professionals in the cost management organization should perform such analyses.

PGL Action Plan Steps

Item #	Task	Status
1	Develop new estimate	Complete
2	Develop Cost Plan for long term sustainability:	In Progress
3	Establish standard cost elements for each project (and program as a whole)	In Progress
4	Define tools for collecting data associated with each cost element	In Progress
5	Establish reporting format for each element	In Progress
6	Analytical and variance expectations defined (including responsibilities)	In Progress
7	Corrective action process defined	In Progress

Management contracted with Burns & McDonnell (B&M) to prepare the new AMRP cost and schedule model. B&M provided a high-level cost and schedule model for the remaining AMRP work. The final deliverable included proposed schedules at the neighborhood level for program scenarios ending in 2030 and, alternatively, 2040. Two separate Primavera P6 schedules for each of the above scenarios were developed, presenting a range of total program costs for several scenarios: New Management Target, Contingency Case (High Restoration Costs), and the Pre-Acquisition Path. Management used new cost and schedule models as a central tool for developing, validating, and generating new AMRP program cost estimates and schedules, which included revised program assumptions, variables, and parameters. The AMRP program estimate and schedules as of the year 2016 formed key initial deliverables derived using the new models.

Management developed a cost element matrix for Liberty to review in a recent workshop, with the matrix under revision to address those project components management believed to require a different cost management approach. Management prepared a main installation cost plan template for review and comment by Liberty, using the Albany Park Project as a pilot to test the cost plan template. Liberty made plans to review this deliverable as part of verification activities.

Expected Post-Implementation Conditions and Factors

Management initially considered the new cost and schedule models developed by B&M a central component of its Integrated Project Controls program management approach for AMRP management. It intended the new cost model to update comprehensive measurement bases and critical assumptions regarding scope, quantities, productivity, labor costs, unit costs, and regulatory requirements. However, this model only serves to provide periodic forecasts of total

program costs. The Cost Plan and Model recommended by Liberty should enable cost management at a more detailed level (*e.g.*, main or service installations under a specific neighborhood project).

Management has since adopted individual Cost Element Plans for all future neighborhood projects. These plans will focus on the cost components of main installation, service installation, restoration, meter mark and bar, other construction costs, stock material, engineering and other support costs. These formal, structured cost element plans define how costs will be managed, establish individual accountabilities, and identify systemic or cultural issues that require specific focus and methods. Management will seek to design them under guiding principles from upper management and execute them using the developed cost controls tools as the building blocks.

The holistic cost management approach structure that Liberty recommends is now complete. Project managers will have visibility on all project costs and productivity performance. Coupled with an effective cost trend program, management has developed a real-time ability to forecast final project costs readily. These efforts should foster an increasingly sensitive culture.

Summary of Liberty's Steps to Verify Implementation

On June 9, 2016, management provided the Program Level Cost Forecast and Schedule Model designed by Burns & McDonnell for preliminary discussion. This document reports on the cost estimates and schedule models for 2030 and 2040. The models included comprehensive measurement bases and critical assumptions. The document itemizes specific contingency elements and percentages. A May 25, 2017 on-line Cost Plan Workshop supported discussion with Liberty informed by drafts of a Cost Element Matrix and a Cost Element Plan for Main Installation/Retirement.

Liberty then met with management on June 1, 2017 to discuss actions taken and to review implementation progress. That meeting included discussion of the following close-out documents:

- A draft Cost Element Matrix: this new matrix will include main installation, services installation, restoration, mark & bar, stock materials, other construction costs, engineering, other PGL direct labor, and other support costs
- A draft Cost Element Plan for Main Installation/Retirement.

Management also plans to revise the Cost Management Procedure to insert a section on Cost Plan development for all future neighborhood projects. Management considers the AMRP Cost Estimate Model 2015 and the AMRP Schedule Model 2015 as key deliverables and closeout components for the new cost estimate.

Observed Conditions and Factors

We found that management accepts the existence of what we view as the fundamental benefits of the cost element plan concept. It has committed to revising the Cost Management Procedure to require cost plans for all future neighborhood projects. Management has established essential cost control tools, such as the Detailed Forecast Files, the cost trend program, and the performance metrics, for example.

Implementation Complete and Satisfactory?

We found a substantial basis for confidence that management will prove able to implement this recommendation fully. Given that our monitoring period is at a close, we consider it appropriate not to leave this recommendation classified as open, under the circumstances. As noted below, however, we scheduled this recommendation among our last verification activities.

Remaining Gaps, Needs

Management needs to revise the cost element matrix and the cost management procedure. Management will have to start developing cost plans for all the elements, starting with the Albany Park Project.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During July 2017 Liberty planned review the Cost Plan Development section of the Cost Management Procedure. Verification activities include validation of the existence of an appropriate cost plan breakdown of the Cost Element Plan Matrix. Activities will also include review of the sample main installation cost plan for the Albany Park Project.

Final Liberty Verification Activities

On July 11, 2017, Liberty met with management to review the Main Installation Cost Element Plan of the Allen Park Neighborhood Project. This plan was developed collectively by all the key project team members. The Cost Element Plan owner, the manager accountable for cost performance, and the supporting cost analyst were identified. The plan cost, the main installed quantities, and the main retirement quantities for all three zones were clearly summarized and displayed as achievement goals. The base sources and management strategy are defined. Weekly and monthly reporting/analysis requirements are documented in great detail. The only addition that Liberty suggested was the inclusion of metrics that management intended to use on this Plan.

Similar plans will be developed for the following major cost elements of this project, namely, Services Installation/Retirement, Restoration, Other Construction Costs, Mark & Bar, Stock Materials, and Other Supporting Costs. These plans will place management in a good position to manage all aspects of the project cost effectively.

Liberty also validated the addition of the requirement for Cost Element Plans in the Cost Management Procedure, effective July 1, 2017.

Liberty considers the implementation of this recommendation verified.

General Observations

None.

G.2 – Cost Trend Program

Peoples Gas should establish a Cost Trend Program to monitor potential, major cost-affecting items.

Such a cost trend program serves as an early-warning system for potential cost deviations. Potential cost changes should get reported immediately, by an assigned cost analyst or cost engineer. Interventions can be initiated to mitigate correctible problems or minimize cost impacts. The cost trend program is a valuable tool that provides up-to-date information that enables Peoples Gas to forecast the final AMRP costs on an almost real-time basis.

Underlying Conclusions

G.3 The AMRP program’s lack of reserve to cover cost growth fails to reflect potential cost exposure.

Best cost estimating practice regards contingency or reserve as a necessary part of a total cost estimate. Cost estimates need to recognize uncertainties that make full cost driver definition imprecise. A specific portion of funding should be earmarked to account for unforeseeable elements of cost. Hence, owners often add contingency or reserve to an estimate to provide for uncertainties in defined scope and in internal and external cost drivers.

A traditionally derived contingency amount will likely prove inadequate in forecasting the costs of a major, long-term program. Liberty therefore favors the term “reserve” or “management reserve” to account for the many uncertainties that exist within and outside program scope as currently defined. Scope changes will almost inevitably occur, and likely have substantial impacts. This broader definition allows a more robust portrayal of forecasted final costs.

PGL Action Plan Steps

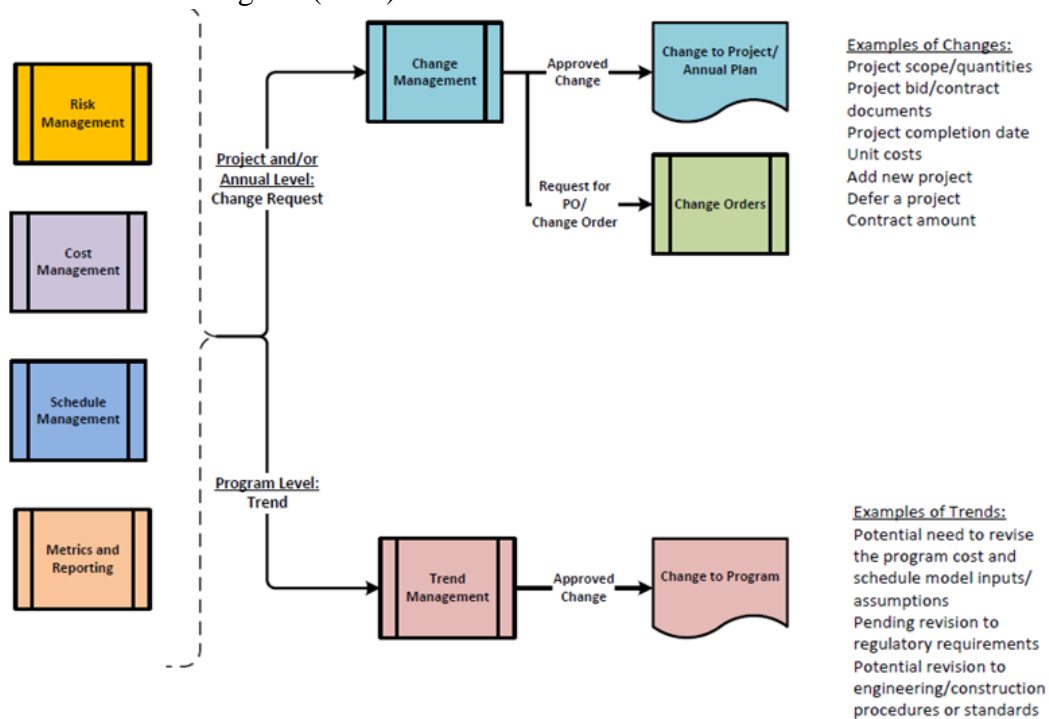
Item #	Task	Status
1	Describe goals and terminology associated with Trend Program	Complete
2	Review goals and terminology with executives and management	Complete
3	Draft Cost Trend Process	Complete
4	Publish Cost Trend Procedure	In-Progress

PGL’s Trend Management Program is established as part of the analysis functions of the Project Controls Group. The Trend Management Program will be part of the annual project plan. Annually a list of proposed projects will be assembled including both AMRP as well as other non-AMRP projects. Rather than having lump sum projects, each project will be broken down into the respective cost drivers. As part of the reconciliation process each project will be reviewed and analyzed to identify trends, outliers, and anomalies to the original project estimate. This data is ultimately updated and used to assist in forecasting additional projects as well as project future program costs. The program will set forth the process of monitoring/controlling the

program/project scope as well as managing any changes in the scope baseline. The Company recognizes that changes may be necessary to the project scope, inherently from its size and complexity, but it is imperative that changes are controlled or mitigated and integrated in order to prevent scope creep and thus directly impact program cost and schedule. The Trend Management Program may also consider non-construction factors such as regulatory, safety, and environmental standards or regulations. The internal Trend Management Program for adjustments to management reserve will be established via the Integrated Project Controls management approach. The internal Trend Management Program will establish the means by which the management reserve will be allocated within the AMRP program.

The goals and terminology associated with the Trend Management Program have been reviewed by the Project Director and were presented at the August 4, 2016 weekly Director meeting. The definitions of major terminology are described as follows:

- Risk: An uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives.
- Change: A modification to a project/annual plan document, deliverable, or baseline
- Trend: The first indication of a potential change to the System Modernization and AMRP Program that must be tracked, evaluated, and if required, acted upon
- Team Objective: To establish and document the requirements, processes, and procedures for the development and management of Changes and Trends for the System Modernization Program (SMP)



Since the beginning of 2017, the Trend Management Program has made tremendous progress. In January, the Trend Management Procedure was drafted and reviewed with Director of Project Management & Construction, Manager of Project Controls, and Manager of Special Projects.

In February, as the Cost Management Procedure, Schedule Management Procedure and Estimating Procedure are finalized and implemented, the data flows from Cost, Schedule, Change and Risk Management Procedure are documented.

In March, the developmental effort is reviewed Director of Project Management & Construction. Primera recommended that implementation of Trend Management be aligned with the collection and availability of three months of Cost and Schedule Data by June 2017. Schedule data will be available for the previous six months. Cost data, including Project/Program Estimates, will be available for three-month actuals and five months of budget. Meaningful trend analysis with user data will be available.

Trend Implementation will begin with collection of the following data over the next three months: Project/Program Forecast vs. Actual unit cost, Project/Program Forecast vs. Authorization cost, Project/Program Estimate vs. Actual Cost, Schedule baseline vs. actual performance, Contractor Forecast vs. Actual unit cost, Contractor baseline vs. Actual performance, Performance Management Log (analyzed for trending opportunities), Risk Management Log (analyzed for trending opportunities), Budget Strategy Meeting output, and Project Cost Review output.

Data in June will be used to identify and communicate potential trends affecting the SMP, identify and communicate drivers of potential trends, evaluate validity of trend, evaluate impact of potential trends and determine alternatives to minimize negative impacts or capitalize on positive trends, develop plan to monitor trends through disposition, recommend changes to the program plan or model when necessary (with appropriate documentation of trend), log and monitor all trend actions. By June 30, 2017, the Trend Management Procedure will be published, and the Trend Management Program will be formally launched.

Expected Post-Implementation Conditions and Factors

The primary purpose of a cost trend program is the containment of costs via control of changes. The changes could be due to scope, productivity, material pricing, wage rates, contractor unit costs, or regulatory requirements. This program is designed to be an early warning of cost changes. Whenever the possibility of a change appeared, it was given visibility through the trend program and then tracked until it was resolved and closed out. The timeliness of reporting was preferred over accuracy, encouraging AMRP team members to ventilate potential changes well before good cost or scope information might be available. The estimated cost impact of each trend could be revised as better scoping or pricing information becomes available.

Regarding scope control, the cost trend program alerts management of a potential cost impact that warrants its attention or intervention. The intent is not to block all proposal of changes, but rather to focus on ways to prepare management to have an opportunity to understand the situation and trigger some timely cost-effective decision to either eliminate or mitigate the proposed items. The benefit would be that quite often weak proposals would simply stop coming.

The cost trend program can be a valuable tool that provides up-to-date information that enables management to forecast the final AMRP costs on an almost real-time basis.

Summary of Liberty's Steps to Verify Implementation

On June 8, 2016, we met with management to provide some cost trending basics and ideas. The discussion focused on how management could establish such an early warning system of cost growth control for more effective overall AMRP cost management.

On March 20, 2017, management conducted an on-site Cost Management Workshop and provided the following cost trending material for discussions:

- Risk, Change and Trend Overview Chart

On March 22, 2017, we met with management to discuss actions taken and review implementation progress. Liberty reviewed the following close-out documents:

- Risk/Change/Trend Relationship Chart
- Trend Management Procedure draft, dated 03/15/2017
- Trend Identification Form
- Trend Management Procedure Development Progress Status Memo

Management considers the following key deliverable as closeout components for the cost trend program:

- Change Management Procedure
- Trend Management Procedure
- AMRP Portfolio Cost Forecasting Model
- Parametric Estimating Tool.

Observed Conditions and Factors

Liberty notices that the monitoring base of this Trend Management Program has been changed from the original AMRP Program cost to the current overall System Modernization Program cost. Nevertheless, the essential features, such as early identification of potential trends, validation of the trends, analysis of the trends regarding their cost and schedule impacts, and timely control of changes to the program, are designed and identified. The process flow diagram identifies four major components, namely risk management, cost management, schedule management, and metrics and reporting. From the Trend Procedure, Liberty is not sure how the risk management is contributing to the program effort.

Liberty notes that one of the major benefits of a trend program is not being realized in that management has elected a short-term focus for the management of overall program costs. The trend program can be a valuable resource in that it has the capability to monitor total costs on a near-real-time basis. This provides an essential framework from which to control cost. For example, a million dollar change on a single project, sunk and beyond further control, might amount to a forecasted impact of a billion dollars on the future program, which is neither sunk nor uncontrollable. This all-important perspective is lost when a short-term focus on cost is the approach.

Implementation Complete and Satisfactory?

Yes. The concept is sound. Senior Management is supportive. The procedure is drafted. Assuming the program is implemented uniformly and effectively, the intent of this recommendation will be met.

Remaining Gaps, Needs

Management needs to implement the Trend Management Program. Before that, all project personnel, including engineering, construction, contract management, project management, cost management, scheduling management, and workforce management, needs to be trained such that any cost trends can be identified early for the program to be effective.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

None. The Trend Management Program is scheduled to launch in June 2017. There is not enough time for Liberty to conduct any verification activities.

Final Liberty Verification Activities

On May 31, 2017, Liberty met with management, determining that the late launching of the Trend Management Program makes verification now untimely.

General Observations

None.

H.1 – Scheduling Master Plan

Peoples Gas should develop a Scheduling Master Plan.

The Company recognizes this need, and has begun a significant effort to develop a Master Plan. It needs to incorporate a master schedule plan that conforms to a well-defined AMRP scope and a newly formed, credible cost plan. To maintain this master schedule plan on a real-time basis, Peoples Gas also needs to develop the capability to assess how cost issues may affect schedule, and (vice versa) how schedule issues will affect costs at the AMRP program level.

Underlying Conclusions

H.1 The AMRP Plan does not include schedules at an overall program level; detailed generic schedules existed at the construction level, but not the production support level.

The AMRP plan should include, at a minimum, schedules at an overall program level, at a production support level, and at a detailed process level. Management has not prepared or used them.

The AMRP does not have the capability to assess in a credible way whether the program’s 20-year duration remains achievable. Nor can management quantify the length of any anticipated delay. The program has used detailed generic schedules addressing construction activities only for the current and the following year. These generic schedules reflected physical work only. They did not address the work activities needed to support construction.

PGL Action Plan Steps

Item #	Task	Due Date
1	Develop RFP for consulting firm	Complete
2	Send out RFP	Complete
3	Review RFP / Select firm	Complete
4	Initial team meeting	Complete
5	Interview / Information Gathering	Complete
6	Draft Cost Model and Schedule deliverables due to Peoples Gas	Complete
7	Peoples Gas review draft results, send critique back to consultant	Complete
8	Final Cost Model and Schedule due to Peoples Gas	Complete
9	ICC report submission deadline	Complete
10	Define overall AMRP program scope and existing quantities	Complete
11	Generate year 1 schedule, cost, and forecast	Complete
12	Generate 2-, 5-, 10-, and 20 year preliminary schedule	6/1/16

Expected Post-Implementation Conditions and Factors

Use of short-term schedules pending Commission and Stakeholder review of fundamental AMRP parameters; long-term schedule plan after fundamentals re-established.

Summary of Liberty's Steps to Verify Implementation

On March 29, 2016 Liberty met with the Project Management & Controls Project Director to discuss actions taken and review implementation progress. Liberty reviewed close out documents including the PGL Master Plan Summary.

Observed Conditions and Factors

Management has developed scheduling alternates in various categories, but these are limited by the current ICC review of the program. With the boundaries of the program uncertain, it is of course impossible to settle upon a master plan at this time. Nevertheless, management has a detailed plan for the short-term as well as a B&M constructed long-term planning model.

Implementation Complete and Satisfactory?

Yes. It is not reasonable to expect more at this time and we therefore consider this recommendation closed.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that this recommendation has been implemented to the degree that current circumstances permit.

Future Liberty Verification Activities

Management plans to update us based on pending feedback from ICC Stakeholder Workshop Process at the end of September 2016, or as determined by the timing of the Commission's Order in the docketed matter resulting from the workshop process.

Final Liberty Verification Activities

The Stakeholder Process has reportedly evidenced support for the notion that short-term projections are likely to be more accurate than longer-term projections. The likely outcome of that process appears to us to involve a move away from long-term schedules. With cost and schedule outlooks limited to three years, extrapolations to longer timeframes will require caution, with variable costs and workload expected from year to year potentially affecting total program completion date very substantially.

General Observations

None.

I.3 – In-House Labor for Backend AMRP Work

Peoples Gas should act immediately to address the need for sufficient internal resources to perform back end AMRP work as planned and scheduled.

Conditions experienced in 2014 with respect to work such as meter installation need to be avoided in the future. Meter installation is less affected by weather than are main replacements and ground restoration. Performance information at the shop level made it apparent that production started to lag as early as March. Peoples Gas was unable to perform sufficient actions to correct performance lags, despite regular attention to the matter by all three Shops.

Underlying Conclusions

I.2 Consistent with the overall AMRP strategy, the Company’s short-term resource plans make an appropriate overall assignment of contractor and employee roles, but do not properly identify internal personnel to install meters and contractors to perform main replacement, service installation, and ground restoration.

AMRP resource plans must identify where the utility will use external and internal personnel. The strategy the utility used to define the overall roles of contractors and internal resources is appropriate for the short-term. However, changes in resource availability in the future may leave the Company in a reactive mode. Peoples Gas cannot rely exclusively on the short-term plans to accommodate future circumstances.

Failure to develop more substantial levels of internal workers skilled in replacing mains and installing services will force near total reliance on contractors for the life of the AMRP. Should the future bring a tighter market for resources (as more utilities accelerate replacement programs) a lack of internal resources will threaten completion of the AMRP on the current overall schedule. Increased competition in the industry for resources may also pose cost escalation risk.

PGL Action Plan Steps

This recommendation contains six tasks, all of which are complete.

Item #	Task	Status
1	Discuss, work rules with local union leadership to develop appropriate flexibility with resource allocation.	Complete
2	Review the construction sequence and modify the process and plan as appropriate to increase efficiency and effectiveness.	Complete
3	Review the proposed neighborhood block plans to ensure that all work can be reasonably accomplished during the scheduled period.	Complete
4	Position of “District Leader” added to the Capital Construction shop workforce	Complete
5	Run a pilot demonstration of the revised process on a selected neighborhood.	Complete
	Review and evaluate the success of the pilot program and make additional process changes as appropriate.	Complete

Expected Post-Implementation Conditions and Factors

Management anticipates that with the process changes and the reassignment of in-house mechanics to the AMRP meter move/change process will result in eliminating any backlog in this facet of the work now and in the future.

Summary of Liberty’s Steps to Verify Implementation

At the conclusion of the construction season, typically in November, Liberty has evaluated the number of services not having meters installed and we compared the results with prior year-ends. In the past, the number of services awaiting meter changes ran to the thousands, which caused additional restoration and multiple mechanic visits to ensure that the meters were eventually installed and moved outside. In some situations, installation delays could have also delayed the change from low pressure to medium pressure in entire areas.

Observed Conditions and Factors

Liberty previously observed that management started the construction season with a backlog of meter moves/changes that carried over into the new construction season. This carry over was eliminated with the proposed process changes and additional in-house staffing

Implementation Complete and Satisfactory?

This recommendation is considered complete and verified.

Remaining Gaps, Needs

Management needs to consider additional in-house resources for moving some of the work from contractors as proposed in recommendation I.2

PGL Position

Management agrees with this recommendation and has activity implemented it.

Future Liberty Verification Activities

None

Final Liberty Verification Activities

Management has implemented this recommendation, changing the AMRP construction sequence to conduct meter marking and meter bar placement (and where possible customer internal piping) at the start of the process, followed by service line installation and main replacement. To perform this work ahead of the contractor construction, management transferred additional internal resources to the program, Management completed and evaluated the results of a pilot program in Beverly Phases 8 & 9. Management then rolled out the new process for inclusion in all future projects. We sought to document the number of services without meters (said to be none) versus the number of meters placed in anticipation of 2017 main and service replacements prior to the 2017 construction season. The number of services without meters at the start of the 2017 construction season was zero, with meter bars awaiting service and meter installation as planned.

General Observations

Management completed the initial trial of the new process in the Beverly Phase 8 and 9 construction areas (see responses to DRs regarding recommendation I.3). Management considered the trial a success, and will make the lessons learned and the change in meter locating and meter bar installation (plus where applicable installation of internal customer piping) the standard for the 2017 construction season. The total number of services without meters at the end of 2015 construction season was in the thousands. The backlog is now zero, with some meter locations marked and meter bars placed in advance of the 2017 construction season.

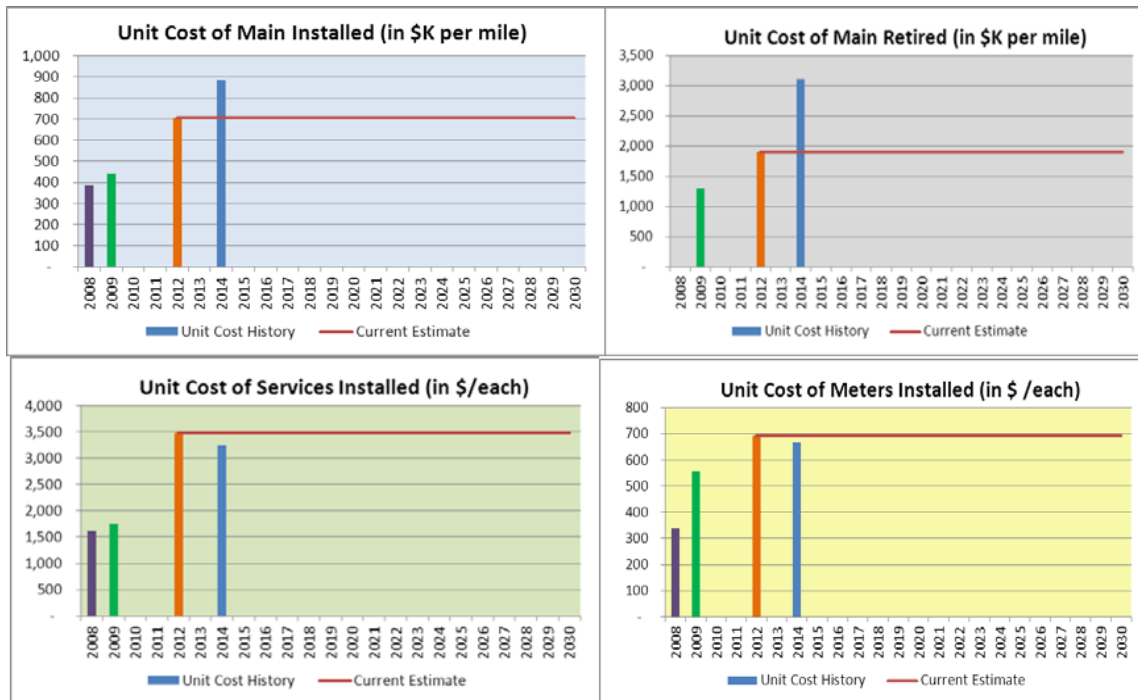
I.4 – Enhanced Productivity Consideration in Resource Planning

Peoples Gas should bring enhanced productivity measurement and management to resource planning.

As noted in a number of this report’s chapters, Peoples Gas has focused on production quantities, and not on the resources it is using to produce them. It is important to evaluate regularly and accurately the relationships between what is produced (output) and what has been used (input). This key metric can readily warn of AMRP program overruns.

Liberty examined a sampling of completed projects. The sample included 102 projects or phases of a project. Peoples Gas needs to monitor productivity in installing the three major AMRP components; i.e., mains, services, and meters. The Company must, of course, know its cost performance in retiring mains. The charts below show program results to date, and provide an example of how the Company needs to monitor these unit costs.

Chart I.9: Installation Productivity Measures



These charts show the kinds of unit cost observations that require analysis and may, depending on the root causes for them, also require corrective actions. For example:

- Mains installed: overrun of 25 percent
- Services installed: underrun of 7 percent
- Meters installed: close to par, with a 4 percent underrun
- Main retired: overrun of 63 percent.

The sample size is small, but the exercise illustrates the importance of monitoring unit costs. Such metrics also have substantial importance in providing solid information for current efforts

(focusing so far on developing a new cost model) to produce a comprehensive and credible forecast of final program costs. job.

Underlying Conclusions

I.7 Current resource plans do not consider rising productivity, or monitor overall program productivity.

The long duration of the AMRP makes it important to use productivity assumptions that match program phases, and that target improvement over time. Peoples Gas is developing a new AMRP Total Cost Estimate using a Planning and Forecasting Model under development. The model must incorporate rising productivity into the estimate. Likewise, the resource planning tool that the newly hired resource manager is charged with developing should take the expected rising productivity into consideration in future resource planning.

PGL Action Plan Steps

Item #	Task	Status
1	Project Director to appoint Productivity Metrics implementation Task Lead	Complete
2	Define objectives and requirements for the Productivity Metrics process & procedures	Complete
3	Design the Productivity Metrics process and procedures	Complete
4	Prepare Productivity Metrics process and procedures	Complete
5	Approve and issue Productivity Metrics process and procedures	In Progress
6	Provide orientation and training to project personnel on Productivity Metrics	In Progress
7	Document completion of the recommendation implementation	In Progress
8	Conduct semi-annual program productivity analysis	In Progress
9	Prepare Program Productivity Analysis reports	In Progress

Continuous monitoring and reporting, supported by insightful and candid analysis form central elements in effective management and executive reporting. The activities and performance metrics housed within the Integrated Project Controls process provide embedded bases for securing the needed information. The approach described by management involves recognizing and implementing productivity enhancements, followed by continuing efforts to push efficiency targets further - - generating a process of continuous improvement in efficiency and productivity. As management recognizes, this process required identification of appropriate cost driver

groupings. Obvious AMRP measurement groups include mains installed, services, meters, and mains retired. Compiling productivity measurements will produce an ultimate cost per distance or cost per unit. Management plans to continually monitor and analyze AMRP productivity analyzed, incorporating into annual construction forecasts expected efficiencies, pushed by target and stretch goals.

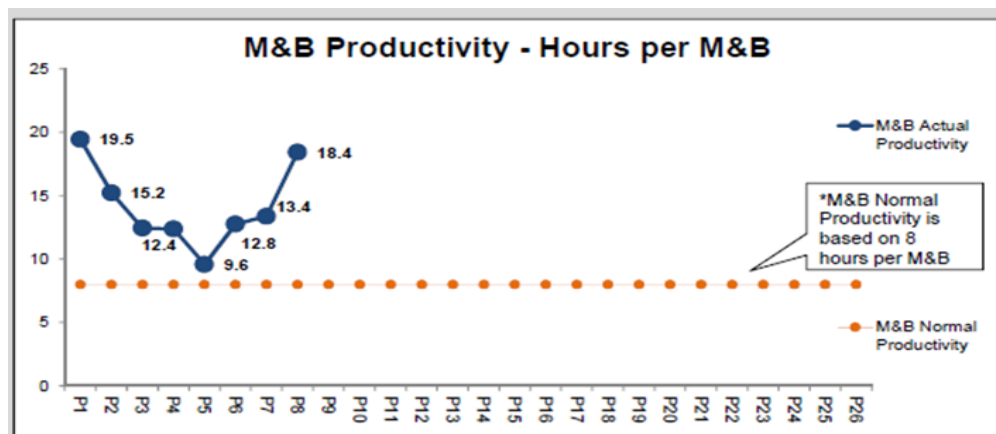
Management’s initial focus concentrates on measuring and managing the productivity of internal resources, and using the efforts to inform resource planning. Management intends to expand the focus of productivity measurement and management to include contractor performed work as needed in the future.

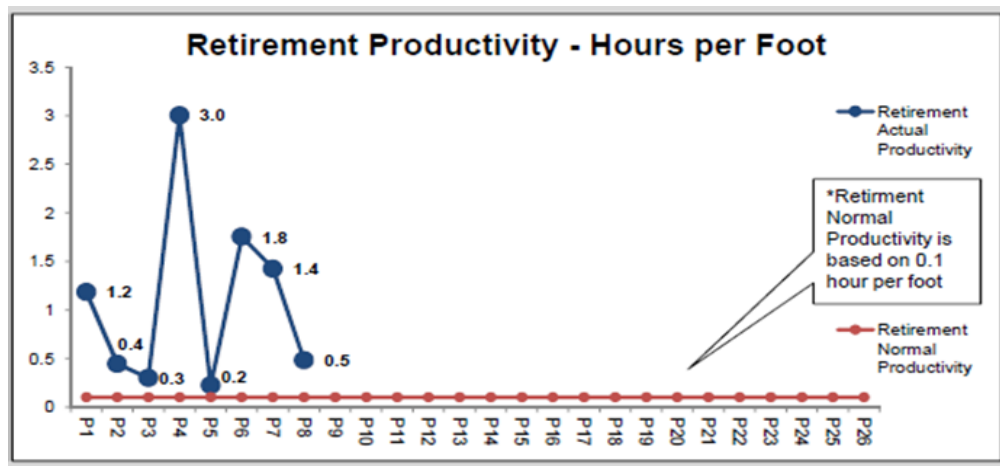
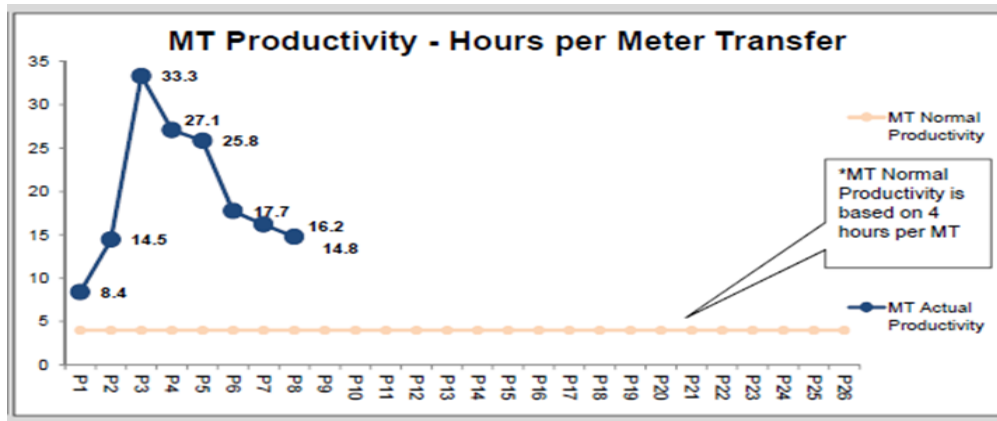
The Director of Project Management & Controls and the Director of Construction serve as task leads for productivity metrics implementation. The requirements and objectives for the productivity metrics process comprise:

1. Specify performance metrics to monitor progress against goals, and evaluate the effectiveness and efficiency of construction.
2. Use performance metrics to assist with allocating and managing resources.
3. Use performance metrics, with analysis and report development, to provide actionable information to assist with decisions about budgets, priorities, and staffing.
4. Monitor and assess productivity changes with the goal of enhancing cost management.

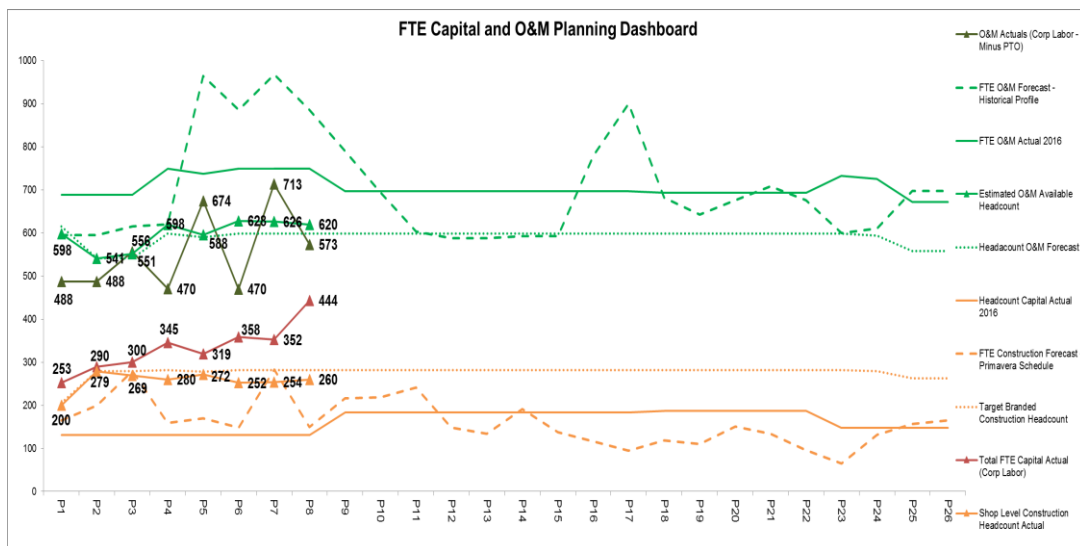
Management will review productivity metrics used for the internal labor Full Time Equivalent (FTE) forecasting process (against the P6 schedule) every quarter against the prior quarter’s actual average productivity. Once reviewed, and collectively agreed upon by the productivity metrics implementation task leads, productivity metrics adjustment will occur as needed, in conjunction with the forecasting efforts. The Resource Planning stakeholders that meet bi-weekly continue to refine and improve the FTE forecasting process, to ultimately enhance and improve future productivity.

The Resource Planning Model has been completely developed. Reports have been generated since the beginning of 2017, used to measure multiple aspects of the internal workforce related to the AMRP program. Specifically, this report provides the basis for a bi-weekly resource planning meeting. The following charts illustrate the three major commodities this model now monitors: Mark & Bar (M&B), Meter Transfer (MT), and Main Retired.





An Executive Dashboard (illustrated below) provides an overview of capital and O&M resources, permitting direct observation of any trend to divert resources from capital construction to O&M work.



Management has developed a Productivity Use and Training Guide to direct the productivity metric process, with associated training scheduled for the third quarter of 2017.

Expected Post-Implementation Conditions and Factors

Enhanced productivity management can offer substantial value in matching productivity assumptions with resource allocation more efficiently, during all program and project phases. Management will use its enhanced measurement results to evaluate cost driver groupings at project and program levels to measure productivity, evaluate scope control, and ultimately make adjustments. Management, as it should, expects AMRP productivity increases as operational efficiencies at all levels of program implementation (*e.g.*, contractors, inspectors, etc.) increase during program implementation.

Summary of Liberty's Steps to Verify Implementation

In May 2016 management provided the following preliminary documents for review:

- New organizational charts showing the addition of Senior Field Coordinator and Field Coordinator positions reporting to AMRP Project Construction Manager
- Job Profile of Senior Field Coordinator (job summary, responsibilities, competencies, experiences, education, travel requirements, physical demands, other requirements, and working conditions)
- Job Profile of Field Coordinator (job summary, responsibilities, competencies, experiences, education, travel requirements, physical demands, other requirements, and working conditions).

Liberty met with management on June 1, 2017 to discuss actions taken and review implementation progress, reviewing several close-out documents:

- Productivity User Process and Training Guide with the following details:
 - Establishment of Productivity Metrics
 - High Level Lifecycle for Resource Planning
 - Detailed view for Resource Planning
 - Shop Level Dashboards
 - Executive Dashboards: Internal AMRP Productivity Output
 - Change in Full Time Equivalent (FTE) Analysis
 - Shop Headcount movement - Illustration
 - Capital and O&M FTE Planning Dashboard
 - Construction Completion & Cost
 - Construction Productivity Charts

Management plans to define the Productivity Metrics process in a procedure that forms part of the Project Execution Plan. A semi-annual Program Productivity Analysis report will form the key deliverable in implementing this recommendation. Completion of implementation will come with institution of the procedure, followed by informing managers of their roles in the process and management's expectations for compliance. Thereafter, management will continue to issue a group of charts or graphs showing the total cost per distance or unit versus time.

Observed Conditions and Factors

We observed that resource planning currently focuses only on internal PGL resources, thus limiting productivity measurement to employee-performed work. Management continues to believe that it does not “control” contractor resources, who select the means and methods they employ. We accept that view under the current mode of operation, which provides for contractor performance of all main installation, services installation, and restoration. In the future, however, contractor resource availability may diminish. Given the potential for that occurrence, the Resource Planning Group needs to position itself to analyze workload demands and coordinate the internal and external labor supplies.

As a minimum, the Resource Planning Group should monitor the unit cost rates of various types of contractor work from year-to-year, and assess the direction of their movement. The Contracting Group should make such information available.

Implementation Complete and Satisfactory?

The Resource Model can now use productivity information for resource planning. When management has good historical productivity information, the resource planning function can consider rising productivity in work performed by the internal workforce. These factors make implementation reasonably complete.

Remaining Gaps, Needs

Management needs to complete the semi-annual Program Productivity Analysis, and issue the Report. It needs to complete the Productivity Metrics Procedure. Management also needs to expand the model to support monitoring contractor unit costs in main installation, services installation, and possibly restoration. Eventually, management also should develop the contractor unit work-hour rates for contractor work.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, Liberty will review the Program Productivity Analysis Report, if available. We will also validate if the Productivity Metrics Procedure is issued.

Final Liberty Verification Activities

On July 11, 2017, we met with management to review the 2016 Year-end SMP Productivity Analysis Report. This report presents well-developed colored charts on Meter Installation, Capital and O&M Full-Time-Equivalent Planning Dashboards, Construction Completion and Costs of Mark & Bar (M&B) and Meter Transfer (MT) Completion, M&B Premise Units Completed, M&B to MT Fully Loaded Cost, Retirement Completion and Cost per Unit. There are also charts on Construction Productivity in hours per unit for M&B Productivity, Meter Transfer Productivity, and Retirement Productivity.

This report contains a wealth of information. However, there are no narratives or analyses on any pages to explain whether these nicely produced charts are projecting a positive or negative message. The Unit Meter Installation Cost is an example, with the year-end actual cost of \$1,941/meter versus the Planned Cost of \$1,000/meter. The actual unit cost almost doubled the planned cost, which was based on the 2015 actual costs. There should be some analyses regarding whether the 2015 level was valid to use as a base for 2016, and also why the workforce achieved only 75% of meter installation while exceeding the Plan Cost by 50%.

Management acknowledges data analysis is an area that needs improvement. It should be pointed out that this report was published in January. The Company has been putting great effort in recent reports to include an “Observations by Management” section.

The Metrics and Reporting Procedure was drafted on September 16, 2016. Liberty considers the implementation of this recommendation verified.

General Observations

None.

I.5 – More Closely Monitor Contractor Resources and Production

Peoples Gas should more closely monitor contractor resources and production.

The Company should analyze every completed project or phase of a project to understand the root-cause of cost growth. This report describes elsewhere the importance of such analysis for cost management purposes. Here, its importance is in supporting sound assumptions about future resource requirements.

Peoples Gas must require contractors to report work-hours, even for unit cost or lump-sum contracts. First of all, calculation of safety metrics requires the information. It will enable the analysts to undertake wage rate analysis and comparison. The work-hours will give the supervisors a greater sense of workload size. Managers will have increased ability to foresee where and by how much the schedule will suffer, should contractors put inadequate numbers of workers on the job.

Underlying Conclusions

I.2 Consistent with the overall AMRP strategy, the Company’s short-term resource plans make an appropriate overall assignment of contractor and employee roles, but do not properly identify internal personnel to install meters and contractors to perform main replacement, service installation, and ground restoration.

AMRP resource plans must identify where the utility will use external and internal personnel. The strategy the utility used to define the overall roles of contractors and internal resources is appropriate for the short-term. However, changes in resource availability in the future may leave the Company in a reactive mode. Peoples Gas cannot rely exclusively on the short-term plans to accommodate future circumstances.

Failure to develop more substantial levels of internal workers skilled in replacing mains and installing services will force near total reliance on contractors for the life of the AMRP. Should the future bring a tighter market for resources (as more utilities accelerate replacement programs) a lack of internal resources will threaten completion of the AMRP on the current overall schedule. Increased competition in the industry for resources may also pose cost escalation risk.

PGL Action Plan Steps

Item #	Task	Status
1	Make organizational structure changes to support establishment of Field Coordinator position.	Complete
2	Conduct training programs to ensure Field Coordinators fully understand their contractor management responsibilities.	Complete
3	Review and change contracts and commercial documents to require prompt and accurate reporting of resources and production.	Complete

4	Document quantity tracking and resource reporting processes to demonstrate monitoring of contractor data.	Complete
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The AMRP organization previously employed a single inspector assigned to each contractor crew to perform Quality Control, safety, and general management activities, but often without appropriately defined functions, producing uneven performance. The organization now employs a project management group to track projects from start to finish. Separate directors address functions related to Project Management & Controls, Engineering, Construction, and Contract Management.

In July 2015, management established the positions of project construction managers and their subordinates, field coordinators. Their primary roles involve overseeing and managing all aspects of contractor field operations. Management assigns a Field Coordinator to manage each contractor crew and to verify resources and production metrics daily. The coordinator also verifies proper work completion and other interface issues implicating safety, schedule, budget, quality, and productivity.

Management will review commercial arrangements with contractors in detail, modifying them as required to hold contractors accountable for accurately and promptly reporting resources and production. Management ensures validation of contractor metrics, confirming them routinely.

The current Construction Organizational Chart at the upper management level shows Senior Field Coordinators and Field Coordinators reporting directly to the Project Construction Manager. That manager in turn reports to the Construction Manager of each shop. Management has identified about one senior and to two field coordinators as the preferred ratio. The job profile for both positions includes a job summary, responsibilities, competencies, experiences, education, travel requirements, physical demands, other requirements, and working conditions.

Management, considering historical experience, has chosen to apply an effective approach of assigning one field coordinator to each contractor crew. Based on the 22 to 24 phases of neighborhood projects in 2017, the project team has identified a total of 104 field coordinators as required, with the addition of 27 more for seasonal work. The employee portion of these resources will amount to approximately 70 with the remaining supplemented by contractors during peak periods.

Multiple training sessions for Senior Field Coordinators and Field Coordinators took place between July 2015 and May 2017. First, “Construction Expectations and Organization” training included a new construction organization chart, laid out expectations from senior management and went over the new Mark and Bar work sequence. Second, “Job Expectations for Field Coordinators” training, developed with help from Ernst & Young, addressed the responsibilities of pipeline and restoration field coordinators. Third, “Restoration Overview” training covered 2016 CDOT specification changes and restoration field coordinator activity details. Fourth, a January 2017 capital construction season kickoff training session spanning two days included all construction functions and newly-hired field coordinators. Fifth, all new Senior and Field Coordinators received a Field Coordinator Binder, updated continuously and available electronically. Finally, all new hires undergo new-hire orientation training.

Management initiated a pilot program on the Mark and Bar function in the Beverly Phases 8 and 9 neighborhood project in 2016, with guidance from Ernst and Young. The program sought to begin collecting crew and quantity data. Two more pilots, one on restoration and the other one on main replacement, are underway. Management is establishing a centralized repository. Eventually, the Project Controls Group will maintain and use the repository for analytical and estimating purposes.

Contractors must provide weekly reporting of resources (*e.g.*, crew counts) and quantities (*e.g.*, length of main installed), with daily verification in the field by the field coordinator. The 2017 General Specifications include an outline of reporting requirements for contractors. The Quantity Management Procedure outlines what management does with the information contractors provide.

In order to monitor contractor work execution against plans, Project Controls prepares variance analyses, using the quantities reported. Upon noting a variance, Project Controls identifies its driver (including crew count deviations), the potential impacts, and actions to mitigate those impacts. Project Controls also uses contractor-reported information to validate the realism of forecasts. For example, if a contractor has been installing a consistent footage of main each week for a project, but will need to double the footage installation in order to meet the forecasted end date, the Project Controls team member inquires into changes needed to increase installation rates and impacts on schedule in the absence of such changes.

Expected Post-Implementation Conditions and Factors

Management has agreed that more effective monitoring of contractor resource allocation will support contractor identification of schedule performance issues, and enable timely mitigation of delays. Closer monitoring of performance will improve management's ability to enforce contract terms and conditions that address performance quality. Management considers historical contractor unit work-hour rates on main and service replacement a useful valuable benchmark for rates to consider when developing internal resources to perform such work.

Summary of Liberty's Steps to Verify Implementation

In May 2016, management provided the following preliminary documents for review and comment:

- New organization charts showing the addition of Senior Field Coordinator and Field Coordinator positions reporting to AMRP Project Construction Manager
- Job Profile of Senior Field Coordinator
- Job Profile of Field Coordinator.

On December 14, 2016, Liberty met with management to discuss actions taken and review implementation progress. Liberty reviewed the following close-out documents:

- Construction organizational charts showing the addition of Senior Field Coordinator and Field Coordinator positions reporting to AMRP Project Construction Manager
- Job Profile of Senior Field Coordinator
- Job Profile of Field Coordinator.

Subsequent to the December 14, 2016 meeting, management submitted a revised implementation action plan that introduced another step in collecting and managing contractor resources and

production information. On June 1, 2017 Liberty met with management to discuss action taken and review implementation progress. Liberty reviewed the following close-out documents:

- Construction Organization Chart
- Senior Field Coordinator – Job Profile
- Field Coordinator - Job Profile
- Capital Construction Training Slides
- Excerpts from 2017 General Specifications
- Quantity Management Procedure – Draft.

Management considers the following deliverables as closeout components:

- Establishment of Field Coordinator positions
- Training programs conducted to ensure that Field Coordinators fully understand their contractor management responsibilities
- Changes made to all new contracts and commercial documents requiring prompt and accurate reporting of resources and production.

Observed Conditions and Factors

Management’s understanding of the term “closely monitor” appears to apply only in a physical sense. Liberty’s recommendation sought more than just overseeing the contractors closely on a day-to-day basis. Management can make good use of the valuable resource and production information submitted by the contractors. We concur that the field coordinators need to manage the contractor performance and verify the accuracy of resource and production data. Management now receives such information from all contractors. The Project Controls Group needs to manage and analyze the data in a way that puts information to effective use on short- and long-term bases.

Liberty appreciates that management is accustomed to monitoring contractor performance in terms of lump sum or unit cost only. However, now that contractors report crew information along with the associated quantities, management has gained the opportunity to monitor contractor performance using the added dimension of unit work-hour rates. We acknowledge that sometimes contractors have to work extended hours to meet the schedule, producing a portion of work-hour expenditures will not always be accounted for. Nevertheless, management can still benefit from establishing the historical unit work-hour rates for future job references in comparing performance among contractors. The information also has value as a target, should management choose to develop internal capabilities to perform the work involved in the future.

Implementation Complete and Satisfactory?

The roles and responsibilities of the field coordinators have been defined. All vacant PGL positions have been filled, with an addition of up to 50 more that can be made available via the contractor, as needed. The training program is comprehensive and all the field coordinators are scheduled to be trained. The requirements for contractors to submit the crew and production information are incorporated into the existing contracts, and relevant data is being submitted electronically for major contractors and manually for minor contractors. It is appropriate to close this recommendation.

Remaining Gaps, Needs

Management needs to establish and monitor the unit work-hour database on contractor performance on main replacement, service replacement, and maybe also restorations.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, Liberty planned to review several contractor crew and production reports, and discuss benefits with a field-coordinator representative. We also planned to validate the established database of contractor historical work-hours and corresponding production quantities by the appropriate units of measure.

Final Liberty Verification Activities

On July 11, 2017, we met with management to review contractor crew and production reports. The contractors selected were KS and Henkels & McCoy. The weekly PGL contractor Production and Two-Week Forecast Report shows the following quantity and resource information: main installed length in feet, main installation crews and Full-Time-Equivalents (FTE), services installed in number of units, services installed crews and FTE, and restoration crews and FTE. For production, actuals are compared to original and proposed quantities. For resources, actual FTE and crews are reported for week 1 and forecasted for week 2. Both reports summarize the above information by project that the contractor is working on. The information submitted is clear and orderly.

Liberty also validated that a database has been established for the repository of the above information submitted by all the contractors. Management currently uses the quantity information to ensure schedule consistency. Any discrepancies will be reconciled in a timely fashion. The Company intends to start using the database to establish contractor productivity measured in hours per unit of production when adequate data is collected.

Liberty also interviewed two senior field coordinators, one from the Central Shop and one from the South Shop. Both field coordinators are retired PGL supervisors, who have extensive field experience with the Company. Their responsibilities have been expanded from the previous field inspector role to the current field coordinator role, which includes field supervision, safety, quality control, problem solving, progress and productivity monitoring. They both indicated that they liked this change because the function was more structured and more field coordination resources were available.

All pertinent information was concisely and comprehensively resided in one convenient document called the Field Coordinator Binder. The previous requirement of assigning one field coordinator to oversee each contractor crew was fulfilled and appeared to function effectively, due to adequate field coordinator resources. Their main objective each day was to ensure the level of production matches up with the scheduled progress. Regarding contract changes, they only identified and confirmed the changes, but left the decision-making to contract administration.

Generally speaking, there were seldom job delays that were caused by material delivery issues. They both agreed that the training program was excellent, and periodic re-training was essential. They were not directly involved in cost and schedule variance analyses, but did supply input to the construction managers, who attended the weekly progress meetings.

Liberty considers the implementation of this recommendation verified.

General Observations

During interviews with the Field Coordinators, Liberty examined the interfaces of the position with other PGL resources. In this regard, there were some indications that perhaps this valuable resource (Field Coordinator) is not being leveraged to the extent possible. For example, there appeared to be no communication between Field Coordinators and many positions and functions that could benefit greatly from their knowledge, including Project Managers, Project Controls personnel, and Procurement managers on the subject of change control. Hopefully, such relationships and communications will develop with time.

I.6 – Establishing a Resource Planning Function

Peoples Gas should establish a centralized resource planning group or function

Resource planning comprises a major and important function. The AMRP needs a group of planners with sophisticated skills. Peoples Gas should centralize this function:

- To analyze workload demands and coordinate the labor supply
- To evaluate the proper mix between internal workforce, overtime, and contractors
- To maintain the resource planning model
- To recommend staffing strategies, crew allocation, contractor management, and timing of training requirements.

Underlying Conclusions

I.1 The AMRP lacks the long-term resource plan required for optimizing long-term program performance.

A program like the AMRP requires resource plans defined by skill for each organization critical to production and to construction support. Peoples Gas has no resource plans. Some short-term planning occurs. Even that planning, however, confines itself to main and installation work performed by contractors and the work performed in the field by Peoples Gas crews. Other support groups, such as engineering and construction inspection, do not appear to use any resource planning, either short-term or long-term. One result has been understaffing.

The Company agrees that it needs long- and short-term resource plans, and that it needs to monitor performance against them. Company initiatives developed since discussions began last September between Liberty and executive management call for redefining the program organization structure, and populating it with resources identified through structured resource plans.

Peoples Gas also needs to address immediately its shortages of engineering and construction inspectors. The current practice of performing quality inspections of one contractor per quarter on gas main replacement, service installation, anode installation, cathodic protection, and directional boring does not serve sufficiently to ensure contractor quality. An enhanced contractor quality inspection program will thus also impose additional resource requirements.

I.2 Consistent with the overall AMRP strategy, the Company's short-term resource plans make an appropriate overall assignment of contractor and employee roles, but do not properly identify internal personnel to install meters and contractors to perform main replacement, service installation, and ground restoration.

AMRP resource plans must identify where the utility will use external and internal personnel. The strategy the utility used to define the overall roles of contractors and internal resources is appropriate for the short-term. However, changes in resource availability in the future may leave the Company in a reactive mode. Peoples Gas cannot rely exclusively on the short-term plans to accommodate future circumstances.

Failure to develop more substantial levels of internal workers skilled in replacing mains and installing services will force near total reliance on contractors for the life of the AMRP. Should

the future bring a tighter market for resources (as more utilities accelerate replacement programs) a lack of internal resources will threaten completion of the AMRP on the current overall schedule. Increased competition in the industry for resources may also pose cost escalation risk.

I.3 The AMRP lacks a structured and analytical approach to determining optimum resource allocation.

The AMRP should, but does not, base optimum resource allocation on study and analysis of factors such as wage rates, productivity, work quality, and resource availability. Peoples Gas presently does not have the capability to perform such studies. Liberty expects that some capable managers have sufficient familiarity with the operations to perform such analysis effectively. Current limits with respect to data, however, would make any such analysis ineffective. The Company needs to begin developing this capability, and to support it through improvement in data quality and completeness.

I.5 Peoples Gas’ current resource plan assumes, probably correctly in the short-term, that there is no contractor resource availability problem, but relying on that assumption for the longer term is risky, as main replacement programs extend across the industry.

Resource plans should address how suitable staffing will be ensured long term. The next two charts show that the internal workforce is only going to perform about 10 percent of the work over a span of 20 years. The consensus within Peoples Gas is that contractor availability will never be a problem. However, Liberty believes that growth in demand for contractor resources (as natural gas use expands due to fundamental changes in price competitiveness and as other utilities tackle the massive amount of leak-prone pipe remaining in the industry) creates a real risk over time.

Chart I.7: Annual AMRP Resource Allocations

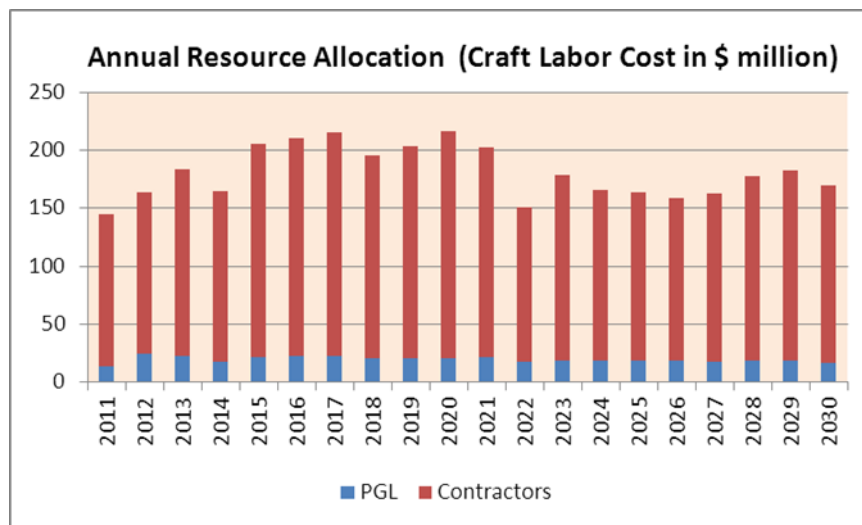
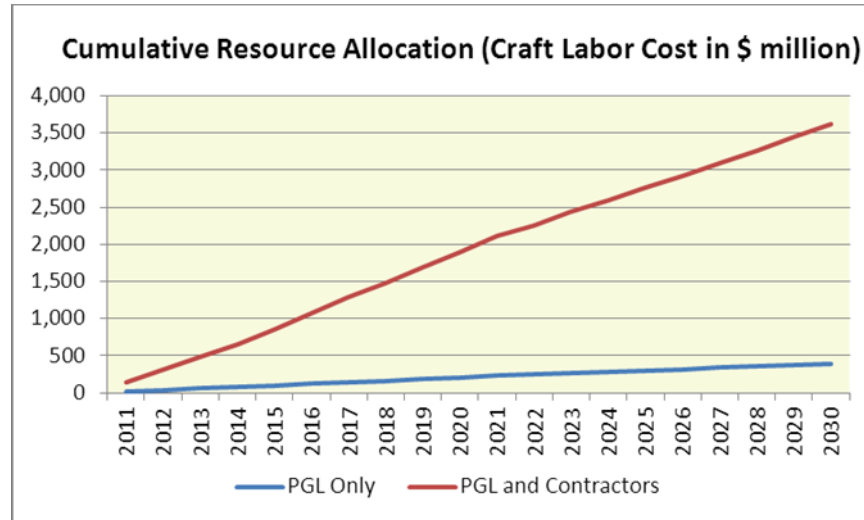


Chart I.8: Cumulative AMRP Resource Allocations



I.6 Current, short-term resource planning considers craft and engineering training.

AMRP resource plans also need to address key training and development needs. Short-term training needs are considered. When the Company develops long-term resource plans, it must consider training and development needs. The replenishing of retired craftsmen provides one crucial piece of information in the resource planning process. Trainee ability and speed to develop into full-fledged operation qualified mechanics are also important factors to be monitored and managed.

PGL Action Plan Steps

Item #	Task	Status
1	Complete the union arrangements and associated training to transfer union workers from the O&M organization to the meter move organization of Capital Construction	Complete
2	Identification of key personnel who will drive the resource planning function along with requisite skills specifications and headcount	Complete
3	Identification of tools to be used by resource planning function	Complete
4	Rework construction sequence process to include greater front end meter move work mitigating internal resource shortfalls once distribution piping has been installed	Complete
5	Scope smaller work packages to enable better resource management	Complete

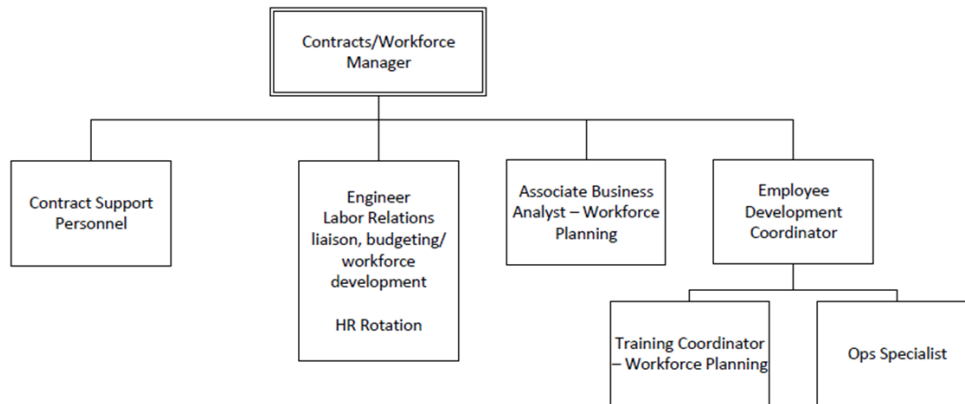
6	Develop contractual control regarding contractor resource efficiency	Complete
7	Integrate the Project Controls and O&M Long Term Planning functions in a manner that will improve resource allocation between O&M and capital construction	In Progress
8	Long term resource analysis for capital replacement project, incorporating retention/retirement rates, onboarding, training, and constraints	In Progress

With centralized resource planning a preferred approach, the possibility of other acceptable approaches to centralizing may exist. At the time of the audit, competing views existed between AMRP project management and O&M management regarding the allocation of resources (primarily for meter moves versus O&M workload). This lack of coordination in making personnel assignments combined with inefficiencies in the construction sequence process to produce delays in meter moves. Delays adversely affected restoration, produced citations from and coordination difficulties with the City, and generated customer complaints.

After the transition to WEC management, competing views between AMRP and O&M management over resource allocation have been eliminated by changes in the organization structure and relationships involving the management groups. Further collaboration with the union has resulted in an ability to transfer up to ninety union employees from O&M to AMRP work, after completion of training. This transformation has produced a field staff more focused on AMRP construction activities. Construction sequence process modifications allowing completion of more meter-move work earlier in the schedule will eliminate delays from a lack of meter-move resources. The process changes also include smaller work scopes for individual project blocks of work, to better assure all work completion under the construction permit and to reduce delays. These changes to the organization reduce needs to coordinate resources with the operations and maintenance function.

To date, management has hired 91 seasonal Project Workers with the second iteration of its seasonal hiring begun in 2016. Management hired seasonal Project Workers to focus mainly on entry level regulatory and compliance work tasks previously performed by higher qualified Operations & Maintenance bargaining-unit field personnel. The hiring of the Project Workers allowed management to reassign those Operations & Maintenance field personnel to support Capital Construction activities, including meter transfer work. The “Workforce Planning” chart below shows the functions of the group that will develop the process and procedures.

CONTRACTS WORKFORCE PLANNING



The Workforce Planning Manager has responsibility for overall development and management of Gas Operations Workforce Planning. The responsibilities include management of resources across the utility to ensure identification, prioritization, and efficient and effective resource allocation. This manager works in collaboration with the Project Management Function, which identifies the need for dedicated field resources. The Workforce Planning Manager will also provide strategic and operational leadership for planning overall resource needs and functions, serving as the Gas Operations liaison to Human Resources stakeholders and service areas engaged in Gas Operations workforce implementation strategies and processes.

Recent hires also include a Workforce Planning Analyst. The Analyst reports directly to the Workforce Planning Manager. The Workforce Planning Analyst develops and maintains workforce data models. The Analyst will provide key reports and data analysis of staffing, workforce productivity, and retention. The Analyst will assist in planning, analysis, and development of labor staffing strategies, to ensure identification, prioritization, and efficient resource allocation. The Analyst will contribute as a key member on the cross functional team between Gas Operations and Human Resources.

Management has reworked the construction sequence process to include greater front-end meter move work to mitigate internal resource shortfalls that might follow distribution piping installation. The organization completed a pilot project using the Future Meter Move Procedure for AMRP. Following pilot completion, management developed a draft procedure for Meter Transfer for post-pilot operations. The procedure captures the process of preparing for the movement of meters in advance of the gas main and service work through the Mark and Bar/Non-Mark and Bar process. The pre-work allows for improved coordination and efficiencies with internal resources and contractors when performing the meter transfer. Additionally, in instances where the front-end meter work is not the preferred method, the procedure provides guidance for the traditional Non-Mark and Bar process.

Management changes include smaller work scope for individual project blocks of work, to better assure all work completion under the construction permit. Construction Permits have a 90-day window. The shortened duration of the construction and smaller work area allow for an entire

project to be completed under the Construction Permit. Success in this regard obviates the need for service or restoration permits. The schedules for these projects allow 30 days for mains and services, 30 days for restoration and then 30 days for retirement. There is no need for service or restoration permits.

Greater attention by management in scheduling, communicating, and coordinating contractors with its own internal resources is intended to result in more efficient work processes. Management will request contractors to provide information on the use and deployment of their resources through bid review discussions, management of their work in the field and with contract controls.

To improve resource allocation between O&M and capital construction, Project Controls and Gas Operations Planning have taken a proactive approach when monitoring program productivity against resource planning. Through the evaluation of full time equivalent (FTE) and production quantities, Project Controls analyzes O&M and capital construction resources required over a two-year cycle, concentrating on the resources required for the immediate year. FTE curves will provide data required to optimize, balance, and reallocate resources where deemed necessary by both the Project Controls and O&M Long Term Planning functions. In addition, a biweekly resource meeting between Project Controls, O&M Planning, and Operations leadership and Construction leadership evaluates current FTE needs against future FTE requirements.

The resource planning model primarily addresses the labor required to complete the forecasted amount of work for the year. The model also enables identification of key positions and forecasted attrition. The full planning analysis considers operational forecast data and forecasted attrition data for key roles. Identification of gaps in those key roles begins consideration strategies to close those gaps (*e.g.*, training/qualifying of existing employees and adjusting the pipelines for new employees). Management currently uses the Utility Worker and Project Worker job titles for new and temporary union employees, but will evaluate other avenues to bring in and qualify new employees, negotiating for changes in future years, based on the needs of planned work and the anticipated attrition of employees needed to complete work.

Expected Post-Implementation Conditions and Factors

Management agrees that better resource planning should allow the AMRP capital construction effort to progress more efficiently and effectively by eliminating or mitigating conflicts with O&M labor requirements and by strategically balancing the internal and contract resource mix. Additionally, clearly defining the work scope and improving coordination efforts between contractor and internal resources should enhance efficiency and effectiveness.

Summary of Liberty's Steps to Verify Implementation

On June 1, 2017, Liberty met with management to discuss actions taken and review implementation progress. We reviewed the following close-out documents:

- Gas Operations Organizational Chart and Workforce Planning Functions
- Workforce Planning Manager - Job Profile
- Workforce Planning Analyst - Job Profile
- Resource Planning Model

- Meter Move Procedure for AMRP - Draft
- Construction Sequence
- Albany Park Interval Piping Upgrade Drawing
- Albany Park Resequencing
- Beverly Phase 3 Interval Piping Upgrade Drawing
- Beverly Phases 8 & 9 Interval Piping Upgrade Drawing
- Beverly Phase 10 Interval Piping Upgrade Drawing
- Attrition Model Sample
- Retirement Eligibility Model.

Management considers the following deliverables as closeout components:

- Identification of key personnel who will drive the resource planning function
- Modified union arrangements are rolled out
- Contractual controls are instituted in the contracts with contractors
- Construction sequence is reworked to include greater front-end meter move work
- Methods are developed to scope smaller work packages in order to mitigate schedule slippage
- Work conducted by the Project Controls and O&M Long Term Planning functions is streamlined and integrated.

Observed Conditions and Factors

Management continues to believe that it does not “control” contractor resources, who select the means and methods they employ. We accept that view under the current mode of operation, which provides for contractor performance of all main installation, services installation, and restoration. In the future, however, contractor resource availability may diminish. Given the potential for that occurrence, the Resource Planning Group needs to position itself to analyze workload demands and coordinate the internal and external labor supplies. It could also recommend staffing strategies, crew allocation, contractor management, and timing of training requirements. It could also evaluate the proper mix between internal workforce, overtime, and contractors.

Implementation Complete and Satisfactory?

Management has fully staffed the Workforce Planning Group and developed the Resource Planning Model, which is operational. Assessments of available resource capacity consider training requirements and attrition/retirement information. This recommendation has been sufficiently implemented.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

Liberty planned to review how training requirements and attrition/retirement assumptions affect resource planning.

Final Liberty Verification Activities

On July 11, 2017, we met with management to review how training requirements and attrition/retirement assumptions affect resource planning. Presently, this information is being tracked under a separate database. Work demands from the Resource Planning Model were downloaded to match up with resource availability calculated in this database. Eventually, this database will be integrated into the Model.

Based on the workload information and resource availability analysis, the resource planning group identifies a shortage of carpenters, welders, and crew leaders in the near future. There are multiple options set in motion to acquire the required resources, namely, union negotiations, partnership with the City of Chicago on the apprentice program, and arrangement of seasonal workers.

The Workforce Planning Group is fully staffed. The Resource Planning Model will be operated and maintained by the Workforce Planning Analyst.

Liberty considers the implementation of this recommendation verified.

General Observations

None.

I.7 – Evaluating Comparative Performance of Internal and External Workers

Peoples Gas should evaluate regularly the performance (e.g., wage rates, quality, productivity, expertise, safety, dependability) of the internal and external workforce.

Liberty understands the performance of internal workforce and contractors cannot be compared on a completely equal footing. Comparisons nevertheless need to be made, in order to optimize resource alignment. Bigger projects having greater lengths of main replacement generally have a cost advantage. If contractors offer more specialized services, they have an advantage that can lead to greater productivity. On the other hand, the internal work crews should be more familiar with the procedures and facilities and may bring a greater sense of “ownership,” which can produce a quality advantage. As long as work differences are understood, the insights gained from comparison will be important in any rebalancing of work that leads to the use of internal resources for moderate portions of main and service installation in the future.

Underlying Conclusions

I.2 Consistent with the overall AMRP strategy, the Company’s short-term resource plans make an appropriate overall assignment of contractor and employee roles, but do not properly identify internal personnel to install meters and contractors to perform main replacement, service installation, and ground restoration.

AMRP resource plans must identify where the utility will use external and internal personnel. The strategy the utility used to define the overall roles of contractors and internal resources is appropriate for the short-term. However, changes in resource availability in the future may leave the Company in a reactive mode. Peoples Gas cannot rely exclusively on the short-term plans to accommodate future circumstances.

Failure to develop more substantial levels of internal workers skilled in replacing mains and installing services will force near total reliance on contractors for the life of the AMRP. Should the future bring a tighter market for resources (as more utilities accelerate replacement programs) a lack of internal resources will threaten completion of the AMRP on the current overall schedule. Increased competition in the industry for resources may also pose cost escalation risk.

PGL Action Plan Steps

3	Design the Internal/External Resource Evaluation process and procedure	Complete
4	Prepare Internal/External Resource Evaluation process and procedure	In Progress
5	Approve and issue Internal/External Resource Evaluation process and procedure	In Progress
6	Provide orientation and training to project personnel on Internal/External Resource Evaluation process and procedure	In Progress
7	Conduct annual Internal/External Resource Evaluation	In Progress
8	Evaluate long term staffing needs of the program based on annual resource evaluation	In Progress

9	Update AMRP Resource Plan and model based on annual evaluation	In Progress
10	Document completion of the recommendation implementation	In Progress
J.1.1	Project Dir. to form Scope Control Task Lead	Complete
J.1.2	Define objectives and requirements for the Scope Control process and procedure	Complete
J.1.3	Design the Scope Control process and procedure	Complete

Management has taken the initial steps to prepare an AMRP resource plan by conducting several resource analyses of the areas of work force constraints. The first analysis completed was an overall work and productivity analysis. The second analysis completed was a workload analysis of the field workforce requirements of the AMRP for 2015 and 2016. Both of these workforce analyses allowed management to model various options to solve for short term, staffing needs for field resources as well as to provide the data input for an integrated resource planning model.

Management has taken the steps noted below as part of the analysis and study activity to prepare the AMRP resource plan.

- **Assess Current Internal and Third Party AMRP Resources:** Prior to the acquisition, management had been in the process of hiring a Workforce Planning Manager to help perform the analysis and strategy for the staffing of the project and PGL. Beginning from the closing day of the acquisition, the new PGL leadership conducted sessions with all employees to introduce the team, review the corporate culture and the overarching goals of the organization, and interact with employees at the main office and shop locations. Subsequently, the Vice President of Construction began a process of participating in weekly construction meetings, reviewing organizational structure and job responsibilities of internal and external resources, reviewing construction reports, and evaluating alternatives and opportunities for improvement. Consistent with Liberty’s recommendations and WEC Energy Group Inc.’s historical practice of in-house management of capital projects, PGL ended the services arrangement with Jacobs Engineering and moved management of the AMRP in-house.
- **Define Organizational Structure and Recruit Key Positions:** The VP-Construction has four direct reports, namely, Director-Engineering, Director-Construction, Project Director, and Director-Contracting. AMRP will be a part of this organization, going forward.
- **Transition to in-house Program Management:** PGL completed the transition to inhouse AMRP program management at the end of October 2015. Based on thorough reviews of skills, qualifications, experience, and value to AMRP as well as the need to maintain appropriate continuity and institutional knowledge of program implementation, a select number of former Jacobs Program Management Organization staffers were retained as either PGL direct-hires or employed through third-party consultants to continue to support AMRP implementation. The remaining positions or vacancies that resulted from

the Jacobs transition had been advertised and internal and external candidates could apply.

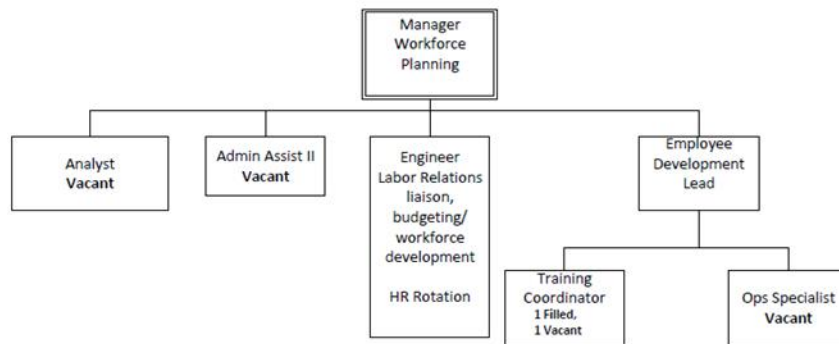
- Evaluation of long term staffing needs of the program: PGL management evaluated the current state of resources post in-house management transition and modeled the long term (3-5 year) workforce needs of the program. The workforce model included retirement impacts and retention rates. Management then developed appropriate staffing plans based on these evaluations and model outputs.

The previous activities are preparatory and intend to support the following principal activity that directly addresses Liberty’s recommendation:

- Develop a Resource Plan and Model: Management will develop a resource planning model that takes into consideration all labor for the program. The plan and model are intended to serve as tools to provide strategic direction and recommendations based upon model outputs and analysis. Furthermore, the plan and model will facilitate risk analysis of the variations of changes in the mix of labor and potential resource needs.

Management expects periodic adjustments to the resource plan and model as well as adjustments to optimize organizational design. To this end, management has now established a workforce planning department as part of the organizational design.

WORKFORCE PLANNING



FUNCTIONS:

MANAGER WORKFORCE PLANNING: RESPONSIBLE FOR MANAGEMENT OF ALL REGIONAL SCHEDULES TO ENSURE ALL PLANNED WORK ACROSS PGL HAVE THE ALLOCATED RESOURCES TO EXECUTE ALL O&M, COMPLIANCE, AND CUSTOMER WORK ON TIME AND ON BUDGET.

EMPLOYEE DEVELOPMENT LEAD: RESPONSIBLE FOR THE OVERSIGHT OF TRAINING AND DEVELOPMENT FOR NON-OQ COURSES FOR PGL, INCLUDING UW SCHOOL

ANALYST: RESPONSIBLE FOR MAINTAINING AND RUNNING THE WORKFORCE PLANNING MODELS

ADMIN ASSIST II: SUPPORT FOR THE WORK FORCE PLANNING DEPARTMENT AND DCRs FOR MANAGEMENT EMPLOYEES

DEVELOPMENT COORDINATOR: RESPONSIBLE FOR COORDINATION OF TRAINING AND DEVELOPMENT FOR UNION EMPLOYEES, AND COORDINATION OF NON-UNION EMPLOYEES

OPS SPECIALIST: SUPPORT OF THE DEVELOPMENT DEPARTMENT

ADMIN ASSIST: SUPPORT OF THE DEVELOPMENT DEPARTMENT

The Manager, Workforce Planning is responsible for the overall development and management of Gas Operations Workforce Planning. Responsibilities include the following:

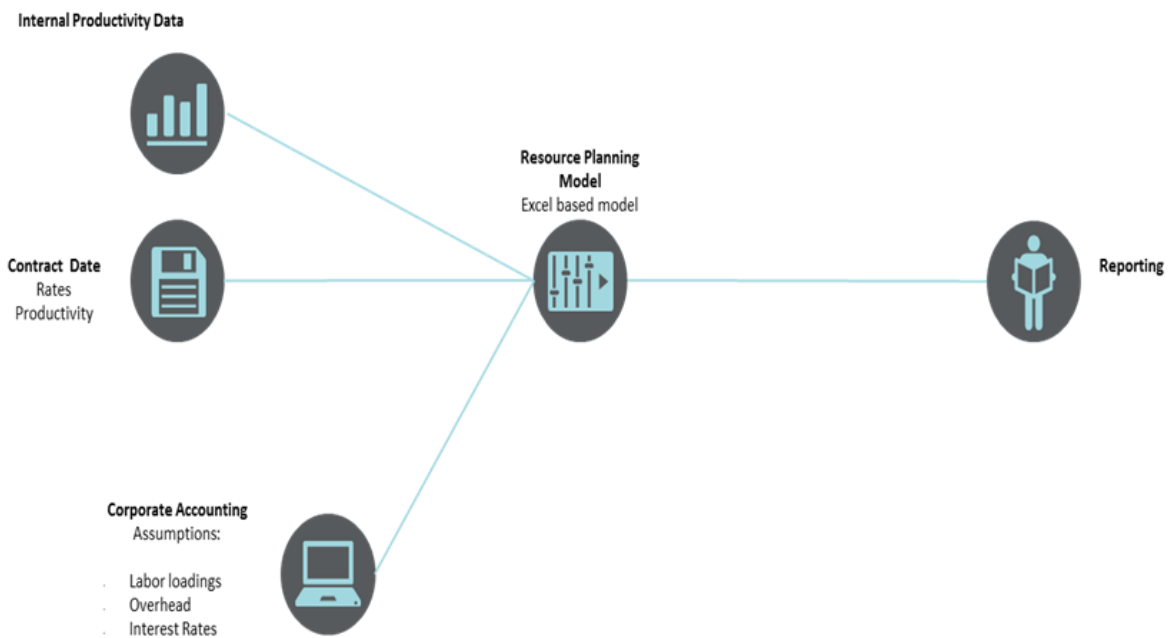
1. Management of resources across the utility to ensure identification,

2. Prioritization,
3. Efficient and effective resource allocation,
4. Provide strategic and operational leadership for planning overall resource needs for the company,
5. And function as the Gas Operations liaison to Human Resources stakeholders and service areas engaged in Gas Operations workforce implementation strategies and processes.

Management has now developed an internal/external resource evaluation model. The objective of the evaluation model is to examine and assess the options between the use of internal and external resources. The model is available for use upon request or as-needed. The model is intended to be used where there are potential changes in the project, labor contracts, or the vendor contracts or if there are changes in need from the forecast.

The model specifically allows for a direct cost comparison between internal and external resources. The model uses productivity data which would be derived from the productivity metric reports from the capital and O&M organizations. The model assumes the ability of either resource to provide the correct skills, expertise and adherence to performance of work to specifications and to ensure that work is performed safely.

Below is a schematic of the inputs and outputs of the resource evaluation model.



Evaluation will be conducted on an as-needed basis. At such time, if there are material impacts to long-term staffing needs and projections they will be addressed on a case-by-case basis.

The Workforce Planning group owns the model and will maintain the evaluation model.

Workforce Planning will work directly with any department needing the evaluation to be done; they will provide the model and any training on the model as needed. The Workforce Planning group will evaluate the model periodically along with any assumptions within the model and make changes or improvements, as required.

Expected Post-Implementation Conditions and Factors

Management could gain insights from performance analysis and benchmarking to help balance work requirements between internal and external resources. The development of an AMRP resource plan will further facilitate planning and performance assessment activities. Management seeks to align actual work and resource scheduling with the plans/budget and improve performance at the back-end of the process (e.g., meters and retirements) by optimizing resource allocations to sustain progress at targeted levels.

Summary of Liberty’s Steps to Verify Implementation

In May 2016, management distributed the following documents for status update:

- Job Profile of Manager Workforce Planning (Job Summary, Responsibilities, Competencies, Experiences, Education, Travel Requirements)
- Organizational Chart - The “Planning Overview” of gas operations with the work planning group integrated in the organizational structure.

On March 22, 2017, Liberty met with management to discuss actions taken and review implementation progress. Liberty reviewed the following close-out documents:

- Manager Workforce Planning – Job Profile
- Gas Operations Organizational Chart and Workforce Planning Functions
- Template for Evaluation Model

Management considers the following deliverable as closeout components for the development of the AMRP detailed resource plan:

- PGL Organizational Structure – Capital Program Delivery
- Resource Analysis & Workforce Constraints
- AMRP Internal & Third Party Resource Assessment
- AMRP Resource Plan & Workforce Model
- Evaluation and analysis procedures – Internal/External resources

This recommendation will be deemed complete when deliverables and applicable program management procedures and organizational elements for resource planning and workforce modeling are approved and published, and all managers have been informed of their role in the process and management’s expectations for their compliance.

Observed Conditions and Factors

Liberty notices that this Internal/External Resource Evaluation Model is designed only to compare cost performance. This is a reasonable approach, since most of the contracts are unit pricing. Different templates are designed for different categories of work. The evaluation is comparing total contractor costs, which include profit, versus all PGL costs, which include salary, benefits, payroll taxes, workers’ compensation insurance, vehicle & equipment, and other costs, such as

supervision, small tools, expenses, interest cost, etc. The only thing that is missing is supervision on the contractors.

Implementation Complete and Satisfactory?

Yes. This cost performance comparison model is a good start. The original scope of this recommendation calls for other performance criteria, such as productivity, wage rates, quality, expertise, safety, and dependability. Liberty appreciates that some of these criteria are not easy and appropriate data has to be collected before analysis can be performed. For example, we recommend that contractor work-hours need to be reported such that productivity can be compared. Other more subjective criteria, such as quality, safety, and dependability can be evaluated by using the same approach as the contractor scorecard.

Remaining Gaps, Needs

Management needs to complete the following deliverables:

- Evaluation and Analysis Procedures – Internal/External resources

Management also needs to select a pilot project to test out the comprehensiveness and usefulness of the templates.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, Liberty will review the Evaluation and Analysis Procedure – Internal/External Resources. We will also validate an actual evaluation and analysis sample, if available.

Final Liberty Verification Activities

On July 11, 2017, Liberty met with management to review the Cost Comparison Model. This model's design supports the evaluation of the cost of performing tasks using internal resources versus contractors. A procedure describes the purpose of the model, its ability to handle all types of physical work, the ownership and maintenance responsibilities assigned to the Contract Administration Group, and the assumptions built into the model (*e.g.*, union labor rates, loaders of 84 percent to account for benefits, taxes, overheads). Management had yet to begin using this recently developed model, but did illustrate it with a hypothetical project (Sewer Pre/Post Camera Evaluation) to illustrate the cost comparison of internal versus contractor resources to perform work.

We found a procedure and model in place and sufficient to enable a *cost* comparison, which comprises the more complex component of *performance* comparison. Management can now compare quality, safety, productivity, and cost of internal versus external resources. We found implementation satisfactory.

General Observations

None.

J.1 – Implementation of Two-Pronged Scope Control Process

Peoples Gas AMRP management should promptly design and implement a two-pronged scope control process: (a) at the program level, and (b) at the individual project level.

Scope control processes should contain, at a minimum, the following features:

- A baseline definition of scope: The program master plan should frame this process, supported by associated documents such as estimates and schedules. The baseline scope serves as a control foundation only if well documented. The documentation must define underlying assumptions completely and include them in the plan.
- A process for prompt identification of proposed changes: “Chapter K: Cost Estimating” proposes a cost trend report. Those proposing or discovering potential changes air them promptly. Immediate publication of proposed changes does not wait for details, cost estimates, or other, detailed supporting information. The process places a priority on prompt identification, so that management, if it chooses, can intervene before significant time passes, and options diminish.
- Technical analysis of proposed changes: Effective control requires an objective evaluation of proposed changes. Proposed changes often come in proposals by organizations with a high level of technical expertise. Proposals through an authoritative voice can tend to cause others to take them as “given.” Providing for technical analysis by a third party of commensurate stature supports sound analysis and alternative identification, which enables best-informed decision-making.
- Cost and schedule impact of proposed changes: Cost engineering personnel must evaluate changes for cost and schedule impact, and report them to management. Sponsoring organizations often underestimate these impacts. They either lack the ability to estimate them, or do not have awareness of the full implications that proposed changes may have for the project involved. Full and correct identification of the impact may lead to withdrawal of a proposed change. Even if a change occurs, management should understand impacts fully before allowing a change to proceed.
- Documentation of management’s decision-making process: Scope changes often serve as a principal driver of project cost increases. Management should demonstrate prudent handling of such changes. Making a full and complete record of management’s actions when learning of the proposed change and of management’s considerations in approving the change supports such demonstration.

Underlying Conclusions

J.1 The AMRP has not operated to date under an effective scope control program.

Liberty found concerns with AMRP project-level scope control on two levels. First, the focus on contracts obscures management visibility with respect to changes originated through other means. For example, changes made in engineering often require incorporation into bid documents. Contract change controls will not identify them. Second, the time delay between a change and its evolution into the contract change process eliminates the possibility of analysis and mitigation. A program like the AMRP requires a formal set of processes for the control of scope at the program and at the individual project levels. Scope control processes should focus on the early identification of potential changes, structured evaluation of the need for them, determination of their schedule

impacts, and alternatives for addressing the needs underlying them. A proper hierarchy of required approval levels should exist.

The AMRP lacks these scope control attributes, instead maintaining that control of contractor change requests is sufficient. The narrow approach that AMRP management has taken does not comport with program needs or with Liberty’s experience in the industry.

Liberty found no scope control processes at the overall program level. Some scope control processes do exist at the project level, but Liberty did not find them sufficient. The AMRP does seek to control scope at the project level, but only when changes directly affect a field contract. Other project-related changes (those not associated with an already-executed contract) do not face scope control processes. Also, by definition, changes associated with an already-executed contract may not come to management’s attention until after options for addressing them are substantially restricted, if not gone entirely.

At the program level, scope changes may have been included and partially documented in cost estimate updates. Liberty, however, found no indication that they underwent analysis and approval processes.

PGL Action Plan Steps

Item #	Task	Due Date
1a	Internal review of current contract terms	Complete
1b	Project Director to form Scope Control Task Lead	Complete
2	Define objectives and requirements for the Scope Control process and procedure	Complete
3	Design the Scope Control process and procedure	Complete
4	Prepare Scope Control process and procedure	Complete
5	Approve and issue Scope Control process and procedure	Complete
6	Provide orientation and training to project personnel on Scope Control process and procedure	In Progress
7	Document completion of the recommendation implementation	In Progress

Clearly identifying program and project level scope comprises the first step in implementing a scope control process. The new cost and schedule models developed by Burns & McDonnell forms the long-term AMRP baseline program. Management develops and refines project-level scope as neighborhoods are designed into phases. Both the project level and program level scope will feed one another. As data and analysis become available, management must incorporate changes in

project level scope into the overall program scope to identify trends or change initial assumptions. To establish the scope properly, management must identify all the potential cost driver groupings.

Consistent and prompt reporting of these groupings is essential for scope control. For example, at a project level, main installation may form one of the cost driver groupings. Subgroupings that make up the main installation grouping could include, for example, contractor cost, material cost, company labor, company vehicles, restoration, and permit costs. This approach enables proper tracking and reporting of all quantities and values. As they are identified, action can be taken to rectify the problem. The establishment of the project-level process can serve as a check against the program level scope and support recommendations and adjustments, as necessary.

Management has accepted the importance of implementing a scope control process, designating the Project Controls Manager as the Scope Control Task Lead. Scope control observations can and should be encouraged throughout all stages of a project lifecycle. The early identification and ability to influence change with the least impact to overall cost and schedule of the program forms the key concept of the process. Management has developed a process of scope control, now deploying training to the appropriate team members, with a focus on proactive scope control. The following two examples illustrate proactive scope control identified in the design and construction execution phases.

Scope Creep Avoidance: An engineer reviewing comments from another local utility on main replacement drawings observed a statement that PGL should replace the other utilities' pipe whenever crossing their pipe. The engineer recognized that this comment would add scope to his project, and potentially lead to significant scope increases if applied to other projects. The engineer brought the comment to the attention of his engineering manager and the Project Manager. Both Managers raised the issue to their Directors, who brought the issue to the attention of the Vice President of Construction. A PGL Executive then met with the other utility's leadership, and reached consensus that the other utility did not intend to have PGL replace its pipe. Identifying this potential scope change quickly produced effective action to control program scope.

Considering Alternate Design Options: A Field Coordinator observed that a project's drawings showed main installations routing around Americans with Disabilities Act-compliant facilities, to avoid having to restore them. The Field Coordinator thought that scope could be controlled further by changing to the directional drilling installation method to pass under the facilities. He brought this idea to the attention of project management, which is now working with engineering and the appropriate City personnel to gain approval for this change in installation execution. The change would reduce the quantity of pipe installation, increase installation productivity, and alleviate overall safety concerns associated with multiple offsets and directional changes of the natural gas infrastructure.

The Change Management Procedure documents the Scope Control process. Management has conducted initial training for team members from Engineering, Contracts, Construction, and Project Management and Controls. To emphasize the importance of early identification of scope changes with the purpose of controlling, avoiding or mitigating them, management contemplates additional training with real-life scenarios during the second quarter of 2017.

Expected Post-Implementation Conditions and Factors

Scope control processes should focus on the early identification of potential changes, structured evaluation of the need for the changes, determination of their schedule impacts, and alternatives for addressing the underlying needs. A proper hierarchy of required approval levels should exist.

Summary of Liberty's Steps to Verify Implementation

On June 9, 2016, we met with the Project Management & Controls Project Director to discuss actions taken and review implementation progress. Close-out documentation reviewed included a Change Management Procedure Draft. Management then, on June 30, 2016, submitted the following documents for review:

- Task Support Document
- Capital Change Management Procedure Draft.

On September 19, we met with management and reviewed the following documents:

- Program Memo – Change Management September 2016
- Construction Change Management Procedure draft, dated September 7, 2016
- Risk-Trend-Change Concept Exhibit
- Change Management Process Flow
- Change Process Examples
- Change Management Overview slides, dated September 7, 2016.

We observed to management that the scope control feature was weak. The underlying recommendation seeks to ensure the exercise of scope control to prevent unjustifiable changes. Management's progress, as reflected in these documents, follows the right track, but limits it to the project (not program) level. The recommendation reaches performance at both levels. At the time, AMRP scope and target end-dates remained open pending an ICC decision following the Stakeholder Process.

Management committed to send updates of its implementation progress, which it later did with a table contrasting differences between project-and program-level activities. On April 28, 2017, Liberty met with management to discuss:

- Background and progress update
- Change management philosophy
- Change management procedure, effective May 1, 2017
- Change management flow diagram
- Change management training for Construction managers and Field Coordinators
- Change management training for PM&C, contracts, and Construction personnel.

After this meeting, management provided descriptions of a few cases illustrating successful intervention to minimize the extent of changes, through early identification and effective communication.

Management considers the following as key deliverables to assist in developing a scope control management program:

- AMRP Schedule Model
- AMRP Cost Model
- Scope Control Plan, which was the old name for Change Management Procedure (now incorporated into the Project Execution Plan).

Observed Conditions and Factors

The purpose of management’s original Change Management Procedure was to manage change requests. This procedure focuses more on how to monitor and manage changes after they occur, as opposed to preventing changes from causing scope expansion. We expressed this concern to management at our June 9 meeting. Management committed to providing a scope control procedure addressing all five essential components defined in the specific guidelines in the Liberty Audit Report; *i.e.*, the baseline definition of scope, the prompt identification of proposed change, technical analysis of the proposed change, the cost and schedule impacts of that change, and the documentation of management’s decision-making process related to that change.

The revised Construction Change Management Procedure we reviewed on September 19, 2016 and on April 28, 2017 meeting, showed major improvement. It covers crucial steps like identification, validation, analysis, control, and action. However, what remains lacking is express intent regarding management decision and intervention.

Implementation Complete and Satisfactory?

The latest version of Change Management Procedure does not adequately address all critical scope-control features. However, the two examples provided by management do illustrate that the application of scope-control practices did occur during engineering and construction phases. For practical purposes therefore, we consider the intent of this recommendation has been met.

Remaining Gaps, Needs

Management should demonstrate how scope is going to be controlled by allowing the appropriate managers to challenge or intervene. The Change Management Procedure is being revised to emphasize the prompt identification, the technical analysis, the cost and schedule impacts, and the documentation of management’s decision of any major proposed changes.

PGL Position

Management believes that the recommendation is complete.

Future Liberty Verification Activities

We planned to evaluate examples of successful scope control scenarios, complete with documentation of effective management decision-making in June of 2017.

Final Liberty Verification Activities

On July 11, 2017, we met with management to review the PGL Scope Control Log, which lists four scope control cases: Water Department Responsible Engineer (RE) requirement, Citations for Restoration Complaint around all Alley Driveway Aprons, adherence to Memorandum of

Understanding (MOUs), and New Waste Management Spoil Disposal process. The potential high-level cost impact was estimated for each case, ranging from \$3 million to \$39 million.

For each case in the Log, PGL identified the scope control issue and escalated the matter to pursue resolution. This Scope Control Log demonstrates the intent of this recommendation is being met. It could be used in conjunction with the Cost Trend Log recommended in G.2.

Liberty considers the implementation of this recommendation verified.

General Observations

None.

K.1 – Developing a Cost Estimating Capability

Peoples Gas should establish a cost estimating capability by formulating a clearly communicated cost estimating philosophy, formalizing a cost estimating process, preparing procedures, and developing effective tools.

Liberty and the Company began discussing planned initiatives to address central program management, control, and oversight needs last September. Peoples Gas has stated that actions to address this recommendation are underway. The urgency of addressing program cost, however, needs to be underscored, in order to accelerate the pace of implementation. Those efforts would be materially advanced by securing the services of outside, professional cost estimators (two or more for a period of approximately six months) to develop a programmatic approach, define processes and procedures, and provide training to those individuals performing cost estimates in the new organization that Peoples Gas plans to manage the AMRP.

Underlying Conclusions

K.1 The AMRP cost estimating process is fragmented and lacking in attributes key to its use as an effective basis for measuring AMRP work.

Each project estimate essentially consists of three different parts provided by personnel from three separate groups:

1. The design engineer normally estimates engineering and materials costs
2. The manager of the Cost Management Group adds overhead costs, which include the monthly allocation of charges from the personnel of all the supporting organizations
3. The Change Management Group provides the estimated construction costs, based on the awarded bid of the selected contractor.

A primary purpose of a cost estimate is to provide a valid cost monitoring base. The current AMRP approach tends to actualize the engineering costs, focus essentially only on the contractor bids, and rely on the expectation that time charges by Peoples Gas employees will fall in line with the historical assumptions used. The AMRP cost estimates developed have limited consistency, and do not promote confidence with respect to their use in providing effective cost management of individual AMRP projects.

K.3 There presently do not exist cost estimating capabilities effective to meet AMRP needs.

No formal, written cost estimating guidelines or procedures exist. The cost estimating skills of the individuals preparing estimates vary significantly. In the absence of formal procedures and training, the quality of project estimates developed also vary greatly. The recent hiring of the first professional cost estimator for a program of this size reflects recognition of the need for improvement. One estimator will not prove sufficient, however, given the size, scope, and duration of the AMRP.

PGL Action Plan Steps

Item #	Task	Status
1	Finalize definition and mock-ups (i.e., methods) of the new cost estimate Compatible Units (CUs) to be used in WMIS	Complete
2	Document the CU annual update process	Complete
3	Obtain updated rates (Company, Contractor & Overhead)	Complete
4	Complete WMIS system changes for new cost estimate CU definitions	Complete
5	Communicate and train stakeholders on new CU process, tools and procedures	Complete
6	Develop new cost estimation philosophy between all identified stakeholders	Complete
7	Define cost estimation process	Complete
8	Define roles and responsibilities for the new cost estimating process	Complete
9	Identify all systems and tools required to support the new cost estimation process	Complete
10	Define all system/tool requirements and identify current gaps	Complete
11	Finalize business case and obtain necessary internal approvals	In Progress
12	Develop cost estimation procedures	In Progress
13	Develop cost reconciliation procedures	In Progress
14	Develop system/tools that meet cost estimating requirements	In Progress
15	Communicate and train stakeholders on new process, tools and procedures	In Progress

A holistic cost estimating process begins at the program level, providing an overall, high level estimate that involves the entire scope of the AMRP. Burns & McDonnell (B&M) has developed

program level cost and schedule models. Project level estimates then begin as the individual projects are initially conceived. Typically, this process happens in the engineering and design phase. As multiple iterations of the design progress, so does the project estimate. These iterations that are developed will be documented with supporting inputs and assumptions. Management has decided to utilize the design engineers to develop the initial engineering estimates and also prepare the final engineering estimates. Throughout this entire process the Cost Estimator within the Project Controls Group has the accountability and responsibility for ensuring that the estimating is credible and take necessary action to identify and correct any discrepancies.

At the start of 2015, management implemented updates to the existing cost estimating process used by Gas Engineering. A team consisting of representatives from Accounting, Gas Engineering, Business Support, the Program Management Office, Project Services, and Team Impact worked together to come up the key components for estimating and how best to use existing software to produce better estimates. It was determined that the existing work management information system (WMIS) system could be modified to meet these needs. The team agreed that the primary estimating components for both mains and services would be: contractor labor, company labor, materials, restoration, and overhead. This initiative resulted in new compatible units to be defined and developed in WMIS.

As a result of the need to continue to refine and improve cost estimates, the philosophy, process, procedures, and tools are revisited. In the development of the cost estimating process and tools, the inter-relationships with upstream and downstream processes were analyzed in collaboration with Project Management & Controls, Engineering, Supply Chain, Contracts, Construction, and IT. The cross departmental team reviewed the Compatible Units (CU) and what the process would be to maintain the CUs as established within the Work Management Information System (WMIS). Based on the review of the maintenance process in conjunction with the inter-relationships with upstream and downstream processes, it was determined that better quality estimates could be prepared outside of the CUs in WMIS with much more efficient maintenance process. The Project Estimator tool was developed in the first quarter of 2016 between Project Management & Controls, Contracts, and Engineering using pay item costs from 2015 bid data.

Cost estimate reconciliation is another major facet of a holistic cost estimate process. The data that is collected needs to be analyzed and compared to the cost estimates to understand the major cost drivers that contributed to significant overruns. Project cost reconciliation will be prepared in a manner that can be completed on a regular basis such that project managers can take appropriate actions confidently for future projects.

In summary, the estimating process as a whole has been upgraded for AMRP. Ultimate responsibility of the estimating functions and oversight will be maintained in the Project Controls Group. A process has been developed to establish the procedures and a standard of performance for estimating. Tools and tactics are established to ensure effective coordination with participating departments that either provide estimate review or use cost estimating data. These estimates will form the basis of project management and provide useful data and insight at both the project and program levels.

Expected Post-Implementation Conditions and Factors

The expected benefit of a holistic cost estimating process would be to provide a basis for sound project management and cost control. A quality estimating process allows the Project Controls Group to monitor productivity and expenses of actual conditions versus what was originally estimated or anticipated. On a timely basis, these comparisons allow the Project Team to respond to early warning sign and manage projects in a proactive manner rather than on a reactive basis. From an overall program level, project estimates can be used to analyze and refine program estimates so adjustments can be made to update and maintain the credibility of the AMRP final projected costs.

Summary of Liberty's Steps to Verify Implementation

In May 2016 management provided the following documents for our review and comments:

- A sample of the new cost estimate Compatible Units currently used in WMIS.
- The CU Annual Maintenance of WMIS Estimating Methods & Values Process Flow Chart
- The cost estimation spreadsheet - a tool that was developed and utilized to get project estimates.
- WMIS updates for cost estimating completed and training outlines developed.
- Cost Estimating Guideline Procedure - revised 3/1/2016
- The cost estimating definition is shown through the Cost Estimating Guideline flow chart

On November 28, 2016, management conducted an on-line Cost Estimating Workshop for us, and provided the following materials for discussions:

- Cost Estimating Procedure - Table of Content page
- Cost Estimating Process Flow Diagram
- Cost Estimating Tool sample page used to prepare project cost estimates
- Excerpts from Cost Estimator Training
- Project Controls Organization Chart
- Cost Estimating Variable Evaluation Summary
- Roles and Responsibilities of Project Controls Cost Analyst-Estimator

On December 14, 2016, we met with management to discuss actions taken and review implementation progress. Liberty reviewed the following close-out documents:

- Cost Estimating Procedure, scheduled to be effective on January 1, 2017
- Cost Estimating Process Flow Diagram, dated December 2, 2016
- Cost Estimating System Flow Diagram, dated December 2, 2016
- Estimate Review Meeting Agenda Template
- Cost Estimate Comparison Log
- Cost Estimating Workshop Presentation, dated November 28, 2016
- Roles and Responsibilities of Project Controls Cost Analyst-Estimator
- Cost Estimating Variable Evaluation Summary

Subsequent to the December 14, 2016 meeting, management submitted the following documents for our review:

- Cost Estimating Philosophy Statement

- Narrative on the development of Cost Estimating Variables Database
- Cost Estimator Training Workshop Presentation

Management considers the following key deliverables for a holistic cost estimating program as closeout components:

- Project cost estimation philosophy document
- Project cost estimation process maps
- Cost estimating procedure for individual projects
- Roles and responsibilities associated with the development of individual project cost estimates
- Documentation of estimating tools to be used
 - AMRP Schedule Model
 - AMRP Cost Model
- Project cost reconciliation procedures
- Project Controls Group Organizational Structure

Observed Conditions and Factors

This recommendation presents management with a very significant challenge, as it seeks to upgrade the cost estimate capabilities. The seven major deliverables are all essential to the success of the cost estimating program.

In the review meeting, we emphasized the importance of a robust cost estimating philosophy. The philosophy should delineate the purpose of the estimate, the uses of different types of estimates at different stages of the project, the general approach adopted, the recognition that the quality of the estimate varies with how and when it is prepared, and the acceptable levels of uncertainties, expressed as contingency, versus the final cost projection. The Cost Estimating Philosophy Statement submitted subsequent to the meeting adequately addresses the primary goals, the quality of estimates, the estimating resources, and the maturity of estimates.

The Cost Estimating Flow Diagram shows that Engineering is responsible for preparing the Initial Estimate after the Line-of-Lay walk-down. There is no display of any interface with contract management. We presume Final bids might not be available when Engineering issues the Final Estimate. Liberty previously has expressed concern that engineering's involvement seems to cease after the completion of the Final Estimate. It is not clear who or if the Final Estimate will be revised if the final bids are significantly higher.

The roles and responsibilities of the cost analyst-estimator is comprehensive and complete. The workload will be heavy and challenging for one experienced, qualified cost estimating professional to fulfill.

Implementation Complete and Satisfactory?

Yes. The cost estimating procedure, which covers cost estimating preparation and final project cost reconciliation, is approved and issued. The project cost estimation process maps are finalized. There is a good estimate review process. The project manager is identified to own the cost estimate once it is approved and issued. The cost estimator position is filled. The roles and responsibilities

of the cost estimator is fully defined. All major project cost overrun will be reconciled. It is appropriate to close this recommendation.

Remaining Gaps, Needs

Management has developed the Estimating Guidelines for Engineering to ensure estimates are prepared comprehensively and consistently. The Company needs to complete the training plan for all the design engineers regarding the philosophy, the methodology, the estimating variable database, the estimate review, the estimating tools, the project cost analysis, and the final cost reconciliation of projects with significant variances.

The Projects Controls Manager should annually evaluate the effectiveness of the cost estimating capability in terms of having the design engineering preparing the estimates and tasking the lone cost estimator to be the overseer of the cost estimating function.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, Liberty will review a couple of newly prepared cost estimate samples. We will also validate the cost estimate process and procedure are being followed.

Final Liberty Verification Activities

Management provided in April 2017 a demonstration, using the Cost Estimating Model, of the preparation of initial engineering and final engineering estimates for two selected neighborhood projects (Albany Park Phase 7 and West Humboldt Park Phase 1). The project manager described estimate preparation and review for the lifecycle of the projects.

Management established its Cost Estimating procedure. Its comprehensive Cost Estimating Model covers all field work (*e.g.*, plastic and steel mains of all sizes, services, restoration, meter moves). All design engineers and supervisors have received training in their use. Management has also completed a process for updating the unit cost database at detailed levels, with 2016 actual data collected for analysis. Management compiles completed-projects data into the Estimate Comparison Log for cost reconciliation purposes.

Liberty found implementation of this recommendation appropriate.

General Observations

None.

K.2 – Establishing a Cost Estimating Database

Peoples Gas should maintain and keep updated a set of historical databases that address cost estimating variables.

Historical data should be collected and analyzed for at least the following key variables: installed quantities, unit costs, wage rates of craft workers, productivity, and the ratio of installed to retired pipe. Productivity information should include at least number of work-hours per mile of main installed, number of work-hours per service installed, number of work-hours per meter moved. Comprehensive and current information about these variables will improve the quality of future cost estimates at the individual project level. The information will also supply valid data for the cost model being designed and constructed to forecast final AMRP costs.

Underlying Conclusions

K.2 Data underlying the compatible units used to perform cost estimates do not have sufficient reliability, given the lack of regular updating.

Data sources used in estimate development need to be maintained and updated at least annually. Design engineers try to compensate for the failure to do so in different ways and degrees when performing AMRP work. Continuing to use 2012 contractor unit cost pricing for the Cost Estimating Template reflects another weakness, and supports the need for creating a dedicated cost estimating group to compile and analyze actual data of a repetitive nature.

PGL Action Plan Steps

Item #	Task	Status
1	Finalize definition and mock-ups (i.e., methods) of the new cost estimate CUs to be used in WMIS	Complete
2	Document the CU annual update process	Complete
3	Obtain updated rates (Company, Contractor & Overhead)	Complete
4	Complete WMIS system changes for new cost estimate CU definitions	Complete
5	Communicate and train stakeholders on new CU process, tools and procedures	Complete
6	Project Director to form Cost Estimating Variables improvements implementation team	Complete
7	Define objectives and requirements for the Cost Estimating Variables improvements process and procedure	Complete
8	Design the Cost Estimating Variables improvements process and procedure	Complete
9	Prepare Cost Estimating Variables improvements process and procedure	Complete
10	Approve and issue Cost Estimating Variables improvements process and procedure	In Progress
11	Provide orientation and training to project personnel on Cost Estimating Variables improvements	In Progress
12	Document Completion of the Cost Estimating Variables improvements recommendation implementation	In Progress

In the development of the cost estimating process and tools, the inter-relationships with upstream and downstream processes were analyzed in collaboration with Project Management & Controls (PM&C), Engineering, Supply Chain, Contracts, Construction, and Information Technology (IT). The cross departmental team reviewed the Compatible Units (CU) and what the process would be to maintain the CUs as established within the Work Management Information System (WMIS). Based on the review of the maintenance process in conjunction with the inter-relationships with upstream and downstream processes, it was determined that similar or even better quality estimates could be prepared outside of the CUs in WMIS with much more efficient maintenance process. Project Controls will not need to rely on IT resources in order to maintain current rates in the Project Estimator tool. The Project Estimator tool was developed in the first quarter of 2016 between PM&C, Contracts, and Engineering using pay item costs from 2015 bid data. The Estimating Tool includes all commonly used pay items for the various main types, sizes, and installation methods. Associated pay items are included for restoration, test openings, and other work items included in the Contract Unit Pricing List. Along with the units for work performed by a contractor, the Estimating Tool includes a rate for meter installation costs, an assumption for other PGL costs including material and overhead, and an assumption for contingency. The database will be updated annually by the cost analyst-estimator using newly available actual costs.

To continually improve the accuracy and effectiveness of the cost estimating process, Management conducted an analysis to determine which variables in the cost estimating process should be tracked and updated in the estimating tools on an ongoing basis. Additional variables may be identified and analyzed as outlined in the Cost Estimating Procedure Estimating Analysis and Improvement section.

Expected Post-Implementation Conditions and Factors

Management recognizes that tracking and using historical data for key cost variables will result in improved quality of cost estimates for individual projects as well as provide beneficial data for the program cost model. The improved cost estimates and data tracking will help the resource planning and overall cost control process and can be used to develop leading indicators that may have cost implications.

Summary of Liberty's Steps to Verify Implementation

In May 2016 management provided the following documents for our review and comments:

- A sample of the new cost estimate Compatible Units currently used in WMIS.
- The CU Annual Maintenance of WMIS Estimating Methods & Values Process Flow Chart
- WMIS updates for cost estimating completed and training outlines developed
- Cost Estimating Guideline Procedure - revised 3/1/2016

On November 28, 2016, management conducted an on-line Cost Estimating Workshop for us, and provided the following materials for discussions:

- Cost Estimating Procedure content page
- Cost Estimating Tool sample page
- Cost Estimating Variable Evaluation Summary

On December 14, 2016, we met with management to discuss actions taken and review implementation progress. We reviewed the following close-out documents:

- Cost Estimating Procedure, scheduled to be effective on January 1, 2016
- Cost Estimating Tool sample page
- Cost Estimating Variable Evaluation Summary

Subsequent to the December 14, 2016 meeting, management submitted the following documents for our review:

- Narrative on the development of Cost Estimating Variables Database
- Project Cost Estimator Training Workshop Presentation

Management considers the following deliverable as closeout components:

- List of cost and productivity variables to be tracked
- Identification of source for the list of cost and productivity variables that will be tracked
- Cost and productivity variable update procedure
- Historical cost data tracking databases/spreadsheets

Observed Conditions and Factors

Liberty notices that the Cost Estimating Variable Improvement Team has determined to track only Installed Quantities and Unit Costs because unit cost is the preferred variable in the estimating tool. Liberty contends that a cost estimate is not an end in itself, but rather the monitoring base of an ongoing project within AMRP. By not monitoring production rates in areas such as work hours/miles of main installed or work hours/service installed, management is losing the unit work-hour installation dimension and the resource management capability. When the time comes to reconcile project estimate overrun, management will not be able to pinpoint whether it is a productivity issue, a wage rate issue, resource issue, or escalation issue.

Management acknowledges the benefits of monitoring these variables that we suggested. The Company would like to start out with just the unit cost dimension first, since most of the new contracts are unit-cost based. As the needs arise, management will expand to include the work-hour dimension, as deemed necessary.

Implementation Complete and Satisfactory?

Yes, the existing data was last assembled in 2016, based on 2015 actual data. In accordance with the Roles and Responsibilities of the Project Cost Analyst-Estimator, this individual has the responsibility to update the Cost Estimating Variables Table annually. Since this position is now filled, Liberty is confident that management has the capability to update the database, as required.

Remaining Gaps, Needs

Management needs to expand the cost estimating variables to include unit work-hour rates for main replacement, service replacement, and restoration in future. The company should definitely start monitoring the work-hours per meter installed or moved now.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, Liberty will review the effort to update the database based on historical data at the end of 2016. We will also validate the updated information is being used to prepare new project cost estimates.

Final Liberty Verification Activities

On April 27, 2017, Liberty met with management, who presented a Unit Price Analysis Tool. This tool compares the existing estimated unit cost with a range of actual contractor unit costs of all categories of different main material and sizes. Management established a process for updating this contractor unit cost database, and collected actual, 2016 unit cost data for future analysis that it will soon perform. Until that happens, the cost estimates of new projects still undergo development using the existing unit cost database.

Management bases meter-move cost estimates on historical unit costs and actual meter counts. Distribution costs, which cover engineering and management overhead costs, rely on historical percentages and will undergo annual evaluation.

Our verification activities confirmed implementation of this recommendation.

General Observations

None.

K.3 – Reconciliation of Project Cost Estimates

Peoples Gas should perform project cost estimate reconciliations to understand major cost deviations, analyze performance and document lessons learned.

This information will improve the ability of construction supervision to manage cost effectively by taking appropriate actions to improve performance.

Underlying Conclusions

K.4 Peoples Gas does not perform cost estimate reconciliations to understand and to deal with cost deviations, or to capture lessons learned.

The Program Management Office does not undertake any structured analysis seeking to reconcile cost estimates with actual costs. Such analysis is necessary to secure understanding of why project actuals vary from expectations. Analyzing the sources of variances supports the identification of root causes, which management can then use to identify corrective actions.

AMRP management appears to consider the change management process governing contractor requests for costs increases sufficient to justify cost increases. This approach does not conform to best practice. Reconciling estimated and actual costs, even for fixed-price or unit cost contracts, comprises an important element in optimizing costs. Knowing what drives contractor costs is central to judging increase requests and to developing cost estimates for future work.

Liberty accepts program management’s assertion that weekly field progress review meetings give an opportunity for lessons to be learned and to be incorporated into the planning and performance of future work. However, a systematic and programmatic approach to reconciliation on an annual basis will make the analysis more insightful, and promote a cost control culture and awareness among all contributors.

PGL Action Plan Steps

Item #	Task	Status
1	Develop Cost Reconciliation Procedure	Complete
2	Develop Cost Control & Change Management Procedure	In Progress
3	Design training process for new plans and procedures	In Progress
4	Publish procedures as part of the Project Execution Plan	In Progress
5	Provide Orientation to appropriate personnel	In Progress
6	Evaluate procedures	In Progress
7	Modify, add, edit cost management procedures	In Progress

The Cost Estimating Procedure is developed to provide for a consistent and estimating process. Within this procedure is an important feature on the topic of Estimating Analysis and Improvement. The Project Controls Estimator is to maintain an Estimate Comparison Log for projects greater than \$1 million in total costs. On an annual basis, the Project Controls Estimate

will identify and analyze completed projects with significant variances for major cost drivers and their root causes for the purpose of recommending performance improvement actions.

Expected Post-Implementation Conditions and Factors

At the end of a project and as part of close-out procedures, management will reconcile expenditures against cost estimate of projects with significant variances. Cost estimate reconciliation is necessary for the project team to understand the major cost drivers that contributed to final overrun. It could be changes in scope, decline in productivity, schedule delays due to internal or external factors, etc. Causes are either controllable or uncontrollable. For those that are controllable, corrective or mitigative actions could be recommended for future projects. For those that are uncontrollable, the cost impacts on future projects could be assessed and evaluated if the final AMRP costs would be affected. Lessons learned can also be identified to manage future projects more effectively. This cost estimate reconciliation process will also promote a cost control and awareness culture among all AMRP participants.

Summary of Liberty's Steps to Verify Implementation

On November 28, 2016, management conducted an on-line Cost Estimating Workshop for us, and provided the following materials for discussions:

- Cost Estimating Procedure draft
- Estimate Comparison Log

On December 14, 2016, we met with management to discuss actions taken and review implementation progress. We reviewed the following close-out documents:

- Cost Estimating Procedure, scheduled to be effective on January 1, 2017
- Cost Estimating Workshop Presentation, dated November 28, 2016
- Cost Estimating Comparison Log

Management considers the following deliverable included in the holistic cost estimating program as closeout component:

- Cost Reconciliation Procedure as part of the PEP
- Cost Estimate Comparison Log

Observed Conditions and Factors

We understand that PGL construction management is identifying and incorporating lessons learned on a routine basis via field progress review meetings or day-to-day problem-solving. It should be noted that project cost overruns could be caused by more than just construction costs. Every major cost components from design costs, materials costs, internal labor costs, contractor costs, support group costs, overhead costs and unexpected expenditures imposed by external influences should all be analyzed for generic major cost driving issues across every neighborhood project throughout the duration of the AMRP program.

Liberty concurs that establishing an estimate comparison log is a positive first step, but there will be other essential information, such as unit costs, wage rates, productivity factors, contract changes, overhead loading factors, cost impact of schedule delays, percent of engineering to construction

costs, etc. that the Project Controls Group might have to acquire or establish in order to enable the cost estimator to perform insightful cost estimate reconciliation or project cost analysis.

Implementation Complete and Satisfactory?

Yes. The cost estimate reconciliation is part of the cost estimating process, as defined in the Cost Estimating Procedure. The Estimate Comparison Log is established. The full-time cost estimator position has been filled to oversee the program. It is appropriate to close this recommendation.

Remaining Gaps, Needs

Management needs to define what variance thresholds to perform cost estimate reconciliation, e.g., $\pm 15\%$ variance or $\pm \$250,000$ from the original engineering estimate or final estimate. The Company also needs to start performing cost estimate reconciliation on the cost overrunning projects identified on the Estimate Comparison Log.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, we plan to review a couple of samples of Project Estimate Reconciliation of completed projects that exceed the acceptable variance thresholds. We will also validate the identification of performance issues and documentation of lessons learned.

Final Liberty Verification Activities

On April 27, 2017, we met with management for a verification meeting. The Project Controls Cost Estimator has examined 32 completed projects and determined 15 of them should be selected as cost estimate reconciliation candidates. Only one project on this list was within the 10% threshold. On a collective basis, the restoration costs overran by 63%, the services underran by 31%, and PGL costs underran by 63%; the total pre-contingency costs underran by about 14% and with contingency the underrun was 25%. Liberty has indicated in the meeting that the final engineering estimate, which is the pre-bid figure on the Estimate Comparison Log, is not the appropriate cost estimate monitoring base.

The two estimate reconciliation samples provided via the data request were within the 10% threshold only because the contingency was adequate to narrow the gap. The comments on the reconciliation page identified the underestimation of restoration costs without explaining the causes. Hence, the written materials would not provide management information to show if corrective actions are required to improve estimating methods. Also, no lessons learned were available for future projects.

We conclude that further improvement is possible for this recommendation.

General Observations

None.

K.5 – Establishing Central Cost Estimating Organization

Peoples Gas should establish a centralized cost estimating organization to maintain and sharpen the cost estimating skills.

The capabilities of estimate preparers fundamentally drive cost estimate quality. The recent hire of one cost estimator takes a first step, but not one that can prove sufficient by itself. Too much work remains to establish sound estimating, and then to continue executing it through the course of the AMRP. It will particularly take more resources to support the cost model being developed to restore the ability to forecast final AMRP program costs credibly.

Peoples Gas needs to hire at least one more cost estimator and one cost estimating supervisor to oversee the cost estimating activities required to support the AMRP appropriately. The new supervisor should report to the AMRP cost management director.

Underlying Conclusions

K.2 Data underlying the compatible units used to perform cost estimates do not have sufficient reliability, given the lack of regular updating.

Data sources used in estimate development need to be maintained and updated at least annually. Design engineers try to compensate for the failure to do so in different ways and degrees when performing AMRP work. Continuing to use 2012 contractor unit cost pricing for the Cost Estimating Template reflects another weakness, and supports the need for creating a dedicated cost estimating group to compile and analyze actual data of a repetitive nature.

K.3 There presently do not exist cost estimating capabilities effective to meet AMRP needs.

No formal, written cost estimating guidelines or procedures exist. The cost estimating skills of the individuals preparing estimates vary significantly. In the absence of formal procedures and training, the quality of project estimates developed also vary greatly. The recent hiring of the first professional cost estimator for a program of this size reflects recognition of the need for improvement. One estimator will not prove sufficient, however, given the size, scope, and duration of the AMRP.

PGL Action Plan Steps

Item #	Task	Status
1	Finalize definition and mock-ups (i.e. methods) of the new cost estimate Comparable Units (CUs) to be used in WMIS	Complete
2	Document the CU annual update process	Complete
3	Obtain updated rates (Company, Contractor & Overhead)	Complete
4	Complete WMIS system changes for new cost estimate CU definitions	Complete
5	Communicate and train stakeholders on new CU process, tools and procedures	Complete
6	Develop new cost estimation philosophy between all identified stakeholders	Complete

7	Define cost estimation process	Complete
8	Define roles and responsibilities for the new cost estimating process	Complete
9	Identify all systems and tools required to support the new cost estimation process	Complete
10	Define all system/tool requirements and identify current gaps	Complete
11	Finalize business case and obtain necessary internal approvals	In Progress
12	Develop cost estimation procedures	In Progress
13	Develop system/tools that meet cost estimating requirements	In Progress
14	Communicate and train stakeholders on new process, tools and procedures	In Progress

Management has made the decision to continue to rely on Engineering to prepare cost estimates. The cost estimating overseeing function is to be assigned to the Project Controls Group, which reports to the Project Director. This organization is being staffed with cost management professionals equipped with the tools, means, and methods to perform beneficial analysis as they relate to cost management and performance. Presently, management only budgets one cost estimator position, and it has now been filled. The roles and responsibilities of this cost analyst-estimator is defined.

Cost estimating philosophy and procedures identify the tools, technology, and methods as well as cost estimating training needs and requirements for staff to effectively manage all the essential cost estimating tasks and functions. In the development of the cost estimating process and tools as part of the transition from CUs in WMIS to the current Project Estimator tool, the Cost Estimating Procedure was drafted to reflect this approach and include the roles of both Engineering and Project Controls. Project Cost Estimator Training has also been developed to demonstrate how to navigate through the new Cost Estimating template.

Expected Post-Implementation Conditions and Factors

The expected benefit of a holistic cost estimating process would be to provide a basis for sound project management. A quality estimating process allows the Project Controls Group to monitor productivity and expenses of actual conditions versus what was originally estimated or anticipated. On a timely basis, these comparisons allow the Project Team to respond to early warning signs and manage projects in a proactive manner rather than on a reactive basis. From an overall program level, project estimates can be used to analyze and refine estimates so adjustments can be made to update and maintain the credibility of the AMRP estimate. The overseeing and maintenance of this holistic cost estimating process demands the full attention of the qualified professional cost estimator.

Summary of Liberty’s Steps to Verify Implementation

On November 28, 2016, management conducted an on-line Cost Estimating Workshop for us, and provided the following materials for discussions:

- Project Controls Organization Chart

- Roles and Responsibilities of Project Controls Cost Analyst - Estimator

On December 14, 2016, we met with management to discuss actions taken and review implementation progress. We reviewed the following close-out documents:

- Project Controls Organization structure with the Cost-Analyst Estimator position filled
- Final draft of the roles and responsibilities of Cost Analyst-Estimator
- Project cost estimation process maps
- Cost Estimating Procedure, stipulating the requirement of project cost estimate reconciliation

Subsequent to this review meeting, management submitted the following documents for review:

- Cost Estimating Philosophy Statement
- Development of Cost Estimating Engineering Guideline
- Project Cost Estimating Training Workshop Presentation

Management considers the following key deliverable for a holistic cost estimating program as closeout components:

- Project cost estimation philosophy document
- Project cost estimation process maps
- Cost estimation procedure for individual projects
- Roles and responsibilities associated with the development of individual project cost estimates
- Documentation of estimating tools to be used
 - AMRP Schedule Model
 - AMRP Cost Model
- Project cost reconciliation procedures
- Project Controls Group Organizational Structure.

Observed Conditions and Factors

The PGL Action Plan Steps Table focuses on the development of the cost estimating process and tools, but not organization. There is no description on the evaluation and decision on retaining the preparation of project estimates in the Engineering organization. There is also no mentioning of the cost estimator as a key action step. Moreover, steps 11 to 14 is not applicable for this recommendation.

We originally recommended a centralized cost estimating organization, and management seems to be comfortable with the Engineering organization continues to develop cost estimates. There is certainly a major advantage for the engineers to prepare the cost estimates as they design the project, and we find the practice appropriate, if management provides for effectively prepared cost estimates. The drawback is that the estimate accountability of the engineers seems to cease once the project proceeds to the construction phase. It is our understanding that the cost analyst-estimator will review and monitor all the project cost estimates.

We examined the roles and responsibilities of the cost analyst-estimator. Our review found the workload very heavy for one person. However, it is not unreasonable for management to test whether one cost estimator will prove adequate in the long run. We would want to emphasize that

if this cost estimator is diverted to perform other cost management functions in the Project Controls Group, the cost estimating capability will be seriously compromised.

During the online meeting on November 28, 2016, we indicated that management needed to have a cost estimating guideline for the engineers to prepare engineering estimates in a consistent and comprehensive manner.

Implementation Complete and Satisfactory?

Yes. The cost analyst-estimator position is filled with qualified professional. The cost estimating procedure is approved and issued. The upgraded cost estimating tool has been in operation for six months. The Cost Estimating Guidelines for Engineering has been developed. The training plan is comprehensive. It is appropriate to close this recommendation.

Remaining Gaps, Needs

Management needs to complete the cost estimating guideline training for the engineers.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, we plan to review if the cost estimation function is adequately staffed with only one full-time cost estimator. We will also validate the effectiveness of assigning the preparation of the engineering estimates to the engineering organization.

Final Liberty Verification Activities

On April 27, 2017, Liberty met with management. We learned that the Project Controls Group currently has one full-time cost estimator to oversee the preparation of all cost estimates. This individual must also perform cost reconciliation, evaluate the effectiveness of cost estimating tools, update the contractor unit cost database, conduct estimating studies, and prepare estimates on potential cost-impacting issues, as identified. The Project Controls Manager plans to periodically evaluate the need for any additional cost-estimating resources.

Presently, design engineers prepare the initial and final estimates. We examined initial and final estimates of the same project, prepared by three different engineers, observing sound and consistent cost-estimate quality. During the April 27 Cost Estimating Demonstration session, both attending design engineers stated that cost estimate preparation did not burden their other, daily workloads. Management has shown that all design engineers have now received training addressing cost estimating approaches, procedures, models, and estimate reconciliation requirements.

We found implementation of this recommendation satisfactory.

General Observations

None.

L.1 – Holistic Cost Management Program

Peoples Gas should implement a holistic cost management program.

Meaningful AMRP cost management requires appropriate processes that professionals knowledgeable in both the work being performed and cost-related skills employ. These professionals need to analyze anticipated and actual execution of the work in a data rich environment. Comprehensive and accurate information enables them proactively to identify and secure management commitment and action to improve efficiency with the ultimate objective of optimizing expenditures.

This essentially holistic approach to cost management requires establishing and reinforcing the need to think about and to address that at a strategic and policy level, as opposed to an accounting level. Companies that succeed in this approach establish cost as a priority, design an organization and structure it to promote cost effectiveness, and integrate cost into the other management systems that guide a program and its projects. A shift in thinking must occur at all levels of program management, to encourage a move away from a narrow focus on numbers and reports and toward a structured use of expanded analysis and an aggressive set of actions.

To achieve the above goals, a holistic approach to cost management operating under the overall structure shown below is in order.

Illustration L.7: Holistic Cost Management Approach Structure



The holistic approach employs three main components:

- A guiding philosophy towards cost management, supported by strong executive commitment and oversight, operating through defined priorities and policies.
- A formal, structured cost management plan that defines how costs will be managed, establishes individual accountabilities, and identifies global issues (systemic and cultural) that require specific focus and methods.
- A comprehensive set of tools and tactics, which comprise the building blocks that facilitate effective implementation of the plan, including systems, metrics, analytical tools, measures, focused initiatives, implementing procedures, reports, analytical skills and predictive capabilities.

Given where Peoples Gas stands, it will take several years to move to a fully effective, holistic approach to cost management. This approach has high importance in optimizing AMRP costs long term. There are short-term and long-term objectives that can be achieved. We provided a checklist

(below) that offers a roadmap to developing such an approach, identifying the time frames applicable to each feature that the Company should seek to implement.

Framework	Short Term	Long Term
(A) A Guiding Philosophy		
Executive commitment	X	X
The priority of cost management	X	X
Independent oversight		X
A coherent statement of policy		X
A strong cost culture		X
(B) Cost Management Plan		
A well communicated plan	X	X
A formal process		X
Organizational responsibilities	X	X
A focus on Cost Control	X	X
A focus on cost drivers (80/20)	X	X
(C) Building Blocks		
A focus on analysis	X	X
A focus on corrective action		X
Credible estimates and budgets	X	X
A network of skilled cost professionals		X
Management system versus accounting system	X	X
Continuous improvement	X	X
Performance measures	X	X
Ties to individual performance		X
Effective cost collection		X
Targeted initiatives		X
Benchmarking		X

Effectively implementing a holistic approach to cost management begins at the executive level. Senior leadership needs to set a foundation, and provide clear direction. This direction communicates a guiding philosophy on how cost management fits in the Company’s strategy. It also establishes where cost falls in the hierarchy of priorities. In most companies, it will not lie at the top, but it remains important for employees to understand how it does rate. Ignoring the question reduces effectiveness and makes the challenge of balancing cost against other priorities that much harder for managers.

The guiding philosophy will provide a framework for emphasizing management’s expectations. It will define policies and priorities for employees. It will also put in place appropriate oversight mechanisms to assure executive management that the philosophy and its accompanying policies are being aggressively implemented.

The second key element of design comes through a formal, structured cost management plan, or set of plans. Such plans define how an organization will carry out the cost management function. This set of plans should define how costs will be managed, the organizational approach to be used,

accountabilities, and any specific issues, including systemic or cultural cost issues that must be addressed.

The presumption that those rising to management levels will inherently have acquired cost management skills is wrong. The plan helps educate managers and support personnel on the actions expected of them and how the cost management system functions. It will not be a general document, and the plan for one organization is unlikely to serve another.

The third element resides in the set of tools used in implementing the program. These building blocks bring the cost management approach, foundation, and plan to life. They include the cost tools and reports that organizations traditionally use. These tools, however, only contribute to, but do not constitute, the end result. They neither comprise the whole program nor define it. Rather they combine with the other building blocks to deliver desired outcomes. Other blocks include the skills and capabilities of cost professionals, predictive capabilities, implementing procedures, focused initiatives directed at specific cost issues and the many other activities and capabilities necessary for effective cost management.

Peoples Gas needs to establish a new program for estimating costs in order to have the capability to project final AMRP costs reliably and on a continuous basis. The Company has been working for some time to create a new cost forecasting model. It has committed to creating a model that will bring the capability to estimate direct program costs and ongoing operating and maintenance costs. Peoples Gas needs to expedite completion of the model and to verify its reliability, which is critical to the production of meaningful capital and operating cost estimates. AMRP management then needs to use this new model to prepare expeditiously a new baseline total cost estimate for the program. Finally, AMRP management must also develop a structured approach, supported by an adequate organization, to continuous cost forecasting in the future.

Underlying Conclusions

L.1 The AMRP has not employed a formal cost management program, leaving the function too weak to fully support program cost management needs and to contribute effectively to program cost optimization.

The AMRP Project Management Office views cost management as essentially equivalent to budget-tracking. Spending to but not above the budget has formed the predominant goal of cost management.

Early program history made it clear that spending the full budgeted amount would prove unlikely. Progress during 2014 is consistent with that history. For example, management reduced the original 2014 goal of 153 miles to 112 miles. The December 2014 Monthly Status Report stated the year-end actual retired quantity was 69 miles. Regular program reports provide no analysis of the variance. We found only a statement indicating that 10 miles did not make an engineering submission deadline.

The Monthly Status Report overly focuses on annual performance. Longer-term AMRP program status information, such as program-to-date costs, program-to-date retired miles, projected final cost and schedule information is unavailable. The lack of such data makes observations about and

analysis of trends versus expectations unavailable as well. The addition of non-AMRP work to reports addressing AMRP work in the first quarter of 2014 further limits the ability to assess true AMRP progress.

A program like the AMRP requires a structured, well-defined, and rigorously executed approach to managing costs. Such an approach includes defining the key cost elements, making clear how management will track and manage each, setting firm expectations for managers and cost support personnel, employing specific reporting requirements, setting clear expectations for the analysis of the data contained in each report, appropriately structuring a cost management organization, and providing the specific skill sets required. Peoples Gas has announced a series of initiatives to address these issues, and has begun work on many of them. It will take major effort and significant time to implement them, even if the Company gives them a high priority and dedicated resources.

L.2 Concentration on contract administration and annual budgeting produced much too narrow a focus on cost management.

Main and service replacement work occurs under contracts with outside contractors who employ, secure, and manage the resources required to provide completed main and service installation work. The use of lump-sum and unit-rate price contracts led management to view contractor cost management from a contract administration viewpoint. We found insufficient focus on labor costs, labor work-hours, hourly labor rates, productivity, and other such determinants of cost. The nature of Peoples Gas' construction contracts affects the way Peoples Gas should manage costs, but it does not diminish the need for Peoples Gas to manage costs actively. Specifically, management's understanding of the labor parameters mentioned above must produce a working knowledge of what drives costs and what deserves management scrutiny. Measuring the effectiveness of current performance and developing a sound basis for future cost expectations depend on such knowledge. Peoples Gas lacks the information needed to develop that knowledge.

AMRP management tracks annual budget performance principally from the perspective of total expenditures. Management appears to define cost management success strictly in terms of conforming to budgeted expenditures. A focus on rate recovery may well be incenting this view. Management has stated that production is a priority in its cost management framework. We did not observe the kinds of cost tracking and reporting or the level of commitment to corrective actions that would demonstrate the commitment it takes to establish production as a material priority.

L.4 Peoples Gas lacks essential cost management tools.

The cost modeling tool now in use was designed for use on an interim basis. Management developed it to track incurred costs and annual authorized spending levels. It is too labor intensive to maintain, and makes the process of ensuring data integrity difficult. Moreover, this tool's displays of performance to date (versus the current year) fail to include some performance data for periods prior to 2014. This gap makes the tool's accuracy questionable. The tool's design for tracking incurred costs also leaves it with limited value in managing total costs. The Company states that it recognizes the current tool as an interim fix only. Announced initiatives include expanding the capabilities of cost modeling to address the gaps.

PGL Action Plan Steps

Item #	Task	Status
1	Define scope and objective of holistic cost management program	Complete
2	Develop Cost Management Plans and Sup-plans listed below	In Progress
3	Develop Cost Planning Procedure	Complete
4	Develop Cost Estimating Procedure	Complete
5	Develop Cost Tracking Procedure	Complete
6	Develop Cost Reporting Procedure	Complete
7	Develop Cost Reconciliation Procedure	Complete
8	Develop Cost Control & Change Management Procedure	Complete
9	Design training process for new plans and procedures	Complete
10	Publish procedures as part of the Project Execution Plan	Complete
11	Provide Orientation to appropriate personnel	In Progress
12	Evaluate procedures	In Progress
13	Modify, add, edit cost management procedures	In Progress

PGL's initial step to implement a holistic capital program cost management for its capital projects to include AMRP, will be to establish a general cost management philosophy and articulate cost management guiding principles. The Company's guiding philosophy for cost management will be to ensure financial discipline at all levels of the program and project delivery teams to maximize delivered value. The general guiding principles that management initially intends to implement as part of its comprehensive improvements to cost management include:

- Value: The goal of all project work is to deliver best value;
- Accountability: Create commitment to a shared vision of project outcomes at all levels
- Risk management: Enable proper identification and management of project and program risks;
- Cost efficiency: Proactively manage resource use and project management costs with project needs and expected returns.

PGL executive management and capital program leadership will provide robust executive direction and cost management oversight through clear policies and priorities. The principal objectives of in implementing comprehensive improvements to the cost management approach will be to:

- Develop a culture of cost control and financial discipline.
- Structure the organization and define the normal duties and responsibilities of the Project Controls Group.
- Provide a standard methodology of controls for consistent continuous measurement to evaluate the progress against the goals and milestones, budget and schedule.
- Provide advance warning of undesirable trends, deviations, slippages and other project problems as well as facilitating timely corrective action to be taken to minimize any related impact on cost, schedule and quality.

- Ensure the project team and management stays informed of program/project status on a timely basis.

Below is a preliminary high-level cost management plan outline, which includes sample activities and sub-activities, which will serve as a basis to further develop and improve the AMRP's cost management functions:

- Cost Scope
 - Expectation
 - Accountability
 - Roles and Responsibility Overview
- Cost Planning
 - Resource Planning
 - Cost Estimating
 - Establishing the Cost Baseline
- Cost Tracking
 - Project Labor Hour Tracking
 - Contractor Costs Tracking
 - Material Costs Design / Engineering Cost
 - Restoration
 - Overall Cost Tracking
- Cost Reporting and Metrics
 - Main footage cost per foot
 - Service footage cost per foot
 - Meter cost per unit
- Cost Control and Changes
 - Cost Variances
 - Cost Re-Planning
 - Cost Re-Baselining

In essence, PGL's Cost Management philosophy is to proactively manage and analyze estimated, actual, and forecast expenditures to confirm that they are accurate and prudent. Costs will be managed at both the project and portfolio/program level with a parametric approach to cost analysis. This approach will facilitate an environment of continuous improvement where costs are analyzed and forecast values for in-process and future work are updated based upon the most current data.

The scope of the cost management procedure includes the following:

- Development of individual project budgets
- Development of the annual Capital Budget
- Interface with the Cost Estimating procedure for budgeting purposes as well as trending based upon actual expenditures
- Link to the Change Management procedure to identify anticipated changes prior to implementation and provide more accurate forecasts
- Analysis of expenditures as a function of quantities which lends itself to a cost per unit methodology

- Variance analysis of actuals: forecast to identify unexpected costs and when applicable implement corrective action
- Regular reporting of actuals: forecast on a monthly basis as well as annual and YTD budget
- Regular training of Controls staff as well as Project Managers and Controls personnel

Expected Post-Implementation Conditions and Factors

The expected benefit of a holistic cost management program would be to improve efficiencies and effectiveness of the AMRP cost management to maximize production levels. The cost management program would not only track costs but provide forecasts for actual versus expected spend. This proactive approach benefits the project management team by providing them with the tools and information in a timely manner to make informed decision on how to actively control costs and optimize resources. Insightful analyses will also help management to take timely corrective actions to improve cost performance.

Summary of Liberty's Steps to Verify Implementation

On December 21, 2016, management submitted the following documents for preliminary review:

- Cost Management Workshop presentation slides, dated December 14, 2016
- Construction Change Management Procedure, scheduled to be effective January 1, 2017

On March 20, 2017, management conducted an on-site Cost Management Workshop for us, and provided the following materials for discussions:

- Cost Management Procedures
- Cost Estimating Procedures
- Construction Change Management Procedure
- Annual Budget Checklist
- Cost Forecast File
- Cost Management Tools
- Project Controls Organization Chart
- Project Controls Roles & Responsibilities
- Cost Management Training

On March 22, 2017, we met with management to discuss actions taken and review implementation progress. We reviewed the following close-out documents:

- Cost Management Procedure
- Project Cost Estimator Training
- Cost Estimating Procedure
- Change Management Procedure
- Cost Management Training Plan
- Cost Management Training
- Change Management Training Plan
- Change Management Training

- Cost Analyst Training Sign-in Sheet and Meeting Agenda
- Project Manager Training Agenda and Meeting Invite

Management considers the following key deliverables for a holistic cost management program as closeout components:

- AMRP Portfolio Schedule Database
- AMRP Portfolio Cost Forecast Model
- Parametric Estimating Tool
- Monthly Variance Analysis and Cost Report
- Cost Management Plan and Sub-plans of the Capital Construction Program Execution Plan (PEP)

Additional deliverables might be developed to allow the Project Controls Group to confidently forecast, track and adjust all the cost drivers on a specific project to ensure budgets are maintained as a priority, deviations from budgets scrutinized, and appropriate corrective action taken in a timely manner.

Observed Conditions and Factors

The holistic cost management concept that we recommend employs three main components: a guiding philosophy supported by strong executive commitment, a well-structured cost management plan that defines how costs will be managed, and a comprehensive set of tools which comprises the building blocks of the cost management program. Management has dedicated a great effort in advancing the holistic cost management concept. Management has embraced the philosophy, acquired competent resources to perform the functions, developed multiple cost control tools, designed required processes, and prepared many comprehensive procedures. All these accomplishments were implemented within a relatively short timeframe and should be commended.

It should be pointed out that of the three main components, the building blocks at the bottom are solidly in place; however, we have regularly emphasized that these are easiest and least important (but still important) elements of a strong program. Management's cost management plan in the middle is still vague. Over time, management should focus next in this area such that all project personnel can work in unison to manage cost. The philosophy at the top needs to be communicated more frequently and made more self-evident such that a cost sensitive culture can be established. For example, cost management initiatives should become an annual goal or incentive-pay metric. Cost management should have a seat at all management tables. The concept needs to be repeatedly preached and emphasized.

Also, all managers need to be reminded and trained that cost management is not just budget management. The Cost Management Procedure is still written in such a way that propagates the annual budgeting emphasis in the cost planning section. Likewise, all the other sections on project budget, collection of actual costs, forecasting, variance analysis, review and reporting, etc. all present a monthly or annual budget view instead of a project view. This is projecting an image of taking a narrow financial or accounting focus instead of a holistic cost management focus.

Implementation Complete and Satisfactory?

Even though the cost management plan is not fully structured at this time, the required cost control resources are trained, and several crucial programs are in place. Management should be able to take the holistic cost management program to an effective level over time. We believes the intent of this recommendation has been met.

Remaining Gaps, Needs

Management needs to complete the cost management training for all the key managers and construction supervisors/field coordinators. Management should continue to develop the cost management culture continuously and consistently from top management level down to the basic work level.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, we plan to review a couple of major products produced by the Project Controls Group. We will also validate the effectiveness of the cost management program by interviewing the Manager of Project Controls Group and the Director of Project Management & Controls.

Final Liberty Verification Activities

On May 31, 2017, Liberty met with management. We reviewed the newly designed Detailed Forecast Files (DFF) and several variance analyses provided by management in response to our data requests. The DFF represents a commendable accomplishment that will provided reliable information for project cost analysis and forecasting. The variance analyses identified problems, but without an in-depth analysis of root causes and corrective actions. Adding this analysis should remain a management action item.

We interviewed the Director of Project Management & Controls and the Manager of the Project Controls Group, seeking their overall assessment of the cost management recommendations. They both concurred that progress could have been further along than it is so far. Management developed and deployed many building blocks and tools, and drafted most of the required procedures for approval. The Project Controls group now finds itself almost fully staffed with experienced cost and schedule professionals. Management approved an additional cost position and steps to fill it have begun. All the internal staff have undertaken cost management training. The key managers also have received basic training, and provided positive feedbacks. More training scheduled covers project personnel at the working level. Both the Director and the Manager expressed optimism that greater improvement will emerge.

Additionally, management has now adopted for all future neighborhood projects individual Cost Element Plans that will focus on the major cost components (main installation, service installation, restoration, meter mark and bar, other construction costs, stock material, engineering, and other support costs). These formal, structured plans define how costs will be managed, establish individual accountabilities, and identify systemic or cultural issues that require specific focus and

methods. Management intends to execute these plans using the cost controls tools developed as the building blocks. Project managers will have visibility on the project costs and productivity performance. Combining that visibility with an effective cost trend program, will support ready forecasting of real-time final project costs.

Management bought into the approach of proactively managing project costs on a real-time basis, focusing on timely analysis which allows for prompt corrective actions. Adopting this approach addresses the top level of pyramid of actions and activities that support effective cost management. The cost control tools defined in the cost management procedures and the Project Execution Plan comprise an important, “closer to the action” third-level of the pyramid. Management also completed Cost Element Plans for all future neighborhood projects (essentially filling in the middle level of the cost management pyramid).

These multiple levels of achievement place management in a good position to execute the holistic cost management program that Liberty recommended. Thus, our verification activities confirmed effective implementation of this recommendation.

General Observations

None.

L.2 – Structured Cost Management at Program, Project, and Annual Levels

Peoples Gas should establish a structured, well defined approach to managing AMRP costs at three levels: the long-term total program outlook, the individual project level, and the annual budget view.

Individual projects form the basic building blocks of the AMRP. The estimates for these individual projects must be improved. Program costs can then be established bottom-up by summing the projects (and/or phases of projects) completed, the cost estimates of the active projects (and/or phases of projects), and the projected costs of projects yet to be designed. The cost estimates of all the active projects need to be sequenced so as to feed the budgeting, scheduling, resource planning, and project management processes timely and effectively.

Underlying Conclusions

L.2 Concentration on contract administration and annual budgeting produced much too narrow a focus on cost management.

Main and service replacement work occurs under contracts with outside contractors who employ, secure, and manage the resources required to provide completed main and service installation work. The use of lump-sum and unit-rate price contracts led management to view contractor cost management from a contract administration viewpoint. We found insufficient focus on labor costs, labor work-hours, hourly labor rates, productivity, and other such determinants of cost. The nature of Peoples Gas’ construction contracts affects the way Peoples Gas should manage costs, but it does not diminish the need for Peoples Gas to manage costs actively. Specifically, management’s understanding of the labor parameters mentioned above must produce a working knowledge of what drives costs and what deserves management scrutiny. Measuring the effectiveness of current performance and developing a sound basis for future cost expectations depend on such knowledge. Peoples Gas lacks the information needed to develop that knowledge.

AMRP management tracks annual budget performance principally from the perspective of total expenditures. Management appears to define cost management success strictly in terms of conforming to budgeted expenditures. A focus on rate recovery may well be incenting this view. Management has stated that production is a priority in its cost management framework. We did not observe the kinds of cost tracking and reporting or the level of commitment to corrective actions that would demonstrate the commitment it takes to establish production as a material priority.

PGL Action Plan Steps

Item #	Task	Status
1	Project Director to form Cost Management process and procedures Task Lead	Complete
2	Define objectives and requirements for Cost Management process and procedures	Complete
3	Design the Cost Management process and procedures	Complete
4	Prepare Cost Management process and procedures	Complete

5	Approve and issue process and procedures	Complete
6	Provide orientation and training to all project personal personnel on Cost Management process and procedure	In Progress
7	Document completion of the recommendation implementation	In Progress

Management will develop and implement clear policies and procedures to manage AMRP costs at three levels. At the long-term program level, procedures will focus on budget planning, account/expenditure tracking, budget changes, and budget reconciliations. At the project level, procedures will focus on cost planning, cost tracking, cost reporting, metrics, cost control and changes, and cost closeout. At the annual budget view level, procedure will focus on annual cost corporate planning and AMRP budget account formulation. Management’s approach to managing AMRP costs will begin at the project level. Project estimates would roll up into an annual program cost forecast. Eventually the annual forecasts would be projected out into the long-term program level budgeting efforts. Tools that are necessary will be developed to complement ongoing cost estimating and cost tracking methodologies which will help develop the new three-tiered approach to managing AMRP costs.

A task team was formed to establish and document the process, procedures and requirements for the development and management of the Cost Management Program and Procedures. The team for this initiative includes Special Projects Manager, Cost Analyst, and Primera Consultants. The stakeholder team includes Director – Project Management & Controls, Director of Engineering, three managers from Engineering, Director of Contracts, Director of Construction, Manager - Project Controls, and Manager of Project Management.

PGL’s Cost Management philosophy is to proactively manage and analyze estimated, actual, and forecast expenditures to confirm that they are accurate and prudent. Costs will be managed at both the project and portfolio/program level with a parametric approach to cost analysis. This approach will facilitate an environment of continuous improvement where costs are analyzed and forecast values for in-process and future work are updated based upon the most current data. The scope of the cost management procedure includes the following:

- Development of individual project budgets
- Development of the annual Capital Budget
- Interface with the Cost Estimating procedure for budgeting purposes as well as trending based upon actual expenditures
- Link to the Change Management procedure to identify anticipated changes prior to implementation and provide more accurate forecasts
- Analysis of expenditures as a function of quantities which lends itself to a cost per unit methodology
- Variance analysis of actuals: forecast to identify unexpected costs and when applicable implement corrective actions
- Regular reporting of actuals: forecast on a monthly basis as well as annual and YTD budget
- Regular training of Controls staff as well as Project Management and Controls personnel

Expected Post-Implementation Conditions and Factors

The purpose of PGL’s capital program cost management plan is to ensure that projects are completed within project authorization. This plan will begin at the project level, roll up into the annual project list, and ultimately be used to forecast costs at a program view. The plan will cover expenditure tracking, variance analysis, oversight of contractor and company labor costs, and reconciliation between AMRP’s budget and project and program management cost processes. Each tier of cost management structure, AMRP Budget, program, and project level, benefits from the ability to establish a baseline goal and track costs according to the established baseline.

This methodology also provides a documentation mechanism to justify and adjust project costs due to changing construction conditions or trends. The new cost and schedule models will be a critical component of the Integrated Project Controls program management approach for AMRP.

Summary of Liberty’s Steps to Verify Implementation

On December 21, 2016, management submitted the following documents for preliminary review:

- Cost Management Workshop presentation slides, dated December 14, 2016
- Construction Change Management Procedure, scheduled to be effective January 1, 2017

On March 20, 2017, management conducted an on-site Cost Management Workshop for us, and provided the following materials for discussions:

- Cost Management Procedures
- Cost Estimating Procedures
- Construction Change Management Procedure
- Annual Budget Checklist
- Cost Forecast File
- Cost Management Tools

On March 22, 2017, we met with management to discuss actions taken and review implementation progress. We reviewed the following close-out documents:

- Cost Management Procedure
- Cost Analyst Training Sign-in Sheet and Meeting Agenda
- Project Manager Training Agenda and Meeting Invite

Management considers the following key deliverable as closeout components for the cost management at the long-term total program outlook, the individual project level, and the annual budget view level:

- AMRP Portfolio Cost Forecast Model
- AMRP Schedule Database
- AMRP Cost Management procedure

Additional deliverables may be identified as current tracking systems, estimators, and reporting mechanism are evaluated.

Observed Conditions and Factors

The decision to focus on the near-term at the expense of a view of total program costs effectively negates this recommendation. We continue to be concerned that the overall program lacks a cost yardstick and the short-term focus also detracts from the ability to fully measure conformance to

the all-important public safety goals and the cost of achieving those goals. Without a long-term perspective, there is no context for effectively managing costs and performance.

Implementation Complete and Satisfactory?

Yes, the required cost control resources are trained, and several cost management tools are in place. We believe the intent of this recommendation, with the notable exception of awareness of long-term cost and performance, has been met. We understand that the recent Stakeholder Process has considered this issue and is likely to approve of management's short-term approach.

Remaining Gaps, Needs

Management needs to complete the orientation and training of all project personnel on Cost Management process and procedure.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, we will review a couple of sample projects that illustrate the roll up of annual costs. We will also validate how neighborhood project costs are being managed at the project level.

Final Liberty Verification Activities

On May 31, 2017, Liberty met with management. The meeting confirmed completion of the design of the Detailed Forecast Files (DFF), a set of multi-year project monitoring tools. The roll-up features allow the combination of all monitored projects at the program level, after the entry of data for each project. The tools enable management to make available annual, consistent budgets for each monitored project. Scope definition uses miles of main installed, number of services installed, number of meters installed, and miles of main retired. The sample used to demonstrate this tool (Albany Park project) had 42 phases. After preparation of the project estimate, management then time-phased it, using the schedule, which provided a basis for annual budgets. Management will use the DFF for cost management purpose during project execution. The annual plan will form part of the three-year rolling plan. Monthly cost reports will be generated for variance analysis for both the annual budget view and the project view.

Our activities verified implementation of this recommendation.

General Observations

None.

L.3 – Defining Cost Management Roles

Peoples Gas should define appropriate roles for cost management professionals, including all activities, responsibilities, and accountabilities important to holistic cost management.

An effective organization must move beyond numbers and reports, so that it can perform meaningful analysis and identify corrective actions. Only people can make that translation of numbers to action. People skills and experience thus become the most significant contributors to success.

The defined roles of cost professionals, along with clear responsibility and accountability for performance in those roles include the following:

- Direct support to work group management, helping and encouraging management to carry out cost management responsibilities
- Continuing preparation of analyses that directly lead to recommended corrective measures
- Assuring that the case for cost is heard in balancing program and project priorities
- Providing a focus on predictive methods and techniques, early identification of cost threats and elevation of cost issues while mitigation remains an option
- Developing and implementing tools and processes that support cost management.

Peoples Gas must develop the requisite skills in its cost staff in a manner fully consistent with these new demands. The AMRP cost organization must become familiar with the technical details of the physical work. With time, such development efforts and integration of new skills will produce the staff of cost professionals required.

Underlying Conclusions

L.3 Peoples Gas lacks the cost management capability needed to support AMRP needs fully.

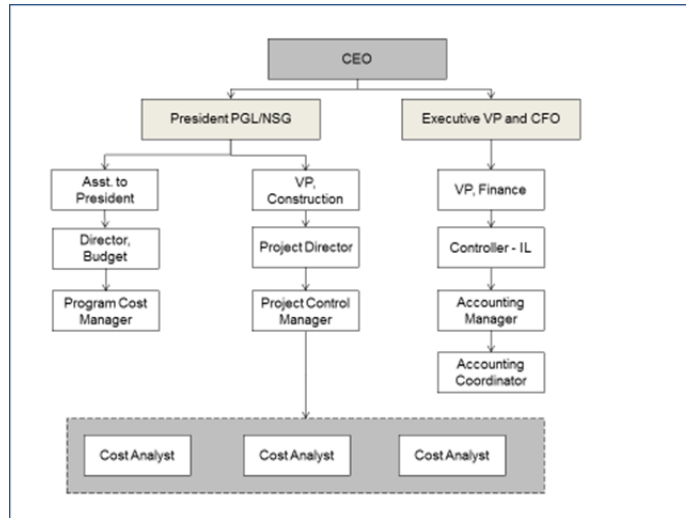
AMRP Management has adopted too narrow a scope for cost management. The cost group is tasked to manage the annual budget, process invoices, and manage cost reporting. The roles and responsibilities of cost management personnel do not have clear definition. Staffing is not sufficient to meet the requirements of a robustly and appropriately defined cost management function.

Peoples Gas needs to define key cost elements, identify tracking methods, set clear and challenging expectations for managers and cost support personnel, identify and use specific reporting requirements, determine what is to be done with each report, establish and staff a much expanded cost management organization, and provide the skill sets required to make cost management effective. These baseline needs exist for any large program, and have greater significance for one of the scope, size, and duration of the AMRP.

PGL Action Plan Steps

Item #	Task	Status
1	Identify Task Lead to develop roles and responsibilities (may be additional external help)	Complete
2	Interview stakeholders involved in cost management program	Complete
3	Develop initial roles and responsibilities	Complete
4	Publish roles and responsibilities	Complete
5	Training / Orientation on expectations of associated roles	Complete
6	Midyear Review (or when PEP is completed)	In Progress
7	Make modifications, publish, train	In Progress

Management acknowledges that it needs to develop the requisite skills in its cost staff in a manner fully consistent with these new demands. The AMRP cost organization must become familiar with the technical details of the physical work. With time, such development efforts and integration of new skills will produce the staff of cost professionals required. Implementing a holistic cost management program begins with instituting a culture that maintains project cost as a top priority and ensures that this philosophy is instilled not only in the Project Controls Group, but with all the other departments involved with the AMRP. A structure must be built around this guiding principle. Additionally, an organization must be staffed with cost management professionals equipped with the tools and knowledge to perform beneficial analysis and identify positive or negative trends. With assistance from PMA Consultants, an effective organization has been developed. Additional resources have been added in a traditional project controls structure in which cost controllers, project schedulers, project planners, and document specialists work are to support project managers within the Project Controls Group. As the organization is assembled, roles and responsibilities are fully defined. Expectations and accountability are assigned for the positions within the Project Controls Group. With the correct talent in place, the next step is to develop structured plans and policies to formalize the cost management process. Establishing the plans and policies will identify the tools and procedures required to effectively administer the holistic cost management approach.



Since forming the Project Controls Group, the Project Controls Manager’s initial focus areas has been establishing a strong relationship with her direct reports, including the cost professionals and scheduling team members. She set up one-on-one discussions with them to review their current approach to their roles and where changes may be appropriate. She interacted with the Project Managers as well to solicit their feedback. With these conversations in mind, she prepared major roles and responsibilities documentation for the cost analysts as follows:

- Cost Analysts are assigned to specific project managers (PM) and are responsible for support of their entire portfolio of projects
- Cost Analysts work with PMs in establishing initial and on-going cash flows for entire life of projects
- Cost Analysts update the Detail Forecast File (DFF), with cash flow updates
- Cost Analysts prepare project authorization forms and monitor risk to authorization
- Cost Analysts run actuals regularly and provide to PMs to help manage financial health of project
- Cost Analysts gather information for and prepare accruals that are submitted to Accounting
- Cost Analysts assist PMs with identifying variances and variance analysis, investigate potential irregularities, and adjust forecast values as necessary reporting

The two major categories of work of the cost analysts can be summarized as follows:

1. Reporting – Project Management & Controls reporting calendar, weekly/monthly quantity report, monthly forecast, AMRP financial reporting, Public Improvement/System Improvement financial reporting, HP Financial reporting, project manager monthly variance analysis, monthly financial slides, forecast analysis reports, and monthly project cost review reports
2. Services – authorization form creation, maintenance of project cash flows, authorization monitoring, providing actual costs, forecast variance analysis, gathering information for preparation of monthly accruals, assisting PGL accounting

with monthly financial close activities, budgeting and assisting PM with preparation and final submittals.

The project controls team was provided orientation on these roles and responsibilities in March 2017.

Expected Post-Implementation Conditions and Factors

The expected benefit of a holistic cost management program would be to improve efficiencies and effectiveness of the AMRP cost management to maximize production levels. The cost management program would not only track costs and provide forecasts for actual versus expected spend, but this proactive approach benefits the project management team by providing them with the tools and analyses in a timely manner to make informed decision on how to actively control costs and optimize resources.

Defining roles and responsibilities with the professionals involved in effective cost management, places accountability on individuals for the task assigned. This ensures that the tasks that are required in a holistic cost management program are properly identified and performed effectively.

Summary of Liberty's Steps to Verify Implementation

On December 21, 2016, management submitted the following document for preliminary review:

- Cost Management Workshop presentation slides, dated December 14, 2016

On March 20, 2017, management conducted an on-site Cost Management Workshop for us, and provided the following materials for discussions:

- Project Controls Organization Chart
- Project Controls Roles & Responsibilities
- Cost Management Training

On March 22, 2017, we met with management to discuss actions taken and review implementation progress. We reviewed the following close-out documents:

- Cost Management Training
- Cost Analyst Training Sign-in Sheet and Meeting Agenda
- Project Manager Training Agenda and Meeting Invite
- Project Execution Plan - Revision 1

Management considers the following as key deliverables as closeout components for definition of roles and responsibilities in a holistic cost management program:

- Project Controls Assessment Report
- Project Controls Group Organization Structure (includes roles and responsibilities)
- Capital Construction Project Execution Plan

At this time, the cost management training plan is another deliverable that will allow the Project Control Group to operate confidently with individuals within the work groups having clearly defined expectations of their own and coworkers' roles and responsibilities.

Observed Conditions and Factors

Cost management professionals have important analytical responsibilities, but are also required to fulfill financial administrative requirements on a regular basis. We acknowledge that most of these financial requirements need to be satisfied. With only three cost analysts and one intern, we have concern that adequate time will not exist to implement the true holistic cost management concept, which constitutes new ideas and techniques that need to be acquired.

The more important responsibilities and accountabilities for performance in an effective cost professional role are not evident. We would like to see a greater emphasis on performing analyses that directly leads to recommended corrective measures, assuring that the case of cost is heard in balancing program and project priorities, providing a focus on predictive methods and techniques, and developing and implementing effective tools and processes that support holistic cost management.

Implementation Complete and Satisfactory?

All the positions have been filled in the Project Controls Group. The roles and responsibilities do not have the comprehensive and clear definition that we prefer to see. At this juncture, management nevertheless has the capability to implement what we intend for this recommendation over time.

Remaining Gaps, Needs

Management needs to address the concerns that we raise here on the roles and responsibilities of the cost analysts. Also, management needs to perform the Midyear Review, as mentioned in Step Six of the Action Plan.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, Liberty plans to interview a couple of cost analysts regarding their roles and responsibilities in supporting the project managers and construction managers.

Final Liberty Verification Activities

On May 31, 2017, Liberty met with management. Liberty interviewed two project controls analysts assigned to a specific project manager and construction manager. These analysts establish initial and on-going cash flows for entire projects, updating the Detailed Forecast Files (DFF) for project cost monitoring, preparing monthly cost reports, performing variance analysis, investigating potential deviations, and adjusting forecasting values, as necessary. Both analysts appear to be growing in their current roles, and enjoy good relationship with the managers they support and with other project team members. We raised the issue of whether management expects its cost analysts to assume a police role, a service role, or

something in between. The Director of Project Management & Controls and Manager of Project Controls both expressed confidence in the service role as the preferred option.

We also reviewed the five major products that the cost analysts produced in 2017. The DFF, developed to support cost monitoring of neighborhood projects, provides an essential tool and represents a major achievement. Another product, the two Budget & Strategy Packages, reflected routine work required to meet financial requirements. Moving to the variance analysis template sample and quantity forecast analysis sample, the narratives or analyses that should accompany the charts were either inadequate or lacking. Describing what the data showed only stated the obvious. Despite the identification of multiple problems, we found no mention of the sources of the problems, who would be taking corrective actions, and whether those actions would result in alleviating the problems or involve some quantifiable cost and schedule impacts. While progress is not what we would have hoped, overall, we remain confident that cost analysts will improve analytical skills with better data quality and team member input.

Liberty thus considers implementation of this recommendation verified, recognizing that improvement should continue to be seen.

General Observations

None.

L.4 – Cost Support Organization

Peoples Gas should establish a cost support organization that: (a) resides organizationally at a level and in a place consistent with treating cost management as a high program priority, (b) serves the cost management needs of all levels of management, (c) develops a force of skilled cost professionals and assures those skills are continuously improved, and (d) has overall accountability for the development and implementation of the cost management program

Chapter L: Organizational decisions by necessity must be carefully tailored to the particular traits of the entity involved. One should therefore avoid prescriptive recommendations on how to structure an organization. That said, our experience does lend itself to identifying approaches and methods that have worked in the past.

The most successful cost management organizations feature a high reporting level. Establishing organizational “clout” underscores the importance of cost and the credibility of the people responsible for the programs designed to manage it. Peoples Gas should place the cost management manager or cost director directly under the senior leader of the AMRP. In addition, the cost manager should have the flexibility to build reports as the cost organization sees fit. This empowerment will facilitate upward communication to executive management and the Board as the manager deems necessary. This placement of the cost management organization will leave no doubt as to its standing as a corporate priority. More importantly, analyses performed by the cost management organization must remain objective, candid, and free of influence from the organizations directly responsible for performing physical work.

In our experience, a matrix approach to cost management can work. A matrix approach is often dictated when a specialized skill is needed in a local organization but will be difficult to acquire, nurture and retain in that organization. This may well be the case for the cost professionals we envision as appropriate for the AMRP. They are needed at the local level, and should report to the local manager. They could have a “dotted line” relationship back to the central cost management organization, which would be their organizational “home.” That organization would be responsible for their technical direction, supporting them with staff capabilities and providing training and career development.

Establishing a career path in cost management can be a valuable contributor to attracting and growing a strong cast of skilled cost professionals.

Underlying Conclusions

L.3 Peoples Gas lacks the cost management capability needed to support AMRP needs fully.

AMRP Management has adopted too narrow a scope for cost management. The cost group is tasked to manage the annual budget, process invoices, and manage cost reporting. The roles and responsibilities of cost management personnel do not have clear definition. Staffing is not sufficient to meet the requirements of a robustly and appropriately defined cost management function.

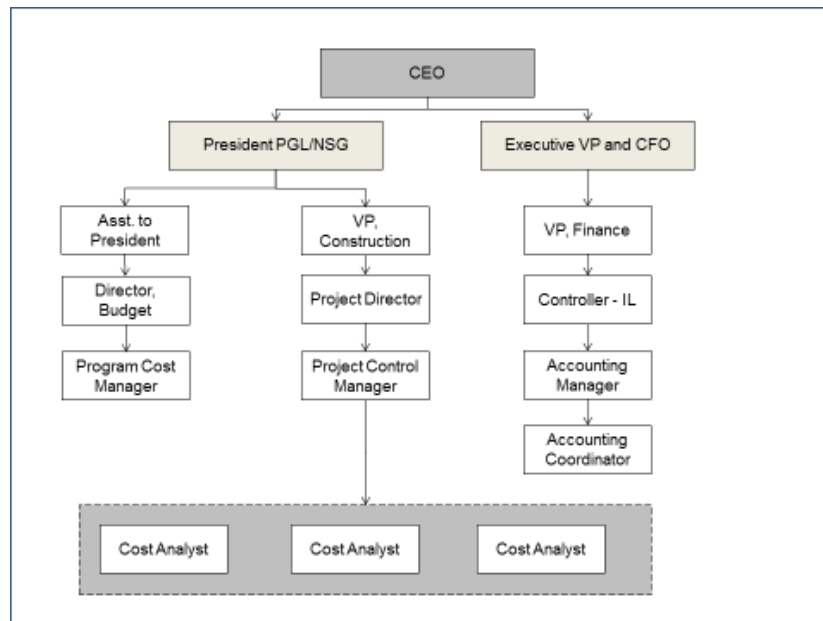
Peoples Gas needs to define key cost elements, identify tracking methods, set clear and challenging expectations for managers and cost support personnel, identify and use specific reporting

requirements, determine what is to be done with each report, establish and staff a much expanded cost management organization, and provide the skill sets required to make cost management effective. These baseline needs exist for any large program, and have greater significance for one of the scope, size, and duration of the AMRP.

PGL Action Plan Steps

Item #	Task	Due Date
L.4.1	Develop new organizational structure	
L.4.2	Prepare and review annual Performance Measurement Plans (PMPs) with cost professionals related to the development and implementation of the cost management program	Complete
L.4.3	Establish responsibilities for cost professionals and communicate those responsibilities across the organization	Complete
L.4.4	Outline cost management needs of all levels of management	Complete
L.4.5	Prepare and review individual development plans (IDPs) with cost professionals	5/31/2016
L.4.6	Identify analysis and reporting to meet the need of all levels of management	6/30/2016
L.4.7	Prepare example career path for project controls organization	6/30/2016

Management has instituted a cost support organization that resides in Project Controls, as well as supporting roles in Operations and Finance that will proactively assist the AMRP program. Below is an organizational chart of the cost support organization and the hierarchy to the executive level.



The cost management structure that is being put into place is structured to provide cost tracking, analysis, and action at both a project and program level. The direct AMRP cost support is structured under the Vice President of Construction. Additional cost support is also utilized from

both an operational standpoint at the company level with a Program Cost Manager that reports to the Director of Budgets for PGL and North Shore, and a corporate level with a Controller, Accounting Manager, and Accounting Coordinator that report up to the Vice President and Controller in the Treasury Department. With this organizational structure, ongoing cross functional coordination with Accounting is occurring to insure that the reporting tools lend themselves to successful cost management for this large construction program. This organization is being structured to serve cost management needs at all levels of management.

As the organization is being filled with cost professionals, management has discussed with several engineering and consulting firms that specialize in Project Controls. Management will include a skills assessment of individuals in the Project Controls organization and recommendations for development or improvement. In addition, the newly created position of Project Controls Manager is responsible for establishing expectations for the cost personnel and ensuring continual development of those cost professionals.

Although the philosophy of financial discipline is carried out throughout the company, overall accountability and implementation of the cost management plan of the AMRP will reside in the Project Controls Group.

Implementing a holistic cost management program begins with instituting a culture that maintains project cost as a top priority and ensures that this philosophy is instilled not only in the Project Controls Group, but with all the other departments involved with the AMRP. A structure is being built around this guiding principle.

Expected Post-Implementation Conditions and Factors

Establishing a cost support organization that reports to senior leaderships reinforces that cost is a priority and enhances the importance of a cost control philosophy. Having the cost support organization serve the needs of all levels of management provides the benefit of reporting flexibility and providing meaningful information to different departments and audiences within the organization. With this qualified group in place, plans and policies will identify the tools and procedures required to effectively administer the holistic cost management approach.

Summary of Liberty's Steps to Verify Implementation

On June 9, 2016 we met with People Gas' Project Management & Controls Project Director to discuss actions taken and review implementation progress. We reviewed close-out documents provided by the Company, including:

- Organizational chart of Cost Support Group and the hierarchy to the executive level
- 2016 Performance Management Plans (PMPs)
- Project Controls Division of Responsibilities (DOR) Template

On June 28, 2016, management submitted the following three documents for review:

- Cost Management – Reporting Needs, Deliverables, and Frequency
- Career Map – Project Management and Controls
- Individual Development Plan for Cost Analyst

Observed Conditions and Factors

We found management’s approach and actions sufficient, assuming that cost analysts will continue to be under the purview of AMRP Project Controls Manager, and not re-assigned to VP of Finance. We want to ensure the cost management recommendation we champion would not drift into accounting-driven mandate. Additionally, the cost analysts are currently located in the home base to get oriented about the new holistic cost management program. Eventually, they need to be rotated or re-assigned to the shop to learn the construction side of the business to gain better insights in their cost analyses.

Implementation Complete and Satisfactory?

Yes. All the essential building blocks are designed and ready to be put in place for an effective Cost Support Group to serve the cost management needs of the AMRP program. The intent of this recommendation has been met.

Remaining Gaps, Needs

Staffing this Cost Support Group with qualified and experienced cost professionals comprises management’s next challenge. In the beginning, outside cost analysts or cost engineers will help shape the program and maintain cost support services. Eventually, management needs to staff this group with its own resources.

PGL Position

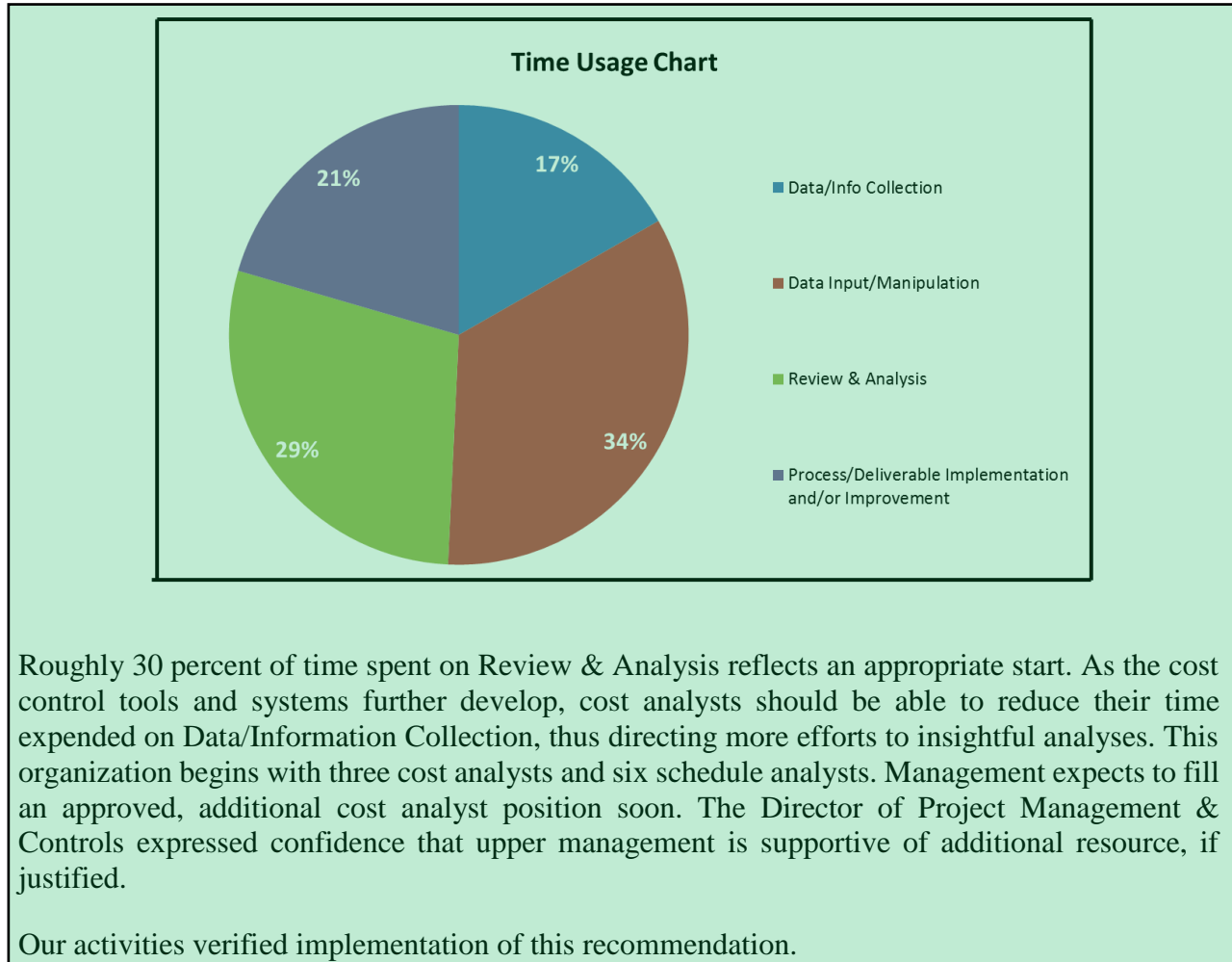
Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

We planned to review the operations and effectiveness of the Cost Support Group. This activity is to be scheduled to take place in the first quarter of 2017.

Final Liberty Verification Activities

On May 31, 2017, Liberty met with management. We conducted an earlier interview with a project manager and construction manager. Both managers expressed satisfaction with the tools and the quality of support they received from the Project Controls group. Prior to this meeting, we requested a time expenditure summary of the cost analysts in the first three months of 2017, to assess whether the managers had become overwhelmed by accounting and administrative tasks. The chart below summarized the time charge distribution in the four major categories of work: Data/Information Collection, Data Input/Maintenance, Review & Analysis, and Process/Deliverable Implementation and/or Improvement.



General Observations

None.

L.5 – Cost Management Training

Peoples Gas should provide training for managers, supervisors and cost support personnel in cost management techniques consistent with the holistic approach.

Training proves especially important where expectations for managers and support personnel are high, as should be the case for a program such as the AMRP. Our experience teaches that such training is welcomed by the managers receiving it.

Training is also essential to permit managers to make rational decisions about their information needs. For example, in developing Peoples Gas new cost management tools, such as the Primavera Unifier, the needs of managers must provide a critical input. However, in the absence of adequate training, it is difficult to see how managers can operate with full effectiveness in defining their needs. Peoples Gas should, therefore, consider cost management training a prerequisite to that new system’s development.

Underlying Conclusions

L.5 No formal training in cost management concepts exists to assist those with cost management responsibilities, and program management and supervision do not have access to designated cost support personnel to assist in analyzing cost and performance.

The absence of a formal cost management program for the AMRP means that managers try to control costs under varying methods, according to their background and experience. The lack of cost management professionals produces a lack of needed cost analytical capability.

PGL Action Plan Steps

Item #	Task	Status
1	Define objectives and requirements for the Cost Management Training process & procedures	Complete
2	Identify the scope and personnel requiring training	Complete
3	Design the Cost Management Training process & procedures	Complete
4	Prepare Cost Management Training process & procedure	Complete
5	Approve and publish Cost Management Training process & procedure	Complete
6	Provide orientation and training to project personnel on Cost Management Training	Complete
7	Document completion of the recommendation implementation	Complete

Once the integration efforts related to Wisconsin Energy Corporation’s acquisition of Integrys Energy Group, Inc. are complete, management assessed the training needs at the various levels for staff with cost management responsibilities. From that analysis, specific training programs were developed and provided on cost management processes, techniques, and leading practices.

The analysis of the training needs was completed, with implementation on an on-going basis as employees come on-board.

The following Training document was drafted on April 15, 2016 and finalized on March 14, 2017:

Cost Management Process Training

(A) The objectives of the Cost Management Process Training:

1. Ensure all accountable employees have understanding of the cost management process and procedure
2. Consistent use of the systems used for preparing and presenting cost information
3. Knowledge of how project costs are budgeted, collected, analyzed, and forecasted in order to support overall cost management for individual projects, on an annual basis, and at the program level.

(B) Training Audience - the training will cover the following audiences:

1. Project Controls Cost Analysts
2. Project Managers
3. Managers from Engineering, Contracts, and Construction

(C) Training Outline

1. Definitions: Estimate, Budget, Actual Costs, Forecast, Variance
2. Levels of cost management (project, annual, AMRP program)
3. Example of cost management lifecycle for a project – review of tools used for each step and roles involved with each step: Estimating, Budgeting, Cost Collection, Variance Analysis, Forecasting, Reporting, Trend Analysis
4. Tool usage: Estimating, PowerPlan, PeopleSoft, WAM, and P6
5. Review of annual cost management process and how the project process is related
6. Review of AMRP program process and how the project and annual processes are related

All the managers have completed the Cost Management Training. The training workshop covered the following topics: cost management basics, roles and responsibilities of the cost analyst, roles and responsibilities of project manager, detail forecast file, forecasting basics, tools to aid in forecasting, monthly reports, accruals, project cost review reports, and variance reporting.

Expected Post-Implementation Conditions and Factors

Cost management training for AMRP project delivery staff will facilitate improved effectiveness in areas such as project cost management, contract management, and cost analysis. Managers should now be more cognizant of cost management expectation of their roles and be more sensitive to the cost impact of their decisions. They are now provided with the essential approach and associated tools to manage the cost of their tasks. They are also aware that the project controls group can be a valuable resource to assist them in performing timely analysis for corrective actions or assessing the cost impacts of potential burgeoning issues.

Summary of Liberty's Steps to Verify Implementation

On December 21, 2016, management submitted the following document for preliminary review:

- Cost Management Workshop presentation slides, dated December 14, 2016

On March 20, 2017, management conducted an on-site Cost Management Workshop for us, and provided the following materials for discussions:

- Cost Management Training

On March 22, 2017, we met with management to discuss actions taken and review implementation progress. We reviewed the following close-out documents:

- Cost Management Training Plan
- Cost Management Training
- Cost Analyst Training Sign-in Sheet and Meeting Agenda
- Project Manager Training Agenda and Meeting Invite

Management considers the following deliverable as closeout components:

- The Cost Management Training Plan

The Cost Management Training plan will be defined in a procedure that will be a part of the Project Execution Plan. This recommendation will be deemed to be complete when that procedure is approved, published, and all managers and project personnel have been informed of their role in the process and management's expectations for their compliance.

Observed Conditions and Factors

We found the cost management training plan and materials acceptable, given the current scope and quality of the cost management program. We observe, however, that training essentially centers around cost estimating, budgeting, and old ways of forecasting. The extent of the holistic cost management program that we suggest in terms of philosophy, structure, and methodology is not being fully implemented and trained. Maybe management's efforts remain a job-in-progress. The tools and building blocks are being addressed first, which is understandable. As the cost management program matures, it is advisable for the training curriculum to be upgraded for a refresher course for all project personnel.

Implementation Complete and Satisfactory?

Yes. The training materials covers the basic cost management elements. All key managers and Project Controls personnel are trained.

Remaining Gaps, Needs

For further effective cost management, management needs to extend the training program one level down from the managers to the supervisors.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

During the second quarter of 2017, we plan to review the list of managers, supervisors, and Project Controls personnel that have received cost management training.

Final Liberty Verification Activities

On May 31, 2017, Liberty met with management. All key managers have now received basic training, and provided positive feedback. Project personnel will undergo more training at the working level during the second half of this year.

Liberty conducted an interview with the High Pressure Senior Project Manager, who reports to the Director of Project Management and Controls, and the High Pressure Construction Manager, who reports to the Director of Construction Management. The Project Manager indicated that the cost management training increased her cost sensitivity, and that she has been able to help the project team focus more on project costs and on how successful cost control practices can benefit future projects. The Construction Manager acknowledged that field personnel started to develop a cost management focus from the field perspective. The training also helped them to identify particular problem areas, and raise resulting cost issues. They both concurred the training gave them a more comprehensive understanding of cost management concepts, and enhanced their skills to manage costs from design to construction to project close-out.

Liberty's activities verified implementation of this recommendation.

General Observations

None.

N.3 – Consistency of AMRP Information to the Board of Directors

Peoples Gas should substantially enhance the completeness and accuracy of AMRP performance information provided to the boards of directors, and ensure its consistency with information used by AMRP program management and provided to the small executive group with designated responsibility for program oversight.

Independent oversight of management performance for AMRP has come principally from the Integrys board, where Liberty found reporting and views more positive than warranted. Reporting on the project to the Integrys board was different from and more positive than the monthly reports at the AMRP management level.

Executive management has acknowledged important gaps in program management and control, and, as discussed in the preceding conclusions, created action plans for addressing them. Those plans, however, do not explicitly address improvement in the accuracy and consistency of project performance information at the board levels. The degree of disconnect in past reporting makes it appropriate for Company plans to identify specifically how consistency will be maintained. Reporting on a program like the AMRP must take place at many levels. It extends as far down as supervision of direct work, and all the way up to the board of director level.

Such reporting obviously should “roll up” in level of detail as one moves upward in the supervision/management/executive/director hierarchy. Supervisors in the field need to measure performance often at the crew level or across durations as short as a day, or even a shift. Information “depth” is thus paramount. Moreover, while their need for detail is extensive in their areas of responsibility, they may have little or no concern even for summary level information in other functional areas (information “breadth”). However, at higher levels in the hierarchy, the need for depth decreases as the need for breadth increases.

The difference in needs, however, does not mean that different sources for information or judgments about its significance should apply. To the contrary, the best run programs promote consistency in information reporting as it rolls up or down the hierarchy. Use of consistent sources of data and engagement by an experienced source of cost management resources form important elements in ensuring that data underpinnings remain consistent and accurate as data information flows through that hierarchy. Similarly, a suitably empowered and located cost management organization has substantial importance in ensuring that analysis of and judgments about performance data remain objective and transparent, particularly at higher levels. This report’s Chapter L: Cost Management discusses the importance of the empowerment aspect of the cost management function. For purposes of this chapter addressing oversight, the critical feature to consider is the need to address explicitly how information accuracy, summarization level, and objective, candid, and complete analysis will be maintained in order to support oversight needs.

Underlying Conclusions

N.6 There has not been sufficiently active board of director oversight and monitoring of the AMRP.

The utility board of directors nominally approves capital expenditure budgets, financings, and major contracts. As is typical of holding company structures, however, it does so through a board

consisting of inside (employee) executive and management leadership, with no representation from outsiders. AMRP update presentations came before the Peoples Gas board only rarely and they ceased after February 2012. These presentations focused on the formal approvals required as a matter of law, and not on program performance metrics. Thus, the utility board cannot be said to have operated as a source of close performance oversight, even when it was receiving occasional AMRP presentations. Liberty’s review of utility board minutes found mention of the AMRP on only four occasions, with the last being in September 2012.

Independent oversight of management performance in the typical holding company structure, as is the case for Integrys/Peoples Gas, comes from a parent board comprised predominantly of outsiders. It is neither surprising nor troubling to find utility subsidiary boards operating through internal executives and focusing on legal and pro forma governance requirements. That said, however, it becomes important to examine the parent board’s AMRP oversight role and performance, given that we did not find robust AMRP oversight at the utility board level.

Communication about AMRP project performance to the Integrys board has produced an overly positive view. Discussions with a director, for example, elicited the view of a program very well executed and managed. This report found, the Company’s own consultant has observed, and executive management (we believe) acknowledges, many important gaps in program management, control, and oversight. Management’s current acknowledgement is constructive, but demonstrates the variance between director perception and performance under the AMRP. The gap between actual program status and the picture presented to directors shows significant communications failure, whether it arises from a lack of management awareness, a lack of clear board expression of the need for better information, or some other cause.

Liberty examined reporting at various levels to determine the consistency of information received at each. This review disclosed inconsistencies as program data moved “upward.” Liberty found instances where reporting on the project to the Integrys board appeared different and more positive than the monthly reports at the program and project management level.

PGL Action Plan Steps

Item #	Task	Due Date
1	Identify the reports that will be reviewed across the hierarchy in order to meet oversight requirements of the Peoples Gas Board and Corporate Management.	Complete
2	Identify how reporting consistency will be maintained.	Complete
3	Employ the ‘roll up’ and ‘roll down’ functionality in the reports for data views as appropriate at various management levels.	Complete
4	Achieve the reporting system objectives mentioned above	Complete

Management recognizes how Project Controls Management will ensure that the project team and management are informed of program/project status on a timely basis. Methods include a reporting system that identifies deviation from the plan and budget. The two primary functions of this reporting system are to:

- Provide the Project Manager and the team with the means of continuously measuring and evaluating the progress against the goals and milestones, budget and schedule.
- Provide advance warning of undesirable trends, deviations, slippages, and other project problems as well as facilitating timely corrective action to be taken to minimize their impact on cost, schedule, and quality.

Management understands that the achievement of the required objectives is contingent upon the completeness and accuracy of the information. The use of consistent sources of data and an engagement by an experienced source of cost management resources form important elements in ensuring that data underpinnings remain consistent and accurate as data information flows through that hierarchy. Similarly, a suitably empowered and proactive cost management organization has substantial importance in ensuring that analysis of and judgments about performance data remain objective and transparent, particularly at higher levels.

Management also acknowledges that continuous monitoring and reporting, as well as insightful and candid analysis, is critical for management and executive reporting. The basis for this vital information is embedded throughout the various activities and performance metrics housed within this reporting system. Management will assess schedule performance of active projects on a weekly and monthly basis, including a detailed variance report against current schedule. The following are in process to better monitor current project performance and develop broad program recovery plans: Program Plan, Integrated Project Schedule, Contractor Performance Metrics (Construction), Construction Finish Variance, Construction Recovery Plan, and Peoples Gas Shop Resources. The centralization of all these reports will ensure information consistency.

Upon completion of this recommendation a reporting process and procedure will be implemented in the Capital Project Execution Plan ("PEP").

Expected Post-Implementation Conditions and Factors

We believe that the intent of this recommendation may have become lost. Our original concern was the honesty and accuracy of communications to the Board. In addition, we concluded that Board oversight of the AMRP was not adequate. We observed that reports to the Board were shaded in a more positive light, and performance shortcomings were not presented fully or accurately. In our opinion, that represented a serious governance issue.

The response seems to have gotten tangled with data issues, consistency of databases, ability to drill down in reports, and maintenance of on-line databases. While those actions are fine, they do not address the fundamental issue of honesty in communications.

While the issue is quite serious, it would not be fair to paint new management with the same brush. No evidence exists that the new team has continued this bad practice. It is nonetheless incumbent on new management to demonstrate that management-to-director communications are accurate and candid.

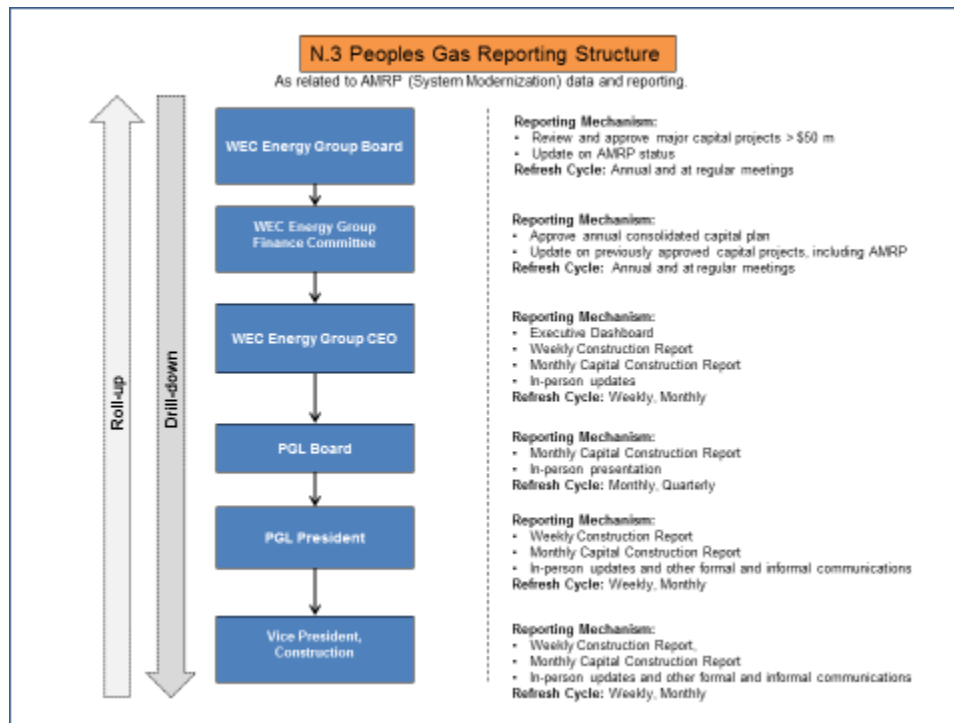
We assume that a program (1) costing many billions of dollars, (2) containing large risks in terms of both human life and corporate liability, and (3) also carrying large regulatory commitments and risks, will be among the Board's highest priorities. Few other endeavors can match the level of opportunity and risk associated with the AMRP. The Board has the obligation to demand an honest assessment of all elements of the program. Under the Integrys organization, we believe the Board

did not get that, with the result that the Board seemed unaware as performance deteriorated and the project struggled. To satisfy this recommendation, there must be a program and demonstrated practice that the Board is getting the quality and quantity of information it needs to carry out its oversight obligations.

Summary of Liberty’s Steps to Verify Implementation

On June 8, 2016, we met with the Project Management & Controls Project Director to discuss actions taken and review implementation progress. Management did not submit close-out documents for this recommendation.

We asked management to re-examine the original recommendation to understand its intent. We also would like to review the information provided to directors and senior executives. On July 15, 2016 management submitted a new response, and also a Roll-up/Drill-down Reporting Structure Chart as follows:



Management implemented a streamlined process to compile and distribute insightful data at varying levels of detail, in an effort to enhance program reporting for the company, has. Seeking to centrally house and structure reporting across the organization, management deployed an MS SharePoint (“SharePoint”) site designed with the sole purpose of functioning as a reporting repository that is easy to access and navigate. This SharePoint site enables key stakeholders to view critical reports that designated personnel update on a pre-determined frequency or cycle (weekly, monthly, quarterly or annual). As recommended by Liberty, this shared and central repository will help ensure the accuracy, completeness, and consistency of reporting content and formatting across the organization. Furthermore, this SharePoint site will help to ensure reporting transparency across the organization by providing multiple lines of sight to the same set of data.

This is a positive and appropriate effort. The reports on the SharePoint site have been tailored to meet the needs of executive stakeholders, senior project team members, directors, and staff across the organization. They are intended to provide complete and accurate information that captures the state of the program at any given time. Within these reports are varying levels of detail intended to provide drill-down and roll-up reporting capabilities. Along with critical performance data and metrics, key insight and analysis into trends are included in the reports to enable data-driven decision making.

On September 7, 2016, management conducted an online workshop for us to discuss this recommendation.

The following are key deliverables that management believes to represent completion of this recommendation:

- Reporting Schematics
- Executive Dashboard - Construction
- Report Samples

On September 19, 2016, we met with the Project Management & Controls Project Director to review the following documentation of tasks progress to-date:

- Capital Monthly Status Report
- Subset of the Capital Monthly Status Report

On October 3, 2016, in response to our continuing search for information on Board communications, management conducted a teleconference with us regarding the reporting paths that the Board is currently receiving:

- Monthly Briefing
- Board Members receiving Dash Board Weekly Report and Monthly Production Report
- Presentation to the Board on AMRP Status
- Monthly Major Project Meeting discussion

Following that teleconference, we received several samples of the discussed reports.

The following are key deliverables that management believes to represent completion of this recommendation:

- Develop sample report templates for use at various levels of management that include project execution team, senior executives and management team, and the PGL Board of Directors
- Develop reporting consistency requirements and standards development
- Account for roll up and roll down functionality of reports for data views as appropriate at various management level

Observed Conditions and Factors

Management has extended considerable effort in developing strong data systems and structured reporting. These continue to lack effective analysis, as discussed in the O-series of recommendations. Regarding Board communications, which is our primary interest in this Recommendation N.3, the formal submittals to the Board seem to have little in the way of

substance, content or meaningful insights. The underlying concern, candor of reporting, cannot be fully addressed, simply because the Board reports are so thin that one cannot be sure of what is being communicated in terms of program performance.

These observations arise from our review of the documents provided by management. The “President’s Report”, which is submitted to the Board quarterly, includes a 3-4 page “construction update”. One of the three reports we received contained some useful observations on program risks. Other than that, there is little one can learn about the program from these reports. We understand that discussion might accompany these presentations, but the Board surely is not being given much to facilitate such discussions. There appears to be production reporting but it would seem that Board members are on their own to determine what those numbers mean. If the Board is indeed given an accurate understanding of program performance, it is not obvious from the President’s Report. Is performance good or bad, and what are the ramifications for the future? Such questions are neither answered nor hinted at in the report.

We also received a “Capital Construction Summary Report”, which is the first three pages of the more detailed monthly construction report. More information on budget and schedule performance is provided here. We note, however, that the June report suggested no deviation was expected for the year, but the catch-up effort to support that conclusion did not happen.

Implementation Complete and Satisfactory?

Although we are critical of the oversight and governance information management provides to the Board, we acknowledge that the Board is responsible for determining its priorities and its information needs. Accordingly, we agree that this recommendation can be considered complete. There is no reason to suggest that the data provided to the Board is less than the Board demands, or that the data is less accurate than the Board expects.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that the recommendation is ready for close-out this quarter (3Q16).

Future Liberty Verification Activities

None.

Final Liberty Verification Activities

On April 27, 2017, Liberty met with management. The Vice President of Construction gave an update of project information provided to the Board of Directors. The older Dashboards no longer provided the primary mechanism, with the information fed from a newly established reporting structure possessing the rolled-up and drilled-down features. The Capital Monthly Status Report comprised the prime reporting mechanism, supplemented by the recently developed Weekly Capital Construction Report. The vice president also discussed about how management planned to develop more leading indicators, to supplement the current, lagging indicators.

Liberty verified implementation of this recommendation.

General Observations

None.

O.1 – Overhauled Approach to AMRP Reporting

The AMRP Project Management Office should overhaul its approach to reporting, with emphasis on defining and meeting the needs of managers and staff.

The purpose of the AMRP reports is unclear, and there does not appear to be a sound objective behind the monthly report. Rather than focusing the report structure on what information the program chooses to share, the structure should emphasize what information is needed by readers and what they should be expected to do with it. The program should work with managers to define their needs and then design reports to meet those needs.

Underlying Conclusions

O.1 AMRP reporting is not sufficient in level and quality to ensure that management has complete and timely information about AMRP performance and progress.

Liberty focused principally on the monthly report, which program management offered as the primary source of communication. Other reports, however, have a similar lack of focus on communicating information that is well-organized, comprehensive, and subjected to careful and insightful analysis.

PGL Action Plan Steps

Item #	Task	Due Date
1	Ensure inclusion of program management specification in the revised Capital Construction PEP	Complete
2	Project Director to form Program/Project Reporting improvements implementation team	Complete
3	Define objectives and requirements for the Program/Project improvements process and procedure and templates	Complete
4	Design the Program/Project improvements process and procedure and templates	Complete
5	Prepare Program/Project improvements process and procedure and templates	Complete
6	Approve and issue Program/Project improvements process and procedure and templates	Complete
7	Provide orientation and training to project personnel on Program/Project improvements	Complete
8	Document completion of the Program/Project improvements recommendation implementation	Complete

Expected Post-Implementation Conditions and Factors

Significantly revise report contents designed to meet leadership and management needs in managing, controlling, and overseeing the AMRP.

Summary of Liberty's Steps to Verify Implementation

On March 29, 2016 we met with the Project Management & Controls Project Director to discuss actions taken and review implementation progress. We reviewed recommendation close-out documentation, including:

- PGL Capital Projects - Production Report
- PGL Capital Construction Projects Monthly Status Report.

Observed Conditions and Factors

Management followed a process by which it designed reports and then sought feedback from its managers on their needs. This latter step, tailoring reports to managers' needs, is the key to this recommendation.

Implementation Complete and Satisfactory?

Yes. Management has provided assurances that this process was indeed completed.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that the recommendation has been implemented.

Future Liberty Verification Activities

We will follow up at a later time to verify that managers are satisfied and using the reports appropriately.

Final Liberty Verification Activities

On April 27, 2017, Liberty interviewed a project manager and a construction manager. The Capital Construction Projects Monthly Status Report currently serves as a primary reporting tool. Both managers indicated that this report provided a good program overview, but did not deliver the necessary information about how their projects were performing. This report provides a good communication tool for all personnel involved in the program. For example, the management initiatives section summarizes all on-going continuous improvement efforts, some of which project coordinators and construction managers recommended. The recently-developed Weekly Status Report also does not provide performance status about the projects under these two managers' purview. They must develop their own reports to fit their needs. The Project Controls Group indicated that existing systems do house the project information desired by the project managers and construction managers, and that they will generate new reports to satisfy their needs.

With plans to use existing data to provide enhanced reporting, Liberty considers the implementation of this recommendation verified.

General Observations

None.

O.2 – Framework for Performance Improvement

Management should establish a framework for performance improvement based on analysis of project performance and corrective actions.

One specific management need is information on program performance and how to facilitate improvements where appropriate. Management should put in place a specific process to provide a continuing means to understand and improve performance based on strong analysis of actual progress.

Underlying Conclusions

O.2 AMRP management has not made effective use of performance results analysis to drive improvement actions, from the board and executive management levels down to day-to-day supervision.

Management is not well positioned to use performance results effectively, because it does not receive performance results in an actionable or credible way. Liberty found a lack of focus on management follow-up to address performance gaps, as this report discusses repeatedly in many chapters.

PGL Action Plan Steps

Item #	Task	Status
1	Project Director to form Program/Project Performance Metrics Improvements Task Lead	Complete
2	Define objectives and requirements for the Program/Project Performance Metrics improvements process and procedure	Complete
3	Design the Program/Project Performance Metrics improvements process and procedure	In Progress
4	Prepare Program/Project Performance Metrics improvements process and procedure	In Progress
5	Approve and issue Program/Project Performance Metrics improvements process and procedure	In Progress
6	Provide orientation and training to project personnel on Program/Project Performance Metrics improvements	In Progress
7	Document completion of the Program/Project Performance Metrics improvements recommendation implementation	In Progress

Management agrees that it should upgrade AMRP performance metrics to include annual or cumulative progress versus the long-term plan goals and metrics for the executive oversight group and the boards of PGL and WEC. Since the beginning of January 2016, management has been focusing on improving its basic set of core metrics associated with the Capital Construction Program, such as the following:

- Cost per service meter
- Cost per foot of main (size)
- Cost per service (size)
- Cost and schedule variance (plan vs. actual)
- Project financial expenditures per month (plan vs. actual)
- Program financial expenditures per month (plan vs. actual)
- Construction work in progress (plan vs. actual)
- Miles of main installed
- Miles of main retired
- Number of meters installed
- Permit compliance metrics
- Crew utilization
- Safety metrics associated with OSHA reporting requirements (work-related illness and injuries)
- Program progress, cost, and schedule reporting

Management expects that improvements in the AMRP performance framework can facilitate the use of key performance indicators, trend summaries, alerts, drill-down capabilities for more detailed analyses of AMRP implementation progress and targets.

Expected Post-Implementation Conditions and Factors

The O-series of recommendations all relate to improving PGL’s use of performance data in an analytical way. Recommendation O.2 is directed at translating that reporting and analytical capability into specific performance improvements. The typical cycle includes:

- Establishment of a performance standard (addressed in Recommendation O.3);
- Measurement of actual performance against the standard;
- Analysis of deviations (addressed in Recommendations O.4 and O.5); and
- Corrective action (addressed in recommendation O.2).

The final step, intended to produce the desired improvement, is the basic objective behind collecting, analyzing, and reporting data in the first place.

Few organizations successfully navigate all four steps in most applications. Most end the process after “reporting”, as if that were an end in itself. Management, in response to this recommendation, initiated a simple, but novel in our experience, approach that should assure a healthy implementation of a strong corrective action program. PGL’s “Performance Improvement Action Log” picks up at the third of the four listed steps, and tracks the actions taken as a result of performance deviations. Accordingly, the process cannot be short-circuited and will be followed by Project Controls and management to the end, including actions to be taken and the success of implementation. We have not seen this formal approach used much elsewhere and consider management’s design and intended use to be a best practice.

Summary of Liberty’s Steps to Verify Implementation

On September 7, 2016, management conducted an online workshop with us to discuss Recommendations O.2 to O.5. The Company is finalizing the new Metrics and Reporting Procedure. Specifically, Section 6.2 of this procedure lays out the steps on Collection, Analysis,

and Reporting of Performance Data, and Section 6.3 the steps on the Review of Performance Data and Performance Improvement Actions.

On September 19, 2016, we met with the Project Management & Controls Project Director to discuss the following documents:

- A. Metrics and Reporting Procedure draft, dated September 16, 2016
- B. Metrics and Reporting Procedure Attachment 1 – Matrix of Project/Annual Plan/Program Recurring Reports
- C. Metrics and Reporting Procedure Attachment 2 – Matrix of Project/Annual Plan/Program Recurring Meetings
- D. Metrics and Reporting Procedure Attachment 3 – Performance Improvement Action Log
- E. Capital Monthly Report – August 2016

We discussed at that meeting the proposed training plan and syllabus, the creation of which we consider an extremely positive step. While a syllabus was not received, a specification for the requisite training was subsequently received and represents a very strong description of the type of analytical thinking and processes required of a sophisticated project management / project controls function.

The following are key deliverables for the performance improvement framework:

- Performance Metrics Framework improvement recommendations
- Performance Measurement process and procedure

Upon completion of this recommendation a reporting process and procedure will be implemented in the Capital Project Execution Plan.

Observed Conditions and Factors

Management has a good grasp of this recommendation’s intent, and has evidenced a strong buy-in to the concept. The path management has chosen to implementation is a good one. The focus on starting with qualified professionals, developing training in analytical skills as applied to construction, and insisting on corrective actions as a result of analyses is excellent, and we believe the approach being taken is a best practice. The formalization of the approach, and the development of the action log, suggest that the program will be effective and sustainable.

Implementation Complete and Satisfactory?

Yes. Management has taken significant steps in designing a plan for this response and in implementing that plan. We believe that management has the desired vision to implement this recommendation and is satisfied that the recommendation is being, and will continue to be, effectively implemented.

Remaining Gaps, Needs

Training of Project Controls professionals, project specialists, project managers, managers from Engineering, Contracts, Construction and Construction Planning. We understand that Ernst & Young has been retained to design the training, in accordance with PGL’s specification.

PGL Position

Management agrees that the recommendation is ready for close-out this quarter (3Q16).

Future Liberty Verification Activities

During the second quarter of 2017, we will conduct a “mini-audit” of the action log to verify successful implementation of this recommendation.

Final Liberty Verification Activities

On April 27, 2017, Liberty met with management, who presented the Performance Improvement Action Log. The log contains more than 50 improvement initiatives, which cover multiple process areas. Information contained in this tool includes date created, person assigned, status, process area, issue, cause, improvement action, due dates, closure criteria, and closure dates. Management just established the log, and assigned its maintenance to the Project Controls Group. The log contains no already-completed items to audit, but we did observe improvement actions being implemented in estimating and scheduling process areas.

While continued emphasis is in order, we verified that management is proceeding along an appropriate path, allowing us to deem implementation of this recommendation verified.

General Observations

None.

O.3 –Program Performance Standards

In the course of its current improvement initiatives, Peoples Gas should redefine and reestablish its standards for program performance.

Given the current lack of standards, Peoples Gas will be unable to provide the insightful analysis needed. The current improvement initiatives should remedy this shortcoming. As Peoples Gas develops these new budgets, plans, and other relevant documents, the Company should define and communicate their intended use for future performance analysis and reporting.

Underlying Conclusions

O.3 The AMRP lacks a credible and comprehensive set of standards, which leaves it without a prerequisite to effective AMRP reporting and performance analysis.

Project measurement bases should find definition in program plans and in documentation of the underlying assumptions. Budgets and schedules, for example, provide standards of performance and management’s expectations regarding performance requirements. Management should hold project organizations and contributors accountable to those standards. Management cannot seek accountability where standards do not exist, or where standards lack credibility.

PGL Action Plan Steps

Item #	Task	Status
1	Project Director to form Program/Project Performance Metrics Improvements Task Lead	Complete
2	Define objectives and requirements for the Program/Project Performance Metrics improvements process and procedure	Complete
3	Design the Program/Project Performance Metrics improvements process and procedure	In Progress
4	Prepare Program/Project Performance Metrics improvements process and procedure	In Progress
5	Approve and issue Program/Project Performance Metrics improvements process and procedure	In Progress
6	Provide orientation and training to project personnel on Program/Project Performance Metrics improvements	In Progress
7	Document completion of the Program/Project Performance Metrics improvements recommendation implementation	In Progress

Management agrees that it should upgrade AMRP performance metrics to include annual or cumulative progress versus the long-term plan goals and metrics for the executive oversight group and the boards of PGL and WEC. Since the beginning of January 2016, management has been focusing on improving its basic set of core metrics associated with the Capital Construction Program, such as the following:

- Cost per service meter
- Cost per foot of main (size)
- Cost per service (size)
- Cost and schedule variance (plan vs. actual)
- Project financial expenditures per month (plan vs. actual)
- Program financial expenditures per month (plan vs. actual)
- Construction work in progress (plan vs. actual)
- Miles of main installed
- Miles of main retired
- Number of meters installed
- Permit compliance metrics
- Crew utilization
- Safety metrics associated with OSHA reporting requirements (work-related illness and injuries)
- Program progress, cost, and schedule reporting

Management expects that improvements in the AMRP performance framework can facilitate the use of key performance indicators, trend summaries, alerts, drill-down capabilities for more detailed analyses of AMRP implementation progress and targets.

Expected Post-Implementation Conditions and Factors

The O-series of recommendations all relate to improving management's use of performance data in an analytical way. The typical cycle includes:

- Establishment of a performance standard (addressed in this Recommendation O.3);
- Measurement of actual performance against the standard;
- Analysis of deviations (addressed in Recommendations O.4 and O.5); and
- Corrective action (addressed in recommendation O.2).

This Recommendation O.3 focuses on the establishment of performance standards. We note that the challenge here is somewhat of a semantic one. All organizations work to approved budgets and schedules, and these often carry a high expectation of compliance. We have generally found, however, that this is not the case on large construction projects, and the larger the project, the less the expectation of conformance. In such cases, budget and schedules are far from performance standards; in fact, there is an expectation that they will not be met. As a result, the budgets and schedules lack credibility from the start and it is impossible to hold anyone accountable for non-compliance. Effective project management and control becomes impossible in this all-too-common scenario. Budgets and schedules may indeed be a measuring stick, but they are by no means a standard of performance.

The intent of this recommendation is to transform budgets and schedules into performance standards. This is largely a matter of culture, but also requires budgets and schedules that are believable. It also requires processes that follow up on performance and hold managers and organizations accountable. In this sense, all of the O-series recommendations are integrated towards this objective. In this particular O.3, we have stressed the importance of communicating

to managers and project participants that there are indeed standards for performance and they will be measured against those. Discussions with management personnel indicate they are on board with this necessity and plan to communicate accordingly.

Summary of Liberty's Steps to Verify Implementation

On September 7, 2016, management conducted an online workshop with us to discuss Recommendations O.2 to O.5. Management is finalizing the new Metrics and Reporting Procedure. Specifically, Section 6.1 of this procedure lays out the steps on Planning of Metrics and Reporting, and Section 6.4 the steps on the Continual Improvement of Metrics and Reporting.

Management also presented Capital Monthly Report sample charts to illustrate the Neighborhood Focus on reporting AMRP annual progress on main installation, services installation, meters installation, and retirement installation. There is also an ICC July Month-End Report sample page on Neighborhood Main Replacement Program.

On September 19, 2016, we met with the Project Management & Controls Project Director to discuss the following documents:

- A. Metrics and Reporting Procedure draft, dated September 16, 2016
- B. Metrics and Reporting Procedure Attachment 1 – Matrix of Project/Annual Plan/Program Recurring Reports
- C. Metrics and Reporting Procedure Attachment 2 – Matrix of Project/Annual Plan/Program Recurring Meetings
- D. Metrics and Reporting Procedure Attachment 3 – Performance Improvement Action Log
- E. Capital Monthly Report – August 2016

The following are key deliverables for the performance improvement framework:

- Performance Metrics Framework improvement recommendations
- Performance Measurement process and procedure

Upon completion of this recommendation a reporting process and procedure will be implemented in the Capital Project Execution Plan.

Observed Conditions and Factors

Recommendation O.3 must be evaluated within the context of the full program for reporting, analysis and corrective action. In discussions with management personnel, it became clear that they understand the subtle, but critical, distinction between targets and performance standards and are factoring that thinking into the program. We believe that this distinction will be communicated and implemented successfully.

Implementation Complete and Satisfactory?

Yes. The implementing steps for this recommendation are less tangible than most recommendations in that they depend on how the organization perceives budgets and schedules within the overall control framework. The required culture change in this regard is likely to take time, as budgets and schedules become more credible, as they are communicated more effectively as legitimate performance expectations, and as project personnel are increasingly held accountable to those standards.

Remaining Gaps, Needs

Training of Project Controls professionals, project specialists, project managers, managers from Engineering, Contracts, Construction and Construction Planning. We understand that Ernst & Young has been retained to design and deliver this training in accordance with the PGL specification.

PGL Position

Management agrees that the recommendation is ready for close-out this quarter (3Q16).

Future Liberty Verification Activities

During the second quarter of 2017, we will review the new standards of performance. We will also validate the implementation of these standards.

Final Liberty Verification Activities

On April 27, 2017, Liberty met with management, who indicated that it actively monitors some of the obvious measurements, such as mains installation, services installation, meters installation, and retirement installation. However, completing the of suitable performance metrics remains in progress. Management has established primary metrics and standards of performance for its construction execution work. On an individual project basis, the main standards by which performance is measured are:

- Project Budget
 - Actual performance relative to the plan
 - Estimate at completion relative to the plan
- Project Schedule
 - Adherence to plan
- Main Installation Quantity
 - Actual performance relative to the plan
- Services Installation Quantity
 - Actual performance relative to the plan
- Meter Installation Quantity
 - Actual performance relative to the plan
- Main Retirement Quantity
 - Actual performance relative to the plan.

Team members from throughout the project lifecycle (engineering, contracts, permitting, and construction) participated in review sessions to prepare and validate these standards, in order to give them wide credibility. The project manager has accountability for the overall health and performance of the project. With development of additional performance standards will come accountability of the Project Manager and the Project Management team. The next chart illustrates additional project and portfolio standards of performance under development.

Metric	Reporting Level	Implementation Time Frame	Implementation Comments
Cost/mile	Portfolio (Neighborhood, PI/SI)	Q4 for projects to be constructed during 2018	To ensure standard has credibility: *Focusing on individual project cost management *Collecting data during 2017 for unit based execution
Cost/meter mark & bar	Portfolio (Neighborhood, PI/SI)	Q4 for projects to be constructed during 2018	To ensure standard has credibility: *Collecting data during 2017 for this installation sequence (pilot tested new approach during 2016) *Supporting roll-out of new customer system in 2Q 2017, which contains meter transfer data
Cost/meter transfer	Portfolio (Neighborhood, PI/SI)	Q4 for projects to be constructed during 2018	To ensure standard has credibility: *Collecting data during 2017 for this installation sequence (pilot tested new approach during 2016) *Supporting roll-out of new customer system in 2Q 2017, which contains meter transfer data
Cost/service	Portfolio (Neighborhood, PI/SI)	Q4 for projects to be constructed during 2018	To ensure standard has credibility: *Focusing on individual project cost management *Collecting data during 2017 for unit based execution

With management now employing a unit-price contracting strategy for a majority of its construction contracts, these rate metrics in combination with quantity standards already in place provide valuable sources for monitoring and controlling scope proactively. As described in its draft Metrics and Reporting Procedure, management will review metrics and standards at least annually. Management expects these standards to continue to evolve as required to support successful execution of the construction work. Management has also completed the orientation and training by Ernst & Young to project personnel on Program/Project Performance Metrics improvements.

The Performance Metrics Framework remains a work in progress and we did not find the current metrics adequate. Nevertheless, management is taking necessary time in the short run to determine suitable measurements, thereby satisfying us to consider implementation of this recommendation verified.

General Observations

None.

O.4 – Framework for Performance Improvement

The Project Management Office should establish a culture and a regular, defined, comprehensive program that provides insightful analysis of program performance, and should acquire the capability to perform such analyses.

The Project Management Office must overcome its reluctance to provide objective and, if necessary, self-critical analysis. The greatest beneficiary of such analysis will be the Organization itself. To accomplish this, the Project Management Office must develop an enhanced capability for analysis.

Each executive should take a more active role in demanding information and analysis from the project to fully support their oversight responsibilities. Executives must work with the program to explain their needs and insist upon necessary analysis and reports. The burden is on the project to provide that material, but executives must take the lead and insist upon responsive actions by the project on a continuing basis.

Underlying Conclusions

O.4 AMRP management has not given strong emphasis to creating a culture and a set of capabilities for aggressive analysis.

The mass of data presented to management does not lend itself to meaningful analysis or valuable insights. The organization has not yet shown the capabilities for such analysis or evidence that it recognizes the need for making analysis a central element of program management.

PGL Action Plan Steps

Item #	Task	Status
1	Project Director to form Program/Project Performance Metrics Improvements Task Lead	Complete
2	Define objectives and requirements for the Program/Project Performance Metrics improvements process and procedure	Complete
3	Design the Program/Project Performance Metrics improvements process and procedure	In Progress
4	Prepare Program/Project Performance Metrics improvements process and procedure	In Progress
5	Approve and issue Program/Project Performance Metrics improvements process and procedure	In Progress
6	Provide orientation and training to project personnel on Program/Project Performance Metrics improvements	In Progress
7	Document completion of the Program/Project Performance Metrics improvements recommendation implementation	In Progress

The new PGL leadership team brings project management expertise from years of work on numerous large and successful capital projects. This new team is further supplemented by external talent to assist with improvements to project and cost controls, cost and schedule planning, and management. Management understands the role of a continuous improvement program to promote a culture of and an emphasis on seeking innovations to improve efficiency in the installation of mains, services, and meters. Management believes that the continuous improvement mindset needs to be embedded into the work culture and practiced at all levels of the organization similar to safety and quality, and as such, may be administered and assessed outside of just a standalone team or group. Nonetheless, such efforts can benefit from an outside facilitator or technology subject matter expert. Management has just begun the process to assess project management technology improvement opportunities. Management intends to establish a performance monitoring program that provides insightful analysis and actionable advice to make improvements to project performance and help guide risk mitigation and management of AMRP.

The list below notes likely areas of monitoring and analysis to better inform AMRP implementation moving forward:

- Program progress, cost, and schedule reporting
- Safety reporting for individuals, shops, crews, and contractors
- Contractor performance and alignment with PGL goals
- Evaluation of project management, crew, and contractor performance
- Engineering quality, compliance with standards, and efficiency
- Performance compared to third party expectations (e.g., CDOT)
- Permit compliance (e.g., construction durations through restoration)
- Customer satisfaction with internal and contractor crews
- Managerial effectiveness
- Team members' personal performance plans
- Root cause analyses
- Materials management and waste
- Capital utilization efficiency
- Regulatory reporting (e.g., ICC, OSHA, PHMSA)

Management expects that improvements in the AMRP performance framework and performance standards can facilitate the use of key performance indicators, trend summaries, alerts, and drill-down capabilities for more detailed analyses of AMRP implementation progress and targets.

Expected Post-Implementation Conditions and Factors

The O-series of recommendations all relate to improving management's use of performance data in an analytical way. This Recommendation, O.4, is directed at building the skills and capabilities to perform the insightful analyses required for an effective management program. The typical cycle includes:

- Establishment of a performance standard (addressed in Recommendation O.3);
- Measurement of actual performance against the standard;
- Analysis of deviations (addressed in Recommendations O.4 and O.5); and
- Corrective action (addressed in recommendation O.2).

We made 95 recommendations in the Phase 1 audit report and recommendation O.4 might be the most important in terms of the success of the Project Management and Project Controls organizations, as well as the overall long-term success of the AMRP. The notion of “insightful analysis” is far from obvious to most people. It represents a skill and way-of-thinking that is often lacking in organizations and is difficult for many managers and analysts to develop, or even understand.

We have conducted had many discussions with management in this regard over the last two years. Such discussions have at times been encouraging, and at other times disappointing. In the latter category are the “management observations”, which we understand are intended to represent “insightful analysis”. Our reading of Company reports suggests that management has yet to fully grasp the concept. The “observations” are generally limited to repeating what the numbers already make obvious. There is little in the way of performance analysis or discussion, no remarks on what can be done better and how, and no insights offered on future expectations.

On the other hand, PGL’s “specification” for “Analytics Training” is spot-on in terms of what we judge to constitute insightful analysis as applied to construction work. In fact, we have rarely seen such a quality discussion of this admittedly fuzzy concept. This short but powerful document provides an excellent roadmap for management to build the skills and capabilities so critical to a multi-billion-dollar program.

Summary of Liberty’s Steps to Verify Implementation

On September 7, 2016, management conducted an online workshop with us to discuss Recommendations O.2 to O.5. Management is finalizing the new Metrics and Reporting Procedure. Specifically, Section 6.2 of this procedure lays out the steps on Collection, Analysis, and Reporting of Performance Data.

On September 19, 2016, we met with the Project Management & Controls Project Director to discuss the following documents:

- Metrics and Reporting Procedure draft, dated September 16, 2016
- Metrics and Reporting Procedure Attachment 1 – Matrix of Project/Annual Plan/Program Recurring Reports
- Metrics and Reporting Procedure Attachment 2 – Matrix of Project/Annual Plan/Program Recurring Meetings
- Metrics and Reporting Procedure Attachment 3 – Performance Improvement Action Log
- Capital Monthly Report – August 2016

In the meeting, there was a discussion on the outstanding training plan and syllabus. Management subsequently submitted a document, which we have termed a specification, for that training program.

The following are key deliverables for the performance improvement framework:

- Performance Metrics Framework improvement recommendations
- Performance Measurement process and procedure

Upon completion of this recommendation a reporting process and procedure will be implemented in the Capital Project Execution Plan.

Observed Conditions and Factors

At this point in time, we are left with a large gap between what the organization currently seems able to do (“management observations”) and what it proposes to do, as described in the training specification. That specification refers to the ability to evaluate field efficiency and spot trouble signs early. It talks of optimum staffing and optimizing overtime and productivity. It also raises the challenge of spotting trends in costs, quality and schedule. Embedded throughout the document is the notion of looking at historical performance only as a way to forecast and optimize future performance.

The fact that management has not, so far, been able to bridge this gap should be a matter of concern. But the fact that management now recognizes the gap, has articulated it in the specification, and plans to implement an extensive training program to close the gap, is extremely positive and encouraging. We recognize that this will not happen overnight, nor will one training course be successful in making everyone a top practitioner of a difficult art. The good news is that (1) an understanding now exists that we did not see before; (2) a roadmap in the form of the training specification is now in place; and (3) the necessary support framework is being built in the form of the implementation plans for the associated recommendations.

Implementation Complete and Satisfactory?

Yes. We would have preferred to see some real tangible analysis in management’s current reports but nonetheless see a positive path forward. We emphasize that “understanding” is an enormous prerequisite to satisfying this recommendation and, for the first time, we see tangible evidence that this understanding is indeed in place.

Remaining Gaps, Needs

The successful execution of the training program, followed by implementation of the concepts, represent unfinished business. We understand that Ernst & Young has been retained to develop and implement the training program in accordance with management’s specification.

PGL Position

Management agrees that the recommendation is ready for close-out this quarter (3Q16).

Future Liberty Verification Activities

During the fourth quarter of 2016, we will review the details of the Ernst & Young training plan, including the syllabus, planned trainees, schedule, and follow-up requirements. The specification is sound, providing confidence that the effort is on the right track. Nevertheless, we plan on a detailed review of the program in December.

During the second quarter of 2017, we will review sample analyses of progress and performance from various reports and at various levels. This will focus on management’s capability to perform such analyses and management’s use of those analyses.

Final Liberty Verification Activities

On April 27, 2017, Liberty met with management. Previously management reported in response to a Data Request that it had completed the first wave of training in the first quarter of this year. Attendees of this program included senior project managers, project managers, project specialists, project control analysts, and document control supervisor. We examined the scope of the training program, and raised a concern that most of the subjects appeared to be statistics-oriented and their application to manage AMRP work had to be questioned. Management claimed that the training had true construction application, and committed to submit some training slides that illustrate appropriate application during training.

On May 12, 2017, management submitted a follow-up summary on this recommendation, addressing its Analytics Training Syllabus. The objectives and contents of this training provide a sound basis for improving business decision making through analytics, developing the necessary analytical skill for business decision-making. However, we did not find the actions cited in line with the intent of this recommendation, which is to provide insightful analysis of AMRP (SMP) program performance. For what we mean by program performance analysis, refer to our illustration on the Weekly Capital Construction Report below.

We did not find the training program reviewed sound. We had termed it a best-in-class initiative in reviewing it in an earlier stage. We stated:

“PGL’s “specification” for “Analytics Training” is spot-on in terms of what we judge to constitute insightful analysis as applied to construction work. In fact, we have rarely seen such a quality discussion of this admittedly fuzzy concept. This short but powerful document provides an excellent roadmap for PGL to build the skills and capabilities so critical to a multi-billion-dollar program.”

Unfortunately, management has not yet delivered in accordance with the excellent specification. The result appears to be an off-the-shelf product that looks like what large consultants have been providing for decades. It does not touch on “insightful analysis as applied to construction work”. Ordinarily, we would conclude that management did not understand the notion of “insightful analysis”, but we know this is not the case from our many interactions. Rather, the failing was in the product finally delivered.

In a separate verification meeting, the Vice President of Construction mentioned that the newly developed Weekly Capital Construction Report comprised the latest tool providing timely communication to upper management. It has been well enough received to force the Dashboard to a backseat. After the meeting, management forwarded a copy of the April 28 Weekly Capital Construction Report on May 9, 2017. This report essentially provides the following two types of charts at the shop level and aggregate level: (a) Weekly Quantity Actual versus Goal for the following six categories of commodities, namely, Mark & Bar, Services Installed, Main Installed – Distribution, Main Installed – HP, Meter Installed, and Field Retirement; and (b) PGL Capital Construction FTE Count. As with most of management’s reports, we observed no narratives or analyses. One is left to wonder how management is going to respond to some of the very significant problems displayed on the charts.

For example, this report displays serious lack of progress for the month of April in four out of six categories of work:

- For Mark & Bar, the north shop completed 1,293 actual versus 4,201 forecast, the central shop 9 actual versus 40 forecast, and the south shop 687 actual versus 1,491 forecast
- For Meters, the north shop installed 55 actual versus 708 forecast, the central shop 42 actual versus 210 forecast, and the south shop 41 actual versus 406 forecast
- For Services, the north shop installed 288 actual versus 505 forecast, the central shop 89 actual versus 203 forecast, and the south shop 163 actual versus 349 forecast
- For Field Retirement, the north shop achieved 3,227 actual feet versus 44,237 forecast, the central shop 0 actual foot versus 251 forecast, and the south shop 4,011 actual feet versus 10,514 feet forecast.

Quantity variances as extremely large as these beg for explanations or analyses, but we found none in writing. As for the daily workforce bar charts, we are not sure whether they are informing management that the current workforce is at the right level. Given the lack of progress displayed in the progress charts, one must question whether the resources are adequate. No written analyses identify the causes and recommend remedial actions, such as reallocating internal resources, acquiring more external resources, how much more, in what category of work, and the overall cost and schedule impacts, for example.

While data quality of the reporting may have improved, we found the analytical aspect of the Monthly Capital Construction Report still inadequate in the Management Observation section. As for the Weekly Capital Construction Report, there is no written analysis. We acknowledge that insightful analysis takes skill that takes time to master, but this newly developed report without analysis displays a troubling concern, indicating that the culture of insightful analysis we recommended remains a distant goal. In this regard, the failure of the promised “training” is especially disappointing, although management reports that it remains under development.

General Observations

None.

O.5 – Roles of Project Controls Professionals

Peoples Gas should expand the role of its project controls professionals to allow for more analysis of project progress and performance and, in turn, support of management by facilitating corrective action.

This report addresses specific analysis improvement opportunities in a number of chapters. Management should address use of existing people to implement Our recommendations in this regard. If they prove unsuitable, then further staff development or supplementing with added skills will prove necessary.

Underlying Conclusions

O.7 Peoples Gas has not called upon its project controls personnel to provide the analysis and facilitation of corrective action that the AMRP requires.

Given the apparent higher than average skill level of the people, the AMRP appears to underutilize them. They likely have the capability to provide the analytical contributions that management does not appear to have demanded. The need for augmentation of cost estimating and management resources may or may not make these personnel a potential pool of resources from which to draw.

PGL Action Plan Steps

Item #	Task	Status
1	Project Director to form Program/Project Performance Metrics Improvements implementation team	Complete
2	Define objectives and requirements for the Program/Project Performance Metrics improvements process and procedure	Complete
3	Design the Program/Project Performance Metrics improvements process and procedure	In Progress
4	Prepare Program/Project Performance Metrics improvements process and procedure	In Progress
5	Approve and issue Program/Project Performance Metrics improvements process and procedure	In Progress
6	Provide orientation and training to project personnel on Program/Project Performance Metrics improvements	In Progress
7	Document completion of the Program/Project Performance Metrics improvements recommendation implementation	In Progress

Management will expand the role of its project controls professionals and in particular, the role of the Project Manager (PM). The PM's role is expected to be cradle-to-grave within the AMRP delivery team. The expanded role will reflect the traditional role of the PM for WEC capital projects. The PM has the overall responsibility and accountability to lead a project from inception and design, through engineering, permitting, contracting, construction, and closeout. Throughout

the project life cycle, the PM will maintain strong leadership, management, and oversight responsibilities to achieve project budget, schedule, safety, and quality targets.

The new PGL leadership team brings project management expertise from years of work on numerous large and successful capital projects. This new team is further supplemented by external talent to assist with improvements to project and cost controls, cost and schedule planning, and management. Management understands the role of a continuous improvement program to promote a culture of and an emphasis on seeking innovations to improve efficiency in the installation of mains, services, and meters. Management believes that the continuous improvement mindset needs to be embedded into the work culture and practiced at all levels of the organization similar to safety and quality, and as such, may be administered and assessed outside of just a standalone team or group. Nonetheless, such efforts can benefit from an outside facilitator or technology subject matter expert. Management has just begun the process to assess project management technology improvement opportunities.

Below is a sample of the core metrics that project controls professionals will closely monitor and analyze to better guide program implementation in the coming months and years. Insightful analysis and progress monitoring by the project controls group of these metrics will better inform and guide risk mitigation, risk management and associated corrective actions for effective program implementation:

- Cost and schedule variance (plan vs. actual)
- Project financial expenditures per month (plan vs. actual)
- Program financial expenditures per month (plan vs. actual)
- Construction work in progress (plan vs. actual)
- Program progress, cost, and schedule reporting
- Safety reporting for individuals, shops, crews, and contractors
- Contractor performance and alignment with PGL goals
- Evaluation of project management, crew, and contractor performance
- Engineering quality, compliance with standards, and efficiency
- Performance compared to third party expectations (e.g., CDOT)
- Permit compliance (e.g., construction durations through restoration)
- Customer satisfaction with internal and contractor crews
- Materials management and waste
- Capital utilization efficiency
- Regulatory reporting (e.g., ICC, OSHA, PHMSA)

Management expects that improvements AMRP performance framework as well as expansion of the role of its project controls professionals can facilitate the use of key performance indicators, trend summaries, alerts, and drill-down capabilities for more detailed analyses of AMRP implementation progress and targets.

Expected Post-Implementation Conditions and Factors

The O-series of recommendations all relate to improving the use of performance data in an analytical way. Recommendation O.5 is directed at empowering project controls professionals

such that they can provide the maximum support to the control scheme. The typical control cycle includes:

- Establishment of a performance standard (addressed in Recommendation O.3);
- Measurement of actual performance against the standard;
- Analysis of deviations (addressed in Recommendations O.4 and O.5); and
- Corrective action (addressed in recommendation O.2).

Prior O-series recommendations focused on establishing the control process and building capabilities. Recommendation O.5 focuses on assuring that the people associated with the processes have the management support to execute the process effectively.

During our audit, it was clear that the role of Project Controls personnel was limited. In many cases, they had the skills to contribute effectively, but did not have a defined role that allowed them to be effective. The processes we have recommended, and which management is implementing, require an empowered staff of project controls professionals. It is essential that roles and responsibilities be communicated and management's expectations for Project Controls be consistent with a strong control scheme.

Summary of Liberty's Steps to Verify Implementation

On September 7, 2016, management conducted an online workshop with us to discuss Recommendations O.2 to O.5. Management is finalizing the new Metrics and Reporting Procedure. Specifically, Section 6.2 of this procedure lays out the steps on Collection, Analysis, and Reporting of Performance Data.

Management has also presented a summary of the roles and responsibilities of Cost Management Professionals. There is a matrix depicting the Division of Responsibilities between the Project Controls Manager, Cost Analysts, and Project Manager.

On September 19, 2016, we met with the Project Management & Controls Project Director to discuss the following documents:

- A. Metrics and Reporting Procedure draft, dated September 16, 2016
- B. Metrics and Reporting Procedure Attachment 1 – Matrix of Project/Annual Plan/Program Recurring Reports
- C. Metrics and Reporting Procedure Attachment 2 – Matrix of Project/Annual Plan/Program Recurring Meetings
- D. Metrics and Reporting Procedure Attachment 3 – Performance Improvement Action Log
- E. Capital Monthly Report – August 2016

The following are key deliverables for project controls professionals' role in performance management analysis:

- Performance Metrics Framework improvement recommendations
- Performance Measurement process and procedure.

Upon completion of this recommendation a reporting process and procedure will be implemented in the Capital Project Execution Plan.

Observed Conditions and Factors

In evaluating responsiveness to this recommendation, the roles and responsibilities document is perhaps the most important. That document specifically addresses 24 tasks or activities. Each task represents a traditional mechanical chore. On that basis, the definition of roles is not supportive of this recommendation, and in fact runs counter to it. By focusing on the mechanical responsibilities, management is not allowing time for the activities we recommended, specifically the expansion of the role into “more analysis of project progress and performance and, in turn, support of management by facilitating corrective action”.

Discussions with management suggest that this is an oversight, as evidenced by the focus on training and development of personnel in analytical skills. We tend to agree with this explanation, although the omission is important.

Implementation Complete and Satisfactory?

Yes. The motivation for this recommendation was to address the low expectations for controls personnel in the old organization. This was a management failure in that the controls organization did have a reasonable set of skills. That level of low expectations does not exist in the new organization, so we are not particularly concerned. Management’s approach to project controls has already convinced us that controls personnel will have the expanded role we recommend.

Remaining Gaps, Needs

The focus of the roles and responsibilities document on mechanical chores and the creation of data while ignoring what is to be done with the data to facilitate management is an omission that should be corrected. Please see the discussion under Recommendation H.4 about insightful analysis, which apply as well here.

PGL Position

Management agrees that the recommendation is ready for close-out this quarter (3Q16).

Future Liberty Verification Activities

During the first quarter of 2017, we plan to review the role that has been assumed by project controls professionals. We view this as an evolutionary process, and therefore do not expect massive change. The pace and direction of change will be more important.

Final Liberty Verification Activities

On April 27, 2017, Liberty met with management. We also observe a demonstration by a Project Controls analyst of the Forecast Model, seeking to illustrate the tools used to identify variances and display analytical results. The several examples shown identified some data issues that resulted in corrective actions. The Model offers a good tool that can project annual year-end and final project costs. We also found it positive that data quality will be enhanced via the initial analysis.

The analysts and schedulers in the Project Controls Group now spend great effort in performing analysis. We accepted management’s belief that the Division of Responsibilities (DOR) is a living document that will be updated with more analytical works. Nevertheless, Liberty re-emphasized

the concern that the analysts could be so overwhelmed with administrative tasks that they would not be able to dedicate their time to perform analysis in adequate terms. This concern was confirmed by the Project Controls analyst present that there would always certain commitments from external departments that need to be satisfied immediately on a monthly basis. We further recommended that the Project Controls Manager should evaluate on a periodic basis the percentage of time the analysts and schedules expended on performing analysis versus the other chores. The AMRP Project Director indicated that additional resources could be approved when required.

Our activities verified implementation as planned, recognizing the evolutionary nature expected. With a positive direction established, the question we raised about the pace of change now takes on more direct relevance.

General Observations

None.

P.3 – Proper Verification of AMRP Charges

Peoples Gas should promptly: (a) correct the potential gap that exists with respect to ensuring the accuracy of material and equipment costs charged to the AMRP, (b) develop a method for reliably and accurately determining independently the magnitude of any error in AMRP material and equipment costs being included in rate recovery, and (c) devise and implement a similarly independent testing program to verify that no material risk exists with respect to AMRP costs subject to rate recovery.

The Internal Audit Services group issued its report about material and equipment reconciliation in November 2014. The Company must promptly verify completion of measures that will address the inability to ensure that material and equipment costs charged to the AMRP match those actually spent. The Company also needs to verify that they have been recorded and reported under appropriate controls. Verification efforts should include the testing of specific transactions and activities.

What is required for the AMRP is a ground-up, fresh examination of rate risk. This examination needs to consider, but not limit itself to the materials and equipment reconciliation issue. The examination should produce a clear and comprehensive assessment of improper recovery risk, and develop plans for testing. Reporting of the assessment and planning processes should be made promptly to the Illinois Commerce Commission on completion. The same is true for reporting of specific tests, examinations, and audits. At least internally to Integrys and Peoples Gas, if not to the Illinois Commerce Commission as well, executives outside the AMRP and rate/regulatory leadership and management chain should be prepared regularly to certify that, to the best of their knowledge, information, and belief, all costs claimed for AMRP rate recovery contain no material error. That certification should rely on explicitly stated confidence in the testing plan and the results of tests conducted. Materiality should be defined with reference to size of the retail rate elements or components under which AMRP costs are recovered.

Underlying Conclusions

P.5 Control over material quantities recorded to AMRP project accounts has not been sufficient; there is no reliable way to verify that wholly accurate materials cost information underlies AMRP costs.

The November 2014 examination of materials reconciliation by Internal Audit Services raises concern from the perspective of program management effectiveness. It has equal and perhaps greater concern for its potential impacts on the confidence that the Illinois Commerce Commission and stakeholders can and should have on the accuracy of AMRP costs that Peoples Gas are recovering through rates.

The amounts directly implicated by the audit's specific test work represent only a small portion of AMRP costs. That said, the casting of doubt about costs underlying even a small portion of rates undermines the regulatory confidence that should always form a hallmark of utility management and operation. Moreover, the Project Management Office belief that it does have a method for determining the level of inaccuracy that exists:

- Underscores the AMRP management, control, and oversight weaknesses that other chapters of this report address,
- Calls for development of more than the current, vague commitment to ensuring a reasonably accurate measure of inaccuracy in the known area of concern
- Begs the question of what review outside of the AMRP management organization is required to provide confidence that similar concerns do not underlie other areas of AMRP cost.

PGL Action Plan Steps

Item #	Task	Status
1	Form Material and Equipment Management Tiger Team and define scope of project	Complete
2	Special Project Manager to complete investigation and analysis and determine required actions. Perform a detailed review of the programs to identify specific action items.	Complete
3	Issue Implementation Schedule	In Progress
4	All required actions are complete	In Progress

Management formed a multi-disciplinary “Tiger Team” at the end of 2015, responsible for completing a detailed review of the program(s) to identify specific action items. Since the formation of the team and prior to the completion of the detailed plan however, certain members of the team were re-assigned to address other priorities.

In mid-2016, senior management assigned a Special Project Manager (SPM) to this recommendation (filled by the Director of Construction). The SPM reviewed the work of the Tiger Team to-date and developed a list of required actions items. Primary areas of focus identified by the SPM included:

- Procurement of required materials and equipment
- Identification of estimated materials on a Bill of Materials on the appropriate design drawing(s)
- Handling of scrap and waste materials
- Requisitioning of material by contractors
- Responsibility for supply for various materials and equipment
- Verification of actual material used versus the design drawing Bill of Materials
- Definition of material and equipment handling protocols in contract documents for contractors
- Establishment of regular internal audit protocols for verification of compliance
- Review of proper accounting treatments associated with materials and equipment in the capital construction program(s)

Throughout June and July of 2016, the SPM reviewed the collected information from prior materials reviews and performed additional investigation and analysis. The result of the review was the identification of a series of gaps related to data and/or collection, data and/or document control, and field review and verification. To address these gaps, the following action items were identified:

1. Management will pilot a project to place the responsibility of furnishing materials upon the contractors to identify all the touch points in supplying materials to a project.
2. A field quantity tracking pilot began in July of 2016 and is planned for completion in March of 2017. This pilot will evaluate the use of an electronic tool (iPads) to track quantities in the field (as entered by the Field Coordinators).
3. Another pilot will be bid out in December 2016 or early 2017 and executed in 2017. The reconciliation pilot adds a dedicated Materials Specialist to the project to track the flow and usage of materials and compare those results to the data provided by two newly available sources of information (electronic field quantity tracking data and as-built GPS data at closeout). The intent of this pilot is to identify how new tools and methods can be used to close the previously identified gaps in the event that furnish and install contracts prove infeasible.

Management has also put several Material Specialists in place, reporting to the Contract Organization (Refer to P.3.1Atch01 and P.3.1Atch02). Material Specialist responsibilities include working as a liaison among Engineering, Construction and Supply Chain to manage and ensure material availability for contractors for all capital construction projects, to coordinate and interact with Engineering and Project Management teams and contracts, and to reconcile materials for projects. (Refer to P.3.1Atch03 for a full job description of a Material Specialist P.3.2 – P.3.4).

Expected Post-Implementation Conditions and Factors

Management has embarked on several pilot projects to address material reconciliation issues identified by this recommendation. The results of these pilots may establish new policies and procedures, as it relates to material reconciliation. As such, it is important that the underlying policies and procedures be updated to reflect the changes in these programs, especially the addition and involvement of the Material Specialists and the processes used by Field Coordinators to update installed quantities in the field.

Management should also formally report on the outcome of each pilot project and determine how well each addresses the issues identified. Plans to extend the pilots company-wide should also be defined and communicated.

Summary of Liberty's Steps to Verify Implementation

On December 14, 2016, we met with the Director of Construction to review the following documentation of task progress to-date:

- (A) PGL Construction Organizational Chart (P.3.1Atch01) detailing Special Project Manager.
- (B) PGL Contract Organizational Chart (P.3.1Atch02) detailing Material Specialists.
- (C) Job Description of a Material Specialist (P.3.1Atch03).

Additionally, we discussed the results of the SPM and proposed pilot projects with the Lead Contract Specialist responsible for overseeing the pilot projects as well as the Material Specialists positions.

Observed Conditions and Factors

PGL’s SPM has completed the analysis, originally intended for a Tiger Team, to identify areas of focus to improve material reconciliation. Three pilot projects have been identified to address the issues and 3 Material Specialists have been placed to oversee the process in each of the Shops. The pilot projects identified appear to address concerns identified during the management audit. Results from these pilots should be available in 2017.

Implementation Complete and Satisfactory?

Yes. Management has appropriately addressed this recommendation. The pilot programs will not be completed prior to the end of our monitoring period. As a result, we will consider this recommendation to be completed. To the extent possible, we will monitor pilot status during the first and second quarters of 2017.

Remaining Gaps, Needs

None.

PGL Position

Management agrees with us that this recommendation should be closed.

Future Liberty Verification Activities

Management implemented a new process to order and reconcile materials and equipment. It will be important to follow-up in the second quarter of 2017 to see how the process is working.

Final Liberty Verification Activities

On March 23, 2017, Liberty met with management, who described activities performed to date, including the hiring of material specialists within the organization during the 3rd and 4th quarter of 2016. Management moved from a pilot project to implementation, by establishing a single-point-of contact for material and equipment ordering and reconciliation. In the past, engineers, construction personnel, and contractors could order materials and equipment directly, but management now requires contractors to coordinate ordering through dedicated material specialists. Additionally, contractors must appoint a dedicated resource as the contact point for these issues. Management is drafting the new procedures for this process.

Management previously indicated plans to deploy iPads to field employees in late April 2017. These devices would ultimately track quantities of materials and equipment installed, after employees have been trained on the process. Ultimately, a dashboard would be developed to track these activities more closely. Until then, a “tracker” spreadsheet will track installed materials and equipment.

On July 12, 2017, Liberty reviewed additional documentation to verify the implementation status of Recommendation P.3. Management reported that the materials specialist positions have been fully staffed. The specialists report up through the Contract Services organization, and have been assigned to each contractor to establish the single-point-of-contact. The specialists work closely with contractors, engineering, construction management, supply chain, and contract specialists to ensure that the contractors have the correct materials when needed. Additionally, the materials specialists follow the contractual process to reconcile issued versus installed. The new process has also eliminated duplicate input of orders and streamlined coordination. Single-point-of-contact builds expertise and knowledge within material specialists, facilitates materials' reconciliation.

Management also indicated that reporting metrics are under development (reference recommendation M.2).

We found implementation activities sufficient.

General Observations

None.

Q.1 – Construction Standards, Training and Auditing

Peoples Gas should address a number of construction standards’ needs, and should enhance training, documentation, and auditing several areas related to construction standards.

(Conclusion Q.2)

Peoples Gas needs to address requirements related to the use of steel straps, jeeping, and thrust blocks. Moreover, the Company needs to address contractor and inspector training to ensure compliance with Company and regulatory standards. The Company also needs to improve consistency and documentation of field work inspection, and consistently perform construction verification audits of contractor work.

Underlying Conclusions

Q.2 The standards to which AMRP resources perform field work generally support safe and reliable installations, with a number of specific exceptions that Peoples Gas needs to address.

(Recommendation Q.1)

Liberty’s field investigations considered the standards under which contractors and Peoples Gas crews perform main and service installation, meter relocation, and pressure-increase activities. The standards used typify what one generally finds in the industry. Chapter C: The Peoples Gas Distribution System addresses engineering and design in more detail. AMRP field work generally conformed to those standards. Liberty’s work, however, did identify a number of areas that require attention with respect to construction standards or to activities designed to ensure that work meets those standards. These areas include: Steel Straps, Jeeping, Thrust Blocks, Contractor Training, Inspector Training, Compliance Monitoring Group (“CMG”) Training, Inspection Documentation, and Construction Verification Audits.

PGL Action Plan Steps

This recommendation contains 14 (15 total) tasks of which 12 have been completed and the remaining are either partially completed or are ongoing.

Item #	Task	Due Date	Actual
1	Issue Work Practice “WP-2019 Thrust Blocks and Bracing	2015	Complete
2a	Implement an annual quality review and audit process for contractor OQ programs.		Complete
2b	Fully documented quality assurance program for contractor OQ programs	03/31/17	Complete
3	Contractors will be required to use the Energy U Training modules, Energy U KNT Testing, and Energy U PEF’s or equivalent. Hard copy paper tests from legacy industry consortiums will not be permitted. Any new OQ	01/30/16	Complete

	evaluation completed after will need to be on the Energy U or equivalent platform.		
4	Contractors will be required to train and OQ qualify their own personnel. Peoples Gas will provide guidance on the required OQ Covered Tasks to perform each work activity.	04/01/16	Complete
5	Construction contractors to supply their own quality control inspectors.	04/01/16	Complete
6	Contractors will be required to provide QR Code IDs, with pictures, to all their personnel performing OQ Covered Task work on company facilities.	05/01/16	Complete
7	Construction contractors will be required to identify, document, and address all quality issues in the field.	07/01/16	Complete
8	Increase the number of auditors in the Compliance Monitoring Group to provide increased oversight of construction contractors.	07/01/16	Complete
9	Metrics to monitor the performance of CMG Auditors will be developed and implemented	7/25/16	Complete
10	Contractors will be required to adhere to the PGL/NSG OQ Program Document.	08/30/16	Complete
11	Issue procedure on jeeping	10/31/16	Complete
12	Issue procedure on steel straps	10/31/16	Complete
13	Construction contractors will be required to use an auditable and query-able database of findings	04/01/17	Ongoing with some progress with 2 contractors
14	CMG will audit the contractors' databases and the contractors' training records	04/01/17	Two completed as of 12/31/2016 and others on going

Expected Post-Implementation Conditions and Factors

Management anticipates that it will complete all the tasks before the end of the next construction season. These new procedures, auditing, and self-inspection by the contractors should result in fewer regulatory violations, improved quality installations and traceable and auditable quality findings. Coupled with the other recommendations regarding auditing, training and procedures, the full implementation of this recommendation will improve the quality of the AMRP and other capital and expense work.

Summary of Liberty's Steps to Verify Implementation

We submitted several data requests to verify the implementation to date of this recommendation. We will also perform field audits during the beginning of the 2017 construction season to ascertain if the self-inspection and CMG auditing is effective.

Observed Conditions and Factors

We had observed several instances of poor quality, lack of Operator Qualification (OQ) and lack of procedures in the 2014 construction season. This recommendation is a direct result of those observations.

Implementation Complete and Satisfactory?

For the tasks already implemented, all have been done satisfactorily.

Remaining Gaps, Needs

Management needs to complete the remaining and open tasks such as completing a contractor QC and OQ data base (Task 1.13) and CMG auditing of all the contractor databases (Task Q.1.14).

PGL Position

Management agrees with this recommendation, and has implemented it.

Future Liberty Verification Activities

None

Final Liberty Verification Activities

With this recommendation, results of the change in staffing in the construction organization became apparent as the 2017 construction season started. Our inspectors observed sufficient numbers of Field Coordinators and construction inspectors on the job sites and projects visited. The coordinators and inspectors appeared to have sufficient training. Management also increased auditor ranks, supporting frequent job-site visits and feedback to the construction organization. See Appendix A, Phase 2 Field Audits for more specifics. As noted above, work remains to complete tasks 1.13 and 1.14.

General Observations

As of September 15, 2016, management has received and approved contractor QA/QC plans from six of the eight contractors allowed to bid on AMRP contracts. Only two have outstanding QA/QC plans (see response to DR-156). We reviewed several recent inspection reports by contractor construction inspectors (responses to DR-157 and attachments), along with related root cause documents. These documents showed that at least one contractor inspector performed extensive inspections on job site equipment, and observed crews when performing routine work. Prior to the end of 2016, management performed full quality audits on two contractor's QA/QC plans, and listed the results and any deficiencies (See DR-251 under task Q.1.14).

Management has stated that Task Q.1.7 is complete, but we observed only limited data from issues identified during quality inspections (response to DR-158). The resumes in response to DR-159 and DR-244 show several for one contractor newly contracted CMG inspectors who previously served as PGL employees and have very substantial experience with gas main installations and general gas work or inspection. Some others appear less seasoned on gas work.

Per Task Q.1.9 (see response to DR-160 and DR-245), management has started tracking CMG audit finding for contractors and in-house crews. The majority of audits performed involved in-house crews (1169 out of 1643, or 71 percent). The results showed 18.6 percent deficient audit findings on in-house crews and 18.1 percent overall, which would yield an average of nearly 17 percent for contractors. The range of deficient audit findings for contractors was between 0 percent (9 audits) and 100 percent (4 audits). The most audits on contractors involved a contractor in Chicago (slightly under 10 percent showed a deficiency). Another contractor exhibited deficiencies on 14 of 53 audits (over 26 percent). The data covered the period between January and September 9, 2016. A later update to a response to DR-245, shows considerable progress in managing out-of-compliance issues and a reduction in the number of non-compliant audits.

One 2014 field audit found a non-qualified person on a directional drilling machine, with construction inspectors not aware of this instance. Management has begun to implement a more complete OQ vetting process, which starts with a compliance form, and will include (in the 2017 construction season) an on line OQ data base. In the 2016 construction season, 449 OQ QA/QC questions were asked of contractors. Answers to six of these audit questions proved deficient (a 1.3 percent rate). The rate remains too high but asking the questions is a good practice. (See response to DR-161).

Q.2 – Construction Checklists and Inspector Empowerment

Peoples Gas should adopt measures to ensure consistent use of construction inspection checklists, develop a structured program for analyzing the information they produce to identify and respond to field performance issues disclosed, and clearly empower inspectors to halt unsafe work. (Conclusion Q.3)

Company-proposed initiatives resulting from discussions between Liberty and senior leadership include the initiation of an audit process intended to verify that all inspectors use the forms, use them correctly, and complete them promptly. This initiative, if implemented effectively, should address the need for ensuring that inspectors fill out the forms completely, do not allow them to accumulate for several days before completing them, and complete them under approved standards, with proper content, and on a timely basis.

Achieving these completion objectives, however, does not go far enough. The Company needs to add to its initiatives the design and implementation of a structured program, under dedicated oversight within the AMRP management organization, for analyzing the forms to determine where the information they capture identify performance problems. This analytical program needs to consider where such problems may exist in a variety of areas; *e.g.*, a specific contractor, employee performance in a geographic area, an engineering or construction standard, or an AMRP-wide work activity.

Our field observations also indicate that management needs to provide additional training for construction inspectors, in order to improve their ability to recognize work that fails to comply with regulatory and procedural requirements. Similar training is necessary to enable inspectors to better recognize abnormal operating conditions (“AOC”), and to document deficiencies in contractor training.

Most importantly, Peoples Gas needs to make clear to inspectors their power to halt improper work or activities immediately when they observe them.

Underlying Conclusions

Q.3 Construction inspectors have not routinely used the checklist process to record and provide a basis for performance analysis, and their power to halt unsafe work appears to be in question. (Recommendation Q.2)

Liberty’s field work disclosed that some construction inspectors have not used checklists correctly. Some also defer completing them until the end of the week. Discussions with AMRP and Shop management also indicated lack of a structured or widespread effort to use checklist information. This data provides a basis for discussing and identifying means for correcting recurring or systemic performance issues. The use of the checklists has importance in ensuring consistent and thorough review of individual contractor performance. The checklists can also provide significant insights into issues that adversely affect work effectiveness, efficiency, and duration.

Liberty’s field work also identified uncertainties among inspectors about their power (absent real-time clearance from a higher authority) to halt work activities that raise safety concerns. Giving that power to inspectors is critical to ensuring work performance that meets safety and performance

requirements and expectations. Inspector lack of confidence or respect from field supervision may well contribute to this situation. Peoples Gas must recognize that denying inspectors the power to take immediate action does not offer a solution. A better approach lies in proper inspector empowerment and in training and communication about their role and authority.

PGL Action Plan Steps

This recommendation contains 6 tasks. Four (4) of the tasks have been completed. The remaining two tasks are in progress or on going and are scheduled for completion before the end of 2017.

Item #	Task	Due Date	Actual
1	Auditors and Inspectors will have a letter of authority (card) on their person while inspecting or auditing a job. They will understand their authority and responsibility as described on this card.	04/01/16	Complete
2	Contractors will supply their own Construction Inspectors.	04/01/16 Changed to 4/4/2017	Modified and Complete
3	CMG will audit construction crews on average about once every week.	07/01/16 Changed to 8/31/2016	Complete
4	Key performance indicators will be developed using the CMG check list.	07/31/16	Complete
5	Contractors will use a query-able database for their findings.	04/01/17 Changed to 12/31/2017	Partially Complete
6	CMG will audit the contractors' databases and the contractors' training records.	04/01/17 Changed to 12/31/2017	On going

Expected Post-Implementation Conditions and Factors

Management committed to improve the inspection of construction crews via a multipronged program of using contractor inspectors, CMG audits and quality assurance and control programs. This new system is expected to be fully functional for the 2017 construction season. All construction inspectors and CMG auditors have been trained that they have the authority and the duty to stop all unsafe and non-compliant work immediately.

Summary of Liberty's Steps to Verify Implementation

We will not be able to verify the full implementation of this task, because it appears likely to occur after the Phase II verification audit has concluded. However, we will perform field examinations of contractor and company crews in the next quarter.

Observed Conditions and Factors

We had observed several issues during the 2014 audit of construction activities, identifying the need to improve the inspection process. Furthermore, during that audit it was noted that contracted construction inspectors believed they did not have the authority to stop unsafe or non-compliant work.

Implementation Complete and Satisfactory?

The tasks already implemented have been performed satisfactorily. Task Q.2.3 (having CMG inspect the quality of the contractors) shows, along with Task Q.2.4 (see the responses to DR-167, DR-253, and DR-168, DR-254 and respective attachments) shows that many of the installations have been audited both during work and after installation completion.

Remaining Gaps, Needs

Management needs to continue to do follow up with contractors and in-house construction crews where problems are identified by any of the inspectors or auditors.

PGL Position

Management agrees with this recommendation and has activity implemented it.

Future Liberty Verification Activities

None

Final Liberty Verification Activities

Implementing this recommendation has made changes in staffing in the construction organization apparent as the 2017 construction season started. Our field inspectors found sufficient numbers and training of Field Coordinators and construction inspectors on the job sites and projects visited. See Appendix A, Phase 2 Field Audits for more specifics. With resources now substantially augmented, management is in a position to develop processes for and emphasize follow-up on problems these resources identify.

General Observations

Management continued to reschedule the effective dates of some planned recommendation implementation activities. Such delays may affect the quality of the work. We performed audits during the 2017 construction season to determine if the previously noted non-compliance issues have been corrected and if the quality of the work is acceptable, given delay in the multipronged quality control program until the start of the 2017 construction season.

Many of the tasks in this recommendation are like those covered in Recommendation Q.1 and its tasks. Management has stated (response to DR-166) that each of the current contractors has deployed some auditors to evaluate the quality of construction, and the number of inspections depends on the number of auditors and amount of work/jobs that the contractor is performing. The field verifications performed by CMG are showing some of the same deficiencies that We noted in 2014 (e.g., gas vents located within three feet of a building opening, meters too close to the ground).

The most recent Company audits of in-house crews found that gas vent location continues to be an issue (see DR-253). Other deficiencies noted in 2014, such as risers not being properly anchored, were not noted. New deficiencies, such as building piping penetrations not being sealed and some outside piping not painted, came mainly from PGL crews. Tracer wire and below grade riser issues arose mainly from contractors (see response to DR-167 and attachments for specifics).

During our field audits/inspections, most of the deficiencies noted in 2016 and before appear to have been corrected, with only a few problems or out of specification work was noted (See Appendix A, Phase 2 Field Audits for more specifics).

Q.3 – Field Resources, Short and Long Term

Peoples Gas needs promptly to conduct short-term and long-term analyses of its requirements for skilled and experienced field resources, develop incentives for moving personnel into new positions and incenting senior workers to remain, and ensure that training and development efforts anticipate (and not merely react to) vacancies.

Performing a comprehensive field resource needs analysis represents a key first step. The Peoples Gas initiatives resulting from discussions between Liberty and senior leadership include plans for a needs analysis that will identify potential losses of first-level and general supervisors reaching retirement age. Peoples Gas should supplement that “numbers” analysis, which is appropriate, with an examination of the likely training and development needs for potential replacements.

The Company seems to understand that incentives to move into supervision and to remain with the Company after reaching retirement benefits plateaus must form part of its plans for ensuring adequate resources over the long AMRP duration that remains. The Company has acknowledged the long-term need to promote first-level supervisors from within (e.g., moving well qualified and motivated crew leaders into management from this current highest union position). Such movement historically has provided an important source for acquiring first-level supervisors.

The needs analysis should look closely at the utility worker (formerly called gas mechanic) position, given the time it takes to fully qualify such mechanics. That training time makes it too late to begin the training process when a vacancy occurs, or becomes imminent...

Underlying Conclusions

Q.5 Peoples Gas has had difficulty in filling internal positions responsible for AMRP work, and, like the industry as a whole, faces graying workforce issues that can cause skills gaps to widen over time.

Maintaining an adequate number of skilled and experienced personnel forms a central element in ensuring work quality, timeliness, and efficiency. Peoples Gas faces current shortages in a number of positions. Liberty’s review also confirmed the risk that shortages will increase, given the demographics of the internal workforce. Like others in the industry, Peoples Gas faces the loss of growing numbers of skilled workers and supervisors as retirement ages approach. A combination of disincentives to remain after reaching benefits plateaus and increased employment opportunities in an improving economy further increase employee retention risk. The growth of accelerated main replacement programs around the country adds further risk.

The discussions that began last September between Liberty and senior leadership produced consensus on the need to address internal resource numbers and skills, both short- and long-term. A comprehensive analysis of needs across the immediate and the longer terms should take place. Peoples Gas also needs to identify methods to incent bargaining unit employees to enter supervision and retirement-eligible workers to remain.

PGL Action Plan Steps

This recommendation contains 2 tasks that have been rescheduled and are now considered completed.

Item #	Task	Status
1	Interview and fill the restructured organizational positions in the Capital Construction organization.	Complete
2	Conduct training programs associated with new personnel in repurposed or new positions.	Complete

Expected Post-Implementation Conditions and Factors

Management will be employing many first level supervisors not having gas construction or gas management experience, because it will rely on outside hires to staff first level supervisor vacancies.

Summary of Liberty’s Steps to Verify Implementation

None

Observed Conditions and Factors

Management will experience a loss of talent as the work force, including first level supervision reaching retirement age. We believed that management should restructure its incentives to provide a method for senior union personnel to move into first level supervisor positions. Management did not agree nor implement this part of the recommendation. Instead, it has decided to hire from the outside, and to train newly hired first level supervisors. Management was able to induce some lower level union personnel to move to first level supervision, but they also must have additional people-skills training. This approach is not as positive as having crew leads move into first level supervision, but should prove better than hiring from the outside and having to train these new company employees in handling gas work.

Implementation Complete and Satisfactory?

Yes, this recommendation is implemented and additional training modules are due to be released for the 2017 construction season.

Remaining Gaps, Needs

Training will be a critical task in ensuring the safety of the gas system since many newly hired first level supervisors may not have prior gas construction or safety experience.

PGL Position

Management agrees that the first level supervisor position is critical, but has decided that it will not change human resources policies to incent senior union personnel to move to management.

Future Liberty Verification Activities

None

Final Liberty Verification Activities

Our verification activities confirmed the continuation of staffing changes to address the resources issue that the implementation plan covered, as of the 2017 construction season start. See Appendix A, Phase 2 Field Audits for more specifics.

General Observations

This recommendation is aligned with Q.4 and Q.5.

In 2016, two redesigned or developed training courses provided the fundamental reference information and expectations of Field Coordinators, with respect to managing contractors in the field. For 2017, the two courses from 2016 continue to serve as an introduction to the responsibilities of Field Coordinators, with an additional training course pertaining solely to roles, responsibilities, and expectations of Field Coordinators will be introduced. All training courses presented to the Field Coordinators address some aspect of management of contractors.

Training increased from six to 16 modules from 2015 to 2016. In 2016, six of the additional training modules available to Field Coordinators were newly developed. For 2017, 39 modules are planned, incorporating 17 newly developed modules for newly hired Field Coordinators. These coordinators will include PGL employees and third party supplied contract individuals, some of which are retired gas employees. Management was also able to hire some mechanics as Field Coordinators, but not union crew leaders, from the bargaining unit ranks.

For the 2017 construction season, management will have hired over 30 additional Field Coordinators, some prior, unionized mechanics, but most new hires with some but limited gas experience. The new training courses are designed to improve their skillsets. As in 2014 and 2015 management is attempting to mentor the novice gas individuals by teaming them with experienced District Leaders and Field Supervisors, of which 18 out of 28 are new to the company.

See Recommendation Q.5 General Observations for comments regarding Quality Control and Quality Assurance on AMRP and other programs.

Q.4 – Field Resources and Inspection Stability

Identify and pursue means to increase the stability in and the numbers of field supervision and inspection personnel.

Discussions with senior management make clear its recognition that Peoples Gas faces resource restrictions that affect AMRP performance. A comprehensive understanding of the size of the resource gaps in areas affecting safety and compliance, however, must depend upon progress in improving overall planning, management, and control of the AMRP.

Nevertheless, on an immediate basis, Peoples Gas needs to begin addressing barriers that exist to securing resources to enhance supervision of crews.

The Company should undertake a focused examination of the incentives necessary to induce union crew leaders to become first level supervisors, as an alternative to filling vacancies through outside hires with limited gas operations experience. Current disincentives to internal succession include retirement programs, pay, and other benefits. The timeframe for filling first level supervision positions is long, as is the learning curve for outside hires. Peoples Gas needs to begin to address vacancies before they occur, even at the expense of temporarily having extra supervisors. Their ability to be trained and mentored by senior general supervisors prior to being assigned to crews will represent resources well spent in the interests of long-term AMRP optimization.

The Company also needs to promote a greater level of continuity in AMRP management and supervisory ranks at the Shop level. Minimizing job shifts that deprive the local Shops of key resources needs to become a priority. Doing so will permit faster resolution of issues by personnel not in the process of learning on the job. Greater stability will also help to make lines of authority and responsibility more clear. Lack of clarity about who (e.g., the Project Management Office versus the Shop areas, Integrys versus Peoples Gas) has responsibility and accountability for what decisions and actions will improve performance beyond what our field inspection teams observed.

Underlying Conclusions

Q.6 A number of factors increase the difficulties that Peoples Gas has in providing sufficient numbers of experienced personnel.

Liberty's field investigations and interviews with field management disclosed a number of specific personnel-related concerns that contribute to performance, safety, and compliance issues.

Peoples Gas has experienced a significant level of vacancies in key field supervision and inspection positions. The utility has not filled vacancies resulting from retirements, promotions, and reassignments at a sufficient rate to sustain resource levels at effective numbers and levels of experience. The growth in work occasioned by the AMRP and other work growth (such as the increase to medium pressure and the relocation of meters to outside locations) has placed significant strain on resources. Frequent switches in job assignments have produced many cases where job holders have short tenures in current, key positions (e.g., shop construction supervisor and manager positions). Moreover, incentives to retain people in key positions and to encourage experienced workers to take supervisory positions are not strong.

Peoples Gas has consequently experienced a shortage of trained personnel to fill supervision and inspection roles. The impacts show in what Liberty’s field inspection team found to be comparatively weak levels of supervision and oversight, particularly with respect to work being performed by Peoples Gas crews. Moreover, it is clear that there have been delays by Peoples Gas crews in accomplishing their designated elements of AMRP work. As contractors continue to perform substantial numbers of gas main and service replacements, the gap threatens to widen, absent expansion in the number and capabilities of Peoples Gas resources.

PGL Action Plan Steps

This recommendation contains 2 tasks that have been rescheduled and are now considered complete.

Item #	Task	Status
1	Interview and fill the restructured organizational positions in the Capital Construction organization.	Complete
2	Conduct training programs associated with new personnel in repurposed or new positions.	Complete

Expected Post-Implementation Conditions and Factors

Management will have many first level supervisors without gas construction or gas management experience, because it is relying on outside hires to staff first level supervisor vacancies.

Summary of Liberty’s Steps to Verify Implementation

None

Observed Conditions and Factors

Management will experience a loss of talent as the work force, including first level supervision reach retirement age. We believed that management should restructure its incentives to provide a method for senior union personnel to move into first level supervisor positions. Management did not agree nor implement this part of the recommendation. Instead, it has decided to hire from the outside, and to train newly hired first level supervisors. Management was able to induce some lower level union personnel to move to first level supervision, but they also must have additional people-skills training. This approach is not as positive as having crew leads move into first level supervision, but should prove better than hiring from the outside and having to train these new company employees in handling gas work.

Implementation Complete and Satisfactory?

Yes, this recommendation is considered complete and implemented.

Remaining Gaps, Needs

Training will be a critical task in ensuring the safety of the gas system since many newly hired first level supervisors may not have prior gas construction or safety experience.

PGL Position

Management agrees that the first level supervisor position and inspectors are critical to the company but has decided that it will not change human resources policies to incent senior union personnel to move to management.

Future Liberty Verification Activities

None

Final Liberty Verification Activities

Our verification activities confirmed the continuation of staffing changes to address the resources issue that the implementation plan covered, as of the 2017 construction season start. See Appendix A, Phase 2 Field Audits for more specifics.

General Observations

This recommendation is aligned with Q.3 and Q.5. See the general observations under Recommendations Q.3 and Q.5 for additional details.

Q.5 – Training and Inspection Issues

Clarify responsibilities for key field roles and institute training programs to support them more fully.

The Company needs to make clear that Technical Training is the recognized authority for guidance involving safety, operating procedures, compliance, and Operator Qualification matters, for both Integrys personnel conducting AMRP work through the Project Management Office and Peoples Gas personnel working under management in the three Shop areas. It must also be made clear that Compliance Monitoring Group personnel are not only monitoring or advisory resources, but have the authority to address field safety and compliance issues directly and as they arise.

Technical Training needs to rework and expand the training for construction inspectors. It needs to design training that will ensure that inspectors are completely knowledgeable about Company procedures, standards, and regulatory requirements. It should undertake that effort based on a focused effort to identify the principal and recurring gaps and other problems.

The training should include practical, hands-on treatment of issues (e.g., fusing and Operator Qualification requirements). It should also focus on how to spot poor quality work and who to call when questions or concerns arise. Technical Training should also make available and ensure that field personnel know how to gain prompt access to a knowledgeable person who can respond in a short time frame. Construction inspector training also needs to include City permit requirements and clear information on what requirements take precedence when conflicting or differing requirements apply (e.g., City versus Peoples Gas standards; depth of cover requirements for city rights-of-way versus customer property).

Technical Training has lost expertise due to retirements and the use of contract instructors. It is therefore necessary to conduct a review of resource numbers, skillsets, and experience needs, followed immediately by preparation and prompt execution of a staffing plan to meet identified needs.

Underlying Conclusions

Q.7 Peoples Gas' designation of roles and responsibilities for oversight of work effectiveness, quality, and safety is unclear, and fully effective means for supporting the execution of those roles do not exist.

Field Supervision

Liberty's field investigations found a lack of supervision of some Peoples Gas crews. Liberty observed in a number of cases the absence of on-site supervision and a lack of visits by responsible supervisors. Each of the three Shop areas has vacancies for first level supervision. Liberty's understanding of the benefits of entering supervisory roles indicates lack of sufficient material incentives for seasoned crew leaders (a natural source of expertise) to become non-union supervisors.

Meter Markers

Liberty's field inspections disclosed a number of cases where inaccurate marking of new meter locations raised concerns about compliance with safety and with Company procedures and standards. The work that Peoples Gas performs under common management with AMRP replacements involves moving to outside locations meters currently located inside customer structures. Marking the new locations thus comprises a significant effort. Completing the work that new main and service installation by contract crews initiates has been a problem for Peoples Gas. Adding to the problem, a lack of knowledge on the part of overly stressed and busy workers performing meter markings has produced violations and cost impacts for corrective work.

Supervision of Contractor Crews

Peoples Gas assigns a construction inspector to each contractor crew installing mains and services. However, Liberty's field investigations identified a lack of sufficient skill and experience levels of Peoples Gas construction inspectors. Many construction inspectors did not have gas or any other pipeline inspection experience prior to their hiring. The training they received is more appropriate for individuals with extensive gas construction experience such as former employees familiar with the Peoples Gas system. A majority of inspectors have come from other types of construction (e.g., highway, water main, buildings). The mentoring provided comprises a good practice, but the quality of mentoring is also a function of expertise in gas construction.

Technical Training and Compliance Monitoring

The Company also needs to identify and empower a single source for providing ultimate guidance for field personnel questions involving operations and materials procedures and specifications. At present, contractors who have questions regarding standards or procedures rely on the advice they obtain from the construction inspectors, who may or may not have the needed experience or knowledge.

Operator Qualification

The Pipeline and Hazardous Materials Safety Administration requires that pipeline operators performing covered tasks undergo evaluation intended to demonstrate the ability to "perform assigned covered tasks and recognize and react to abnormal operating conditions." Peoples Gas has the responsibility for ensuring that the resources it employs are operator qualified.

Liberty found instances of contractor non-compliance with the standard operating procedures and standards program of Peoples Gas, particularly with respect to: (a) required operator qualifications ("OQ"), gas system mark-out (to avoid third-party damages when working in the vicinity of gas facilities) accuracy issues, providing adequate ground cover (above replaced mains and services), providing adequate service regulator vent terminus clearance (minimum distances from opening in buildings through which gas can migrate), performing meter marking to promote efficient interior piping, and thrust block sizing. In one instance an operator of a directional drilling machine did not have an up-to-date certification.

Q.8 The high rates of turnover, the lack of experience among replacements, and the slow pace in filling some positions make the need for training a particularly high AMRP priority.

Peoples Gas does not provide training in a reasonably uniform manner to those who require it, and its training programs do not fully reflect the needs of a work force that has a large number of

people filling roles in which they do not have significant experience. Moreover, when making organizational and process changes to address oversight of work safety and quality, the Company will have to provide training intended to ensure that those responsible for key roles understand their authority and how they need to execute it. Training regarding procedures and standards for construction inspectors requires particular attention.

PGL Action Plan Steps

This recommendation contains 2 tasks that have been rescheduled but that need to be implemented before this recommendation can be considered closed.

Item #	Task	Status
1	Interview and fill the restructured organizational positions in the Capital Construction organization.	Complete
2	Conduct training programs associated with new personnel in repurposed or new positions.	Complete

Expected Post-Implementation Conditions and Factors

Management will have many first level supervisors that do not have gas construction or gas management experience, because it relies on outside hires to staff first level supervisor vacancies.

Summary of Liberty’s Steps to Verify Implementation

None

Observed Conditions and Factors

Management will experience a loss of talent as the work force, including first level supervision reaching retirement age. We believed that management should restructure its incentives to provide a method for senior union personnel to move into first level supervisor positions. Management did not agree nor implement this part of the recommendation. Instead, it has decided to hire from the outside, and to train newly hired first level supervisors. Management was able to induce some lower level union personnel to move to first level supervision, but they also must have additional people-skills training. This approach is not as positive as having crew leads move into first level supervision, but should prove better than hiring from the outside and having to train these new company employees in handling gas work.

Implementation Complete and Satisfactory?

Yes, this recommendation is considered complete and implemented.

Remaining Gaps, Needs

Training will be a critical task in ensuring the safety of the gas system since many newly hired first level supervisors may not have prior gas construction or safety experience.

PGL Position

Management agrees that the first level supervisor position and inspectors are critical to the company but has decided that it will not change human resources policies to incent senior union personnel to move to management.

Future Liberty Verification Activities

None

Final Liberty Verification Activities

Our verification activities confirmed the continuation of staffing changes to address the resources issue that the implementation plan covered, as of the 2017 construction season start. See Appendix A, Phase 2 Field Audits for more specifics.

General Observations

This recommendation is aligned with Q.3 and Q.4. Management has made multiple changes in how it has proposed to perform quality control of field organizations for both in-house maintenance and construction and outside contractor performed maintenance and construction. Management formed a CMG organization in the late 2000s to perform this critical audit function, and most recently proposed to have contractors perform QC on the AMRP work with some auditing by CMG. This change altered the prior AMRP approach, under which third parties provided construction inspectors, acting with limited oversight by the CMG organization. Management has made another, recent change, proposing again to use a third-party contractor to inspect the construction contractors, similar to the initial AMRP approach. Management has, however, expanded the CMG organization to provide additional inspection resources for internal and external performed maintenance and construction work. The reason given for the change was that the construction contractors were not producing robust QC and QA programs.

While observing improvements, it remains appropriate to take a cautious approach for the future. None of the previous methods of construction inspection appeared satisfactory. Management formed the CMG organization formed to prevent continual compliance issues, but, until recently, substantial improvement was not apparent. The early construction inspectors employed by the third-party inspection contractor did not have sufficient experience or training to recognize out-of-compliance and safety issues. The latest iteration of the QC process returns to the old method, which makes it important to continue to pay close attention to its effectiveness. The discussion of Recommendation Q.2 addresses this issue further.

Management cited a new training for Field Coordinators and other individuals involved in capital construction work. Management stated that the new training modules were being demonstrated with a pilot group in December, and will be rolled out all new and existing Field Coordinators (and others) in January and February 2017. Depending on the completeness of this new training, quality and safety issues noted in prior Liberty work involving PGL may be eliminated. Another concern that management says it has corrected is that any individual can now stop unsafe and non-compliant activities. Based on the completed field audits at the start of the 2017 construction season, it appears that the training and other improvements to construction oversight and management are working to improve quality and efficiency.

As pointed out in the Phase 2 Field Audit Report, quality and efficiency have improved between the prior field audit in 2014 and the 2017 construction season. Additionally, the CMG out of specification reports for 2016 have been used to improve quality in 2017.

Q.6 – Equipping Technicians with GPS Devices

Peoples Gas should examine the benefits of equipping technicians with sub-meter accurate GPS devices in areas that have lines of sight to satellites.

Liberty’s field investigations and interviews with field management disclosed a number of specific personnel-related concerns that contribute to performance, safety, and compliance issues.

Peoples Gas has experienced a significant level of vacancies in key field supervision and inspection positions. The utility has not filled vacancies resulting from retirements, promotions, and reassignments at a sufficient rate to sustain resource levels at effective numbers and levels of experience. The growth in work occasioned by the AMRP and other work growth (such as the increase to medium pressure and the relocation of meters to outside locations) has placed significant strain on resources. Frequent switches in job assignments have produced many cases where job holders have short tenures in current, key positions (e.g., shop construction supervisor and manager positions). Moreover, incentives to retain people in key positions and to encourage experienced workers to take supervisory positions are not strong.

Peoples Gas has consequently experienced a shortage of trained personnel to fill supervision and inspection roles. The impacts show in what Liberty’s field inspection team found to be comparatively weak levels of supervision and oversight, particularly with respect to work being performed by Peoples Gas crews. Moreover, it is clear that there have been delays by Peoples Gas crews in accomplishing their designated elements of AMRP work. As contractors continue to perform substantial numbers of gas main and service replacements, the gap threatens to widen, absent expansion in the number and capabilities of Peoples Gas resources.

Compounding the difficulty, AMRP work must compete for resources with other programs that Peoples Gas must conduct contemporaneously (e.g., compliance and leak management). Senior Peoples Gas executive management acknowledges the need for increased resources and for addressing together the AMRP and other needs that will continue to require substantial resources into the future.

Problems in maintaining sufficient numbers and experience levels also lead inevitably to losses in productivity and accountability for work completion. These losses appear in a number of ways; e.g., increased use of overtime, poor location of service riser mark-outs, errors in work performance and resulting rework, and increased restoration costs when service transfers are completed after initial restoration following new main installation.

Underlying Conclusions

Q.10 Unexpected field conditions have not presented an abnormally high number of problems for AMRP installations, but the high incidence of third-party damages to Peoples Gas facilities indicates the need for examination of better methods for mapping new installations.

Liberty’s field work did not observe an unusual level of “surprises” affecting the ability to make installations as planned. Pre-construction work to investigate field conditions takes industry-typical forms. Peoples Gas has taken action to improve the locating of subsurface utility locations by performing follow-up quality control checks on problematic service providers, performing test

holes to physically locate services, and using meter markers to locate entry points of legacy services on plot plans.

The high number of third-party damages to Peoples Gas facilities (described in this report’s Chapter C: The Peoples Gas Distribution System), however, does raise concern about the marking of Company facilities. Peoples Gas currently uses manual processes to map new main and service installations. These processes can introduce errors in fixing the locations of new installations. Moreover, Peoples Gas currently uses building property lines measured from existing street corners. These corners can change, further reducing the accuracy of maps identifying Peoples Gas subsurface facilities. Considerable time can also pass between converting manually measured locations to geographic information system coordinates for placement on maps supplied to locating and mark out personnel and service providers.

Urban environments with a prevalence of very tall buildings can make it problematic to obtain a sufficient number of GPS satellites to locate mains and services accurately. Many Chicago neighborhoods undergoing AMRP work, however, consist primarily of low-rise residential structures that do not present this difficulty

PGL Action Plan Steps

Management accepts the recommendation, and is looking to expand it to in-house construction in the later years to support electronic update of most Company records. Management has observed that many areas (e.g., the Loop) include tall buildings that affect GPS signal receipt. Management requires technicians that cannot access GPS to use manual survey equipment and submit data for mapping of all AMRP projects in GIS.

Item #	Task	Due Date	Revised Date
1	Incorporate GPS point data collection standards into the General Construction Specifications	Completed	Completed
2	Provide an overview and training on the GPS data collection standards to representatives of the construction contracting companies	Completed	Completed
3	Modify back office processes to incorporate GPS data into as-built workflow	Completed	Completed
4	Monitor and assess GPS data collection results and as-built workflow and identify additional opportunities for improvement	Completed	Completed
5	Expand GPS data collection requirements and internal as-built processes to include capturing additional attribution as well as collecting GPS data for linear information such as gas mains	03/01/16	Completed
6	Assess the effectiveness of the electronic GPS and as-built record collection and look for opportunities to enhance the process in order to reduce the reliance on paper as-built records	12/31/17	On going
7	Implement automation of asset creation within the WAM System from the GPS and other as-built data that is collected in the field	12/31/18	On going

Expected Post-Implementation Conditions and Factors

This recommendation’s first five subtasks address base implementation. They were completed by the end of the first quarter of 2016. The five involve updating processes and procedures to allow for updating of as-built maps and records via electronic means using GPS and requiring all contractors to use GPS in areas where signals are available (areas with high rise buildings may

block GPS signals thus paper maps and records must be used). For internal capital construction and O & M, management also plans to use GPS but that may take longer.

The two remaining subtasks concern what we view as post-implementation efforts: examining what other internal programs or process can have electronic records updated via GPS and determining if GPS can be used to populate the work management system WAM.

Summary of Liberty's Steps to Verify Implementation

We sought documents demonstrating GPS provisioning, training, and plans for using it for the 2016 construction season.

Observed Conditions and Factors

We examined documents provided by management demonstrating GPS provisioning, training, and plans for using it for the 2016 construction season.

Implementation Complete and Satisfactory?

We consider this recommendation as implemented.

Remaining Gaps, Needs

None

PGL Position

Management agrees that this has been implemented.

Future Liberty Verification Activities

We will verify the use of GPS during field audits in the 2016 construction season.

Final Liberty Verification Activities

This recommendation was implemented during the 2016 construction season, through use of GPS to update the PGL mapping system with completed main and service projects electronically. Management required contractors, starting in 2016, to use GPS on all work to produce an electronic update to the PGL mapping system. Our review validated application of an approach we found appropriate during 2017 construction site visits. We continue to find it appropriately applied, based on our verification activities. Note that several steps remain, per management's implementation schedule, ongoing.

Other steps confirming successful continuation of changes made include management's provision to contractors of specific procedures on what to locate via GPS. In addition, contractors now install marker balls on all service tees on the replaced mains. Management has started training contractor personnel on these new procedures and provided documentation of this training. Eventually all employee- and contractor-performed work will be located via GPS for updating of their mapping system.

General Observations

None

R.1 – Continuous Improvement

Peoples Gas should establish a formal continuous improvement program under the Impact Team to promote a culture of and an emphasis on seeking innovations to improve efficiency in the installation of mains, services, and meters.

A Company-established Impact Team that has been examining AMRP performance for some time generated a number of initiatives. Most have Integry's-wide application. This team, or a successor identified by new AMRP leadership, should focus more specifically on improvement opportunities created by the highly repetitive nature and the long duration of AMRP construction work (specifically with respect to main, service, and meter installations). Employees working on the AMRP likely form a primary, if not the most likely, source of identification of improvement initiatives. A formal continuous improvement program, complete with emphasis on quantifying costs and benefits will promote a cost awareness culture, and improve efficiency on an on-going basis.

Underlying Conclusions

R.1 Peoples Gas has implemented some improvements to work management practices, which focus on construction, but has not captured all opportunities for gaining efficiency in performing repetitive AMRP activities.

To take advantage of the long duration and repetitive nature of AMRP work, management needs to focus on opportunities to increase productivity in the installation of mains, services, and meters, which comprise the three largest components of overall costs. This report's Chapter I: Resource Planning addresses productivity monitoring. Moving past the construction ramp-up period and informed by experience to date, Peoples Gas should be at the point of producing close to maximum installation efficiency. For instance, Liberty expected the unit rate of work-hours per meter installed by the internal workforce would show improvement (i.e., reduction). Likewise, the unit cost of main installation and service installation should lower, or at least remain flat. Failure to monitor such rates, however, precludes a clear understanding of the direction of such rates over time. The Company needs to accompany improvements in monitoring such rates with efforts to examine the potential for process improvements that will produce efficiency gains.

PGL Action Plan Steps

Item #	Task	Due Date
1	Integrate Business Effectiveness (former "Team Impact") with Business Systems	Complete
2	Outline all process improvement projects and subsequent timelines	Complete
3	Create framework for long-term plan for system and process integration	Complete
4	Establish criteria for selecting and prioritizing projects	Complete
5	Establish means for tracking and reporting on projects	Complete
6	Ensure effectiveness of implemented projects through Validation Plans	Complete (Per PGL) Ongoing (Per Liberty)

This revised recommendation implementation plan now contains six tasks, versus the five previously proposed.

Expected Post-Implementation Conditions and Factors

Management recognized that they need to have program of continuous improvement that is partially driven by the owner organization and not only driven by the corporation. Thus, future improvement projects will be sourced via discussions with operating organizations in order to best serve their needs and to improve on the ‘as is’ condition with regard to safety, cost, and system performance.

Summary of Liberty’s Steps to Verify Implementation

We reviewed the documentation on the various revisions to the implementation plan for this recommendation and the data requests on the implementation of the revised tasks.

Observed Conditions and Factors

We and management spent considerable time fine-tuning this recommendation so that it would meet all of the necessary criteria and would be an achievable recommendation.

Implementation Complete and Satisfactory?

Yes, this recommendation is considered implemented and but verification will occur after the completion of the initial projects. Management’s successful completion of the five tasks makes it appropriate to consider this recommendation implemented. The sixth task actually comprises an implementation effectiveness review of the type we consider appropriate for post-implementation verification. That step will take place after completion of an improvement project, with that project to be selected by us.

Remaining Gaps, Needs

None

PGL Position

Management agrees that it has implemented this recommendation.

Future Liberty Verification Activities

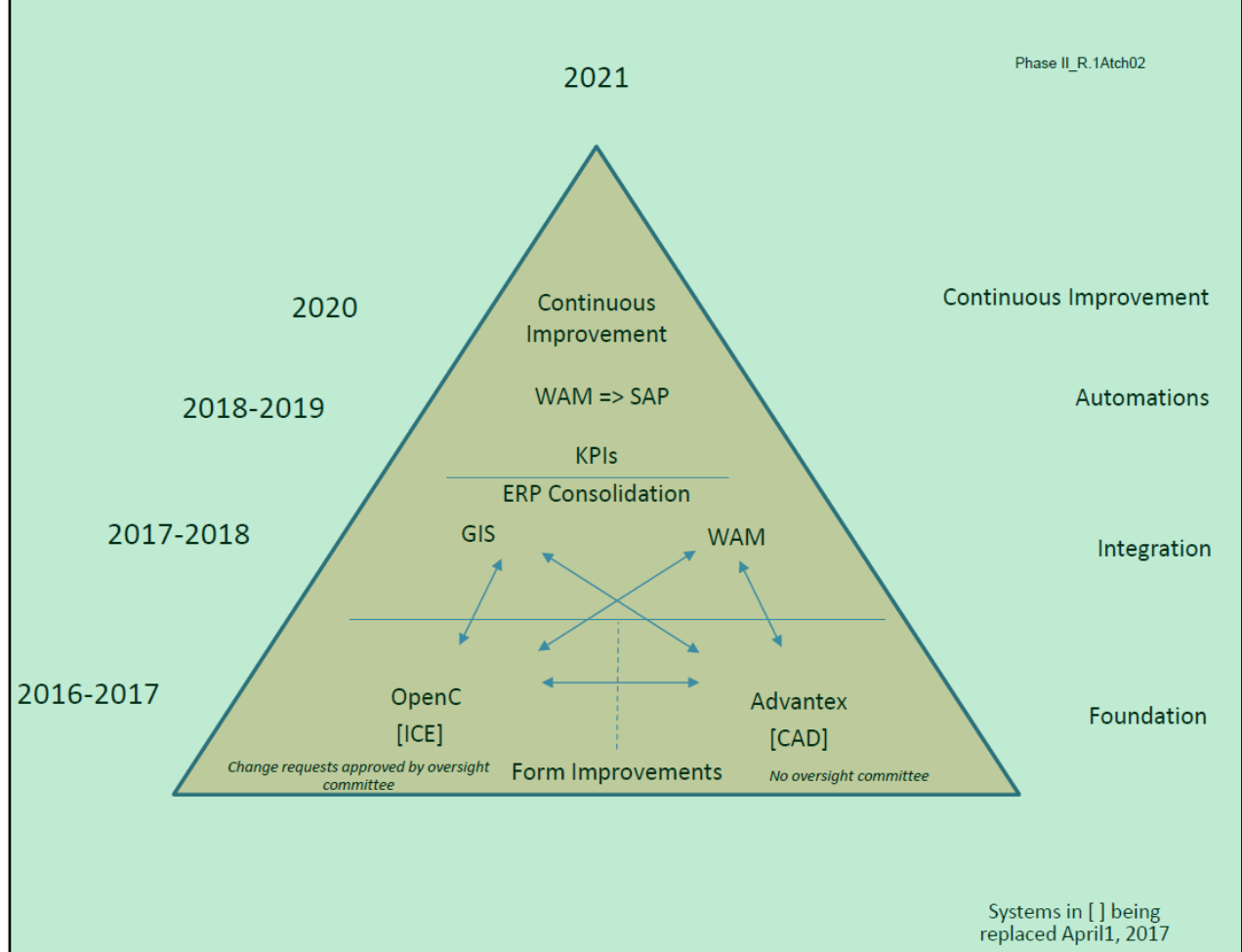
We will review the output of initial improvement projects completed during the monitoring period.

Final Liberty Verification Activities

Verification activities focused on where responsibility lies for ensuring a continuous improvement approach and what activities will be included. Management has made positive changes in both, as concerns long-term projects or programs like the AMRP. Management has transitioned the existing Impact Team to an operations oriented Business Improvement organization. This group takes responsibility for improving existing process from a business point of view. This organization selects operations for review, and includes representatives from operations to ensure that its conclusions and recommendations are implemented.

We reviewed the 2017 projects slated for review, finding them satisfactory. The following graphic shows that management implemented a systemic improvement program to address short- comings

of their data collection systems and are upgrading these systems to those with more robust capabilities. The challenge for management will be to build from the momentum that these first efforts reflect to ensure continuing attention in the future.



General Observations

This recommendation will also be used to assist in the implementation of Recommendation F.1 that concerns data quality.

S.1 – Safety and Compliance Commitment

Peoples Gas should invigorate its commitment to safety and permit compliance through designation of an executive level “champion,” and institute a comprehensive communications program, set aggressive goals and performance targets, perform regular measurement, perform root cause analysis, and develop responsive action plans.

Integrays and Peoples Gas resources both must contribute to produce effective safety performance and compliance with permit requirements. The parent has engaged in a number of efforts to standardize operations across its entities. Liberty was unable to find a single, senior-level person responsible for championing AMRP safety and compliance. Increasing the focus on such performance through designating an executive lead with specific responsibility for the AMRP will materially assist in bringing greater structure and attention to safety and compliance performance. A strong executive-level communications program, including top leadership, is necessary to underscore the value that the Company places on such performance, its commitment to making tangible, measurable improvements in that performance, and its intention to hold people accountable for securing those improvements.

Underlying Conclusions

S.1 The number and the severity of the past violations and continuing self-reporting violations indicate a need for management to increase emphasis on compliance with requirements as an integral element of work performance.

Liberty’s work for the Illinois Commerce Commission some five years ago raised concerns about upper management’s focus on public safety. The emphasis that management places on instilling an aggressive commitment to safety remains an issue. Certainly, the scope and magnitude of AMRP work brings greater occasion for safety violations and incidents. That change, however, serves only to increase the importance that the Company must place and continue to emphasize regarding public and worker safety. The number and nature of Illinois Commerce Commission safety inspection items and self-reported violations show a continuing need for improvement. The reported violation data and the observation of Liberty’s field investigation team merit a re-examination of the approach and programs that assure public and worker safety.

PGL Action Plan Steps

Item #	Task	Due Date	Status (per PGL)
1	Root Cause Analysis Techniques training	Ongoing	Training started
2	Establish a Senior Safety Steering Committee	12/31/15	Complete
3	Review and enhance or consolidate existing Safety committees	12/31/15	Complete
4	Establish a Contractors Safety Committee	02/28/16	Complete
5	Review and update Safety Business Plan (refer to S.1 Attachment 2 for plan actions)	Ongoing basis	Ongoing

Expected Post-Implementation Conditions and Factors

We would expect to the safety record for both PGL and the contractors working on infrastructure improvements to have an improvement, year after year, of their safety records. We would also

anticipate that if the newly reorganized and revitalized safety committees were effective to see a decrease in the severity of safety incidents

Summary of Liberty's Steps to Verify Implementation

We examined written documentation demonstrating implementation of the new safety committee and the exceptions to the root cause training

Observed Conditions and Factors

We confirmed that PGL's safety committee is meeting and that lower level groups are focused on safety and compliance. Liberty reviewed PGL's new safety business plan.

Implementation Complete and Satisfactory?

Yes.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that the recommendation is complete.

Future Liberty Verification Activities

At year-end 2016, we will review annual safety data.

Final Liberty Verification Activities

Management has sustained the actions noted above to implement the recommendation. Senior leadership has designated a safety champion, and made management more accountable for safety, via a senior management safety committee and contractor safety committee. Additionally, management also tracks and acts on near misses to prevent safety incidents. Management has most recently observed an increase in soft tissue incidents (indicative of an older work force). Through November 2016, employee lost time incidents and OSHA recordable incidents have fallen. We reviewed safety statistics for all of 2016 vs. 2015 for employees and contractors overall and for employees and contractors on AMRP work. See Recommendation S.2 for updated safety statistics.

General Observations

All five of the subtasks for this recommendation were implemented prior to or during the first half of 2016. These subtasks include root cause analysis techniques training, establishing a senior safety steering committee reporting to the safety champion (the Senior Vice President of Gas Operations), improving the existing safety committees, establishing a contractor safety committee, and continuously reviewing and updating the corporate/company safety business plan.

Responses to data requests (007-S.1a, -S.1b and attachments and 007-S.2b) verify the new safety champion, the make-up of the new senior safety steering committee, and the new safety business

plan. DRs DB S.1.1 and DB S1.3 verify that management has trained individuals on root cause analysis and has enhanced the existing safety committees.

S.2 – Safety Incident Improvements

Peoples Gas should more closely examine the root causes and develop a responsive action plan to improve employee accident rates. (Conclusion S.2)

Discussions between Liberty and senior leadership, which began last September, produced consensus on the need for specific organizational and programmatic change to address worker safety. The recommended emphasis on commitment to safety and making a senior executive responsible for championing a safety culture comprises an important first step.

Liberty recommends, and understands that the Company accepts, the need for immediate-term changes while longer-term efforts progress. Peoples Gas proposed provisionally to use American Gas Association Best Practices as a method to improve safety performance. Those practices undoubtedly have merit. Following them rigorously should make near term improvements in safety. The Association, however, considers them confidential. Therefore, a broad commitment to use them will not leave the two-year monitoring effort that follows this audit with a clear baseline for measuring the effectiveness of implementation.

Underlying Conclusions

S.2 The Peoples Gas employee accident rates on AMRP work exceed those of contractor personnel, and require an increased focus on safety.

An outside reviewer (PwC) also observed a lack of definition of and approved processes for quality management. PwC also observed that, while the safety program conformed to industry standards, its results did not meet expectations. Historical worker safety performance by Peoples Gas personnel has fallen significantly below that of AMRP contract resources, and significantly below the goals established for the program. Only exceptional (by comparison) contractor performance has served to keep overall safety performance at expected levels.

PGL Action Plan Steps

Item #	Task	Due Date	Revised Date
1	Establish a Senior Safety Steering Committee	12/31/15	Complete
2	Review and enhance of existing Safety committees	12/31/15	Complete
3	Establish a Contractors Safety Committee	02/28/16	Complete
4	Review and update Safety Business Plan (refer to S.1 Attachment 2 for plan actions)	Ongoing basis	Ongoing

Expected Post-Implementation Conditions and Factors

Similar to recommendation S.1, the subtasks on this recommendation call for implementation either prior to or during the first quarter of 2016, and mirror the subtasks of S.1 with the exception of the root cause analysis training.

Summary of Liberty’s Steps to Verify Implementation

DRs received to date show the same implementation as S.1 per DRs 007-S.2b and –S.1b. Additionally, DB S.2.2 is identical to DB S.1.3.

Observed Conditions and Factors

We will monitor employee and contractor accident rates for improvements

Implementation Complete and Satisfactory?

Management agrees that this recommendation is complete.

Remaining Gaps, Needs

None

PGL Position

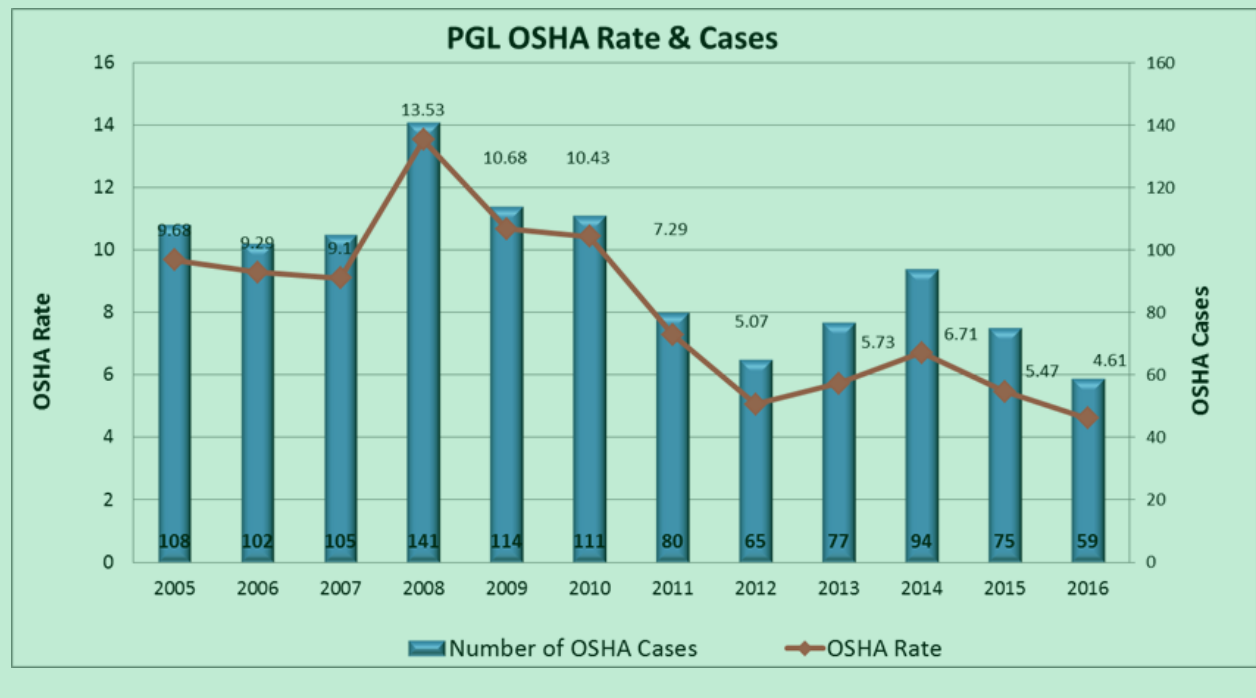
Management agrees with this recommendation

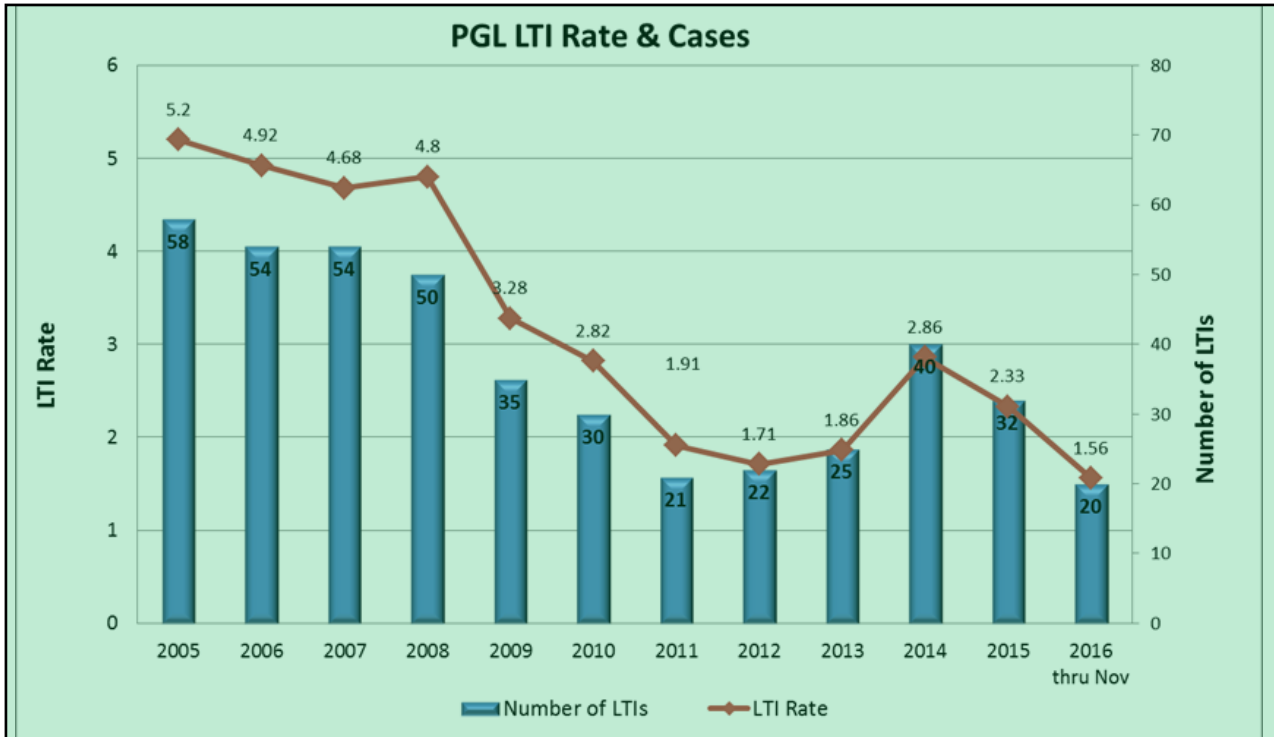
Future Liberty Verification Activities

We will review the yearly accident rates.

Final Liberty Verification Activities

Noted under Recommendation S.1, management has formalized several new safety committees including a senior management safety committee, a contractor safety committee and other safety committees for union employees. These committees are charged with communicating the high priority of safety, providing a focal point to drive better safety performance and communicating learned from safety incidents and near misses to prevent reoccurrences. Preliminary results through November 2016 showed a 33 percent improvement in lost time and a 16 percent improvement in OSHA Recordable incident rates.





The next table summarizes metrics from Bureau of Labor Statistics on OSHA Recordables and Lost Time Incidents.⁴

Organization	Lost Time Incident Rate	OSHA Recordable Incident Rate	Safety Incidents
Total PGL 2016 (thru Nov)	1.56	4.61	
Total PGL 2015	2.23	5.47	
All Contractor 2016			
All Contractor 2015			
AMRP PGL 2016	2.20	4.76	13
AMRP PGL 2015	0.9	4.81	16
AMRP Contractor 2016	0.4	1.21	6
AMRP Contractor 2015	0.4	1.07	8
2015 All US Industry	1.6	3	
2015 Utilities	1.2	2.2	

⁴ www.bls.gov/iif/oshwc/osh/os/pr156xx.pdf where xx is state initials, IL, CA, NY, MA, WA
www.bls.gov/iif/news.release/archives/osh_10272016.pdf

2015 IL	1.6	2.9	
2015 IL Utilities	1	1.5	
2015 NY Utilities	1.5	2.4	
2015 CA LDC	1.4	1.7	
2015 MA LDC	3.4	4.6	
2015 WA Utilities	0.8	1	

Lost time rate calculations are per 100 employees and calculated by using the number of incidents times 200,000, with the total then divided by total hours worked. The OSHA recordable rate used a per-100-employees basis, and equals the number of incidents times 200,000 divided by total hours worked.

Our verification work demonstrated that management has sustained implementation activities that we found responsive to the recommendation and data depicting results to date has shown some improvement.

General Observations

None

T.1 – Improve Communication & Coordination with the City

Peoples Gas needs to continue to focus on improving communications and relationships with the City and with its Department of Transportation, but must recognize that it will take improved permitting and work performance to create and sustain relationships at the level needed to optimize AMRP performance.

Peoples Gas has made substantial strides in addressing the issues it has with the City, through designation of a specific liaison and resultant activities. The internal meetings focusing on City-related activities also show high-level attention to the relationship. Permanent and meaningful change will require a continuing priority on relationship improvement. However, as important as communications and relationships with the City may be, Peoples Gas performance in the field becomes the more important factor going forward. Improving performance in meeting permitting requirements and expectations comprises a more significant driver of the relationship with the City and of success in carrying out the AMRP, as other chapters of this report address.

Underlying Conclusions

T.1 The Chicago Department of Transportation’s perception of Peoples Gas performance has been very negative, although it may be beginning to improve.

The AMRP creates a primary programmatic interface between Peoples Gas and the City of Chicago. The nature of AMRP projects causes construction activity to run the lengths of entire city blocks, often on both sides of the street. By the end of the program, the AMRP will involve every ward of the city. Significant problems at the outset of the AMRP served to aggravate the disruptions and public irritations that work on such a large scale inevitably produces.

Fundamentally, however, the relationship with the City and the Chicago Department of Transportation has been and will continue to be a function of the management and execution of the AMRP and all other Peoples Gas construction and maintenance activities in the Public Way. Overall, communications with Chicago Department of Transportation and the City have improved, and show promise of further improvement. Further improving relationships with the City will depend upon improving project planning, scheduling, management and execution, not just of the AMRP but of all interactions with the City and Chicago Department of Transportation.

PGL Action Plan Steps

Item	Task	Due Date
1	Meet with CDOT to review the new proposed project construction sequence and solicit comments on interface and communication	Completed
2	Document comments from CDOT meeting and determine required changes to existing communications protocols and procedures.	Completed
3	Begin reviewing all new work by scoping blocks of work such that all work can be completed within 60 days of permit issuance under normal circumstances	Completed
4	Review interface communication protocols and procedures (while this is an ongoing monthly process, schedule a formal session to review)	Completed

5	Document lessons learned, from pilot of the proposed construction sequencing and outline any changes to communication protocols and procedures that impact CDOT or other City Departments.	Completed
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Prior to the acquisition, PGL had improved relations with the City through designation of a specific liaison and resultant activities. Permanent and meaningful change will require a continuing priority on relationship improvement and improved results in the field.

Since the acquisition, PGL’s new senior management team met with senior City officials; discussions focused on improving communication, coordination, and performance. The City raised concerns with AMRP progress and schedule. In response, PGL proposed a new project construction sequence in early 2016 and met with CDOT to review the new process and to identify required interface and communications protocols.

In March 2016, management established a coordination agreement with the City and agreed to report through DOT Maps. Management conducted a pilot in Beverly Phase 3 with a goal of completing all work within 60 days of permit issuance. PGL was not successful completing the work within 60 days; phases 8 & 9 were completed within 90 days of permit issuance. Phase 12 showed improvement as 4 of 5 first blocks were completed within 60 days.

In 2017 PGL plans to create a block by block schedule in an effort to achieve completing work within a block within 60 days of permit. However, this approach requires more schedulers, PGL is in the process of hiring additional schedulers and has plans to pilot the block by block approach in October 2016.

PGL has also been communicating more frequently with City Alderman, especially any changes to the schedule that impact their neighborhoods. Alderman complaints have been reduced significantly.

Expected Post-Implementation Conditions and Factors

We would expect to see improved coordination of construction activities with the City and CDOT and fewer complaints from the City and City Alderman.

Summary of Liberty’s Steps to Verify Implementation

On September 19, 2016, we met with management to discuss actions taken on this recommendation. We requested and reviewed documentation to describe efforts to-date, including:

- PGL CDOT Meeting_1115 (T.1.1 Atch01)
- PGL CDOT Meeting 1215 (T.1.1 Atch02)
- PGL CDOT Meeting 0316 (T.1.1 Atch03)
- Beverly Phase 3 (T.1.3 Atch01)
- Beverly Phases 8 and 9 (T.1.3 Atch02)
- Beverly Phase 10 (T.1.3 Atch03)

Observed Conditions and Factors

CDOT has upgraded its permitting system (Hansen) and PGL has made most of the required changes to its AWP to accommodate CDOT changes. However, some of the new data fields have not been completely debugged (permit holds and extensions); management has implemented manual entry work-arounds until CDOT addresses the issues on its system. Management manually updates several AWP fields (holds and extensions) until CDOT resolves the issues.

PGL's IT group will implement a patch to the AWP system in July to integrate fully the restoration permitting data flow between PGL and CDOT. Until this patch has been completed and tested, a spreadsheet tracks restoration permit status.

PGL has also centralized permitting under one manager, to improve permit coordination and tracking. The manager in charge of permitting has responsibility for the permitting tracking database and the monthly audit of permitting data quality. Management has conducted monthly data quality audits since December 2015. We reviewed the results of these monthly audits (audit period December 2015 through April 2016) as well as the status of remediation efforts.

Implementation Complete and Satisfactory?

Yes, management has completed all Action Plan steps satisfactorily and provided the appropriate supporting documentation. Management has met the intent of this recommendation. It is therefore appropriate to close this recommendation.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that implementation is complete.

Future Liberty Verification Activities

None.

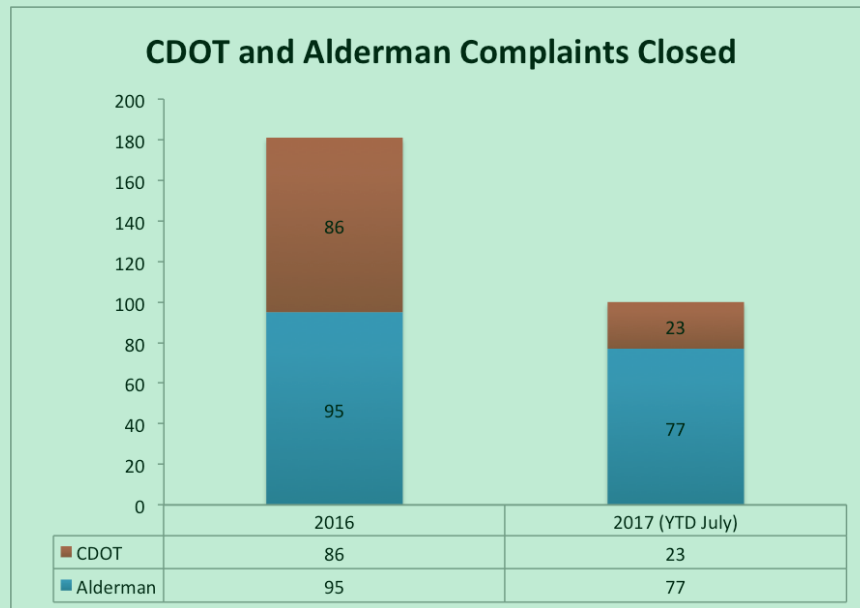
Final Liberty Verification Activities

On March 23, 2017, we met with management, who provided a report of status on activities with the City and Alderman. Management conducts multiple meetings per week with CDOT officials regarding its construction programs and plans. Additionally, management has established good and open lines of communication with the Mayor and COO's teams.

Management has been more proactive with City Alderman, working ahead of the construction program to initiate communications about the future impact of construction projects to their communities. Additionally, Management follows up at several points during the project to make sure things are going well. Management treats Alderman complaints as an escalated complaint.

On July 13, 2017 Liberty reviewed complaint levels for 2016 and 2017 to gauge impact of the new relationship with the City. The following chart displays the level of CDOT and Alderman

complaints received and closed during 2016 and 2017. The level of 2017 CDOT complaints are significantly improved over 2016 levels. Alderman complaints are also down as of year-to-date July figures.



Reduced complaint levels are indicative of an improved relationship with CDOT and improved communications with neighborhoods and customers. Our verification work demonstrated a continuing management commitment to improving relationships.

General Observations

None.

U.2 –AMRP Customer Appointments

Peoples Gas should standardize the process to set AMRP customer appointments.

Peoples Gas should standardize the appointment setting process and the Contact Center should set all appointments to facilitate a one-stop experience for customers. The Company should use the customer system to set and track appointments. These changes will provide a more consistent experience for customers. Peoples Gas should also consistently offer options for after-hours and weekend appointments to accommodate customers who need them.

Underlying Conclusions

U.2 AMRP communications techniques have been inconsistent.

Peoples Gas requests appointments for service mark-outs through a standard letter process, and the Contact Center schedules them. However, each Shop individually handles requests to schedule appointments to move meters. This approach may prove easier for the Shops to manage. It can, however, cause confusion for customers, who set the first appointment through the Contact Center. A month or so later Shop personnel go door-to-door to set appointments with customers. In some cases, no letter or other communication informs customers about the process from end-to-end.

This approach causes problems in addition to inconsistency in the customer experience. Customers may not be home, or unwilling to answer the door. Door-to-door delivery of brochures involves significant costs. The Peoples Gas field employees going door-to-door also do not have the customer-service “soft skills” training necessary for making such contacts effective.

The Shops record appointments on handwritten lists. The Shops do not document appointments appropriately in the Peoples Gas customer information system (known as “Cfirst”). The Contact Center therefore has no record of these appointments. Customer Service Representatives thus do not have the information that enables them effectively to answer questions or reschedule appointments.

U.5 Peoples Gas has not consistently scheduled off-hour appointments for customers unavailable during normal business hours.

The Company recently limited the availability of after-hours appointments to move meters. The letter requesting a customer appointment offers hours from Monday through Friday, between 8 am to 7:30 pm. It also offered Saturday appointments from 8 am to 3:30 pm. However, from August through October 2014, Peoples Gas Shops were not permitting the scheduling of Saturday appointments. This restriction frustrated many customers, and increased complaints and special handling requests.

PGL Action Plan Steps

Item #	Task	Status
1	Collaborate with customer service, communications, construction, engineering, and others to finalize construction sequence and adopt appropriate meter marking and meter move protocols.	Complete
2	Confirm director level approval of construction sequence.	Complete
3	Meter Move Customer Service Task Force to develop recommendations to eliminate gaps in customer service records management related to field personnel making appointments and not scheduling.	Complete
4	Evaluate the implementation success and develop next level improvements to scheduling and executing customer appointments.	Annually at year-end

At the beginning of the 2016 construction season, management developed a new customer communication process to set customer appointments and support the re-sequenced construction approach (Mark and Bar and Meter Moves). A cross-functional Meter Move Task Force team developed customer appointment protocols for both the existing construction process and the future process. While the composition of the team varied during the development, the following areas were represented, Construction, Project Management, Customer Service, Process Improvement, Government Relations, Compliance, and IT. The team included executive level involvement, Director, Construction; VP, Customer Service; and Director, Strategy & Performance.

The Task Force focused on a temporary solution to allow appointments to be better coordinated between the field and customer service in a manner that mitigates or eliminates impact to the customer. The following process was developed:

- Field employees setting appointments with customers in the field must document the appointment on an Appointment Log form.
- The employee turns in the Appointment Log and the Daily Recaps (Completion Reports) to the shop at the end of the shift.
- An Operations Specialist in each shop will enter the Appointment Log information and completion reports into the C-First customer service system.
- The Operations Specialist serves as the coordinator between Customer Service and Field Construction in the event of issues or questions.

A pilot program was conducted and completed in the Beverly neighborhood during 2016. Following the pilot, minor mid-course corrections were identified and the Mark and Bar program was expanded rapidly. At that time, a training program was provided to all Mark and Bar and Meter Move crews.

A “lessons learned” session was held in the fall of 2016 to review the success of the communications protocols. A flow chart was developed to document the revised construction

communication process (U.2.4Atch01). Enhancements to the AMRP appointment setting process (as a result of the lessons learned session) are illustrated in yellow on the flow chart. The flow chart also documents the communications materials that are provided to customers as part of the AMRP customer appointment process.

A more robust, formal training program is being developed for the January 2017 pre-construction season training, which includes upgrading field technology. While the program is running well, the process will be incorporated into a formal procedure in mid-2017. Another “lessons learned” session will be conducted at the conclusion of the 2017 construction season to make any additional required adjustments to the communications protocols.

Expected Post-Implementation Conditions and Factors

Management plans to replace its current Customer Information System (Cfirst) in 2017. A long-term customer appointment setting solution should be identified, using the upgraded field technology and new customer system to support the revised appointment setting process. This will allow management to track field progress and communicate that progress across the organization and to customers. This integration will eliminate the current manual appointment logging process and standalone database and improve Customer Service responsiveness.

Summary of Liberty’s Steps to Verify Implementation

On December 14, 2016, we met with management to discuss progress on this recommendation and to review the following documents:

- A. AMRP Construction & Communication Process (U.2.4Atch01)
- B. LSO 201: Example Customer Introductory Letter (U.2.4Atch02)
- C. Step-by-Step Guide of Infrastructure Upgrade Construction Process (U.2.4Atch03)
- D. FAQs for Infrastructure Upgrade Construction Process (U.2.4Atch04)
- E. Door Hanger Leave Behind (U.2.4Atch05)

Observed Conditions and Factors

Management has revised the customer appointment process to address the re-sequenced construction approach (Mark and Bar) and strengthened the process to document appointments set by the field in each of the Shops. The new process was communicated to the field ahead of the 2016 pilot in the Beverly subdivision. Following the pilot, the mark and bar process was expanded, and additional training was provided to improve the appointment process.

During the fourth quarter of 2016, management conducted a lessons learned session to identify any needed changes to the appointment process. An enhanced process was documented and incorporated into the upcoming training for the 2017 construction season.

Management plans to revisit the customer appointment process annually through lessons learned sessions. Ultimately, when the field technology upgrade is complete, appointments will be integrated into the technology, eliminating the current manual log and update process, which will ensure better communications with employees and customers.

Implementation Complete and Satisfactory?

Yes. Management has satisfactorily addressed the concerns of this recommendation.

Remaining Gaps, Needs

None.

PGL Position

Management agrees that the recommendation is ready for close-out this quarter (4Q16).

Future Liberty Verification Activities

During the first and second quarters of 2017, we will review periodic results from the We Care customer satisfaction surveys and other feedback to better understand the impact of the revised appointment setting process and associated customer communications efforts.

Final Liberty Verification Activities

We met with management on March 23, 2017, who reported the measurement of customer satisfaction (through the We Care program) with AMRP-related Meter Moves since 1Q 2016. Service marking was added to We Care in the late summer, and in September, management began surveying customers regarding satisfaction with AMRP restoration efforts.

We reviewed weekly AMRP customer satisfaction reports from September 2016 through the end of March 2017. Customer dissatisfaction with AMRP related meter moves has ranged from 0 to 5 percent of customers responding to the survey, while dissatisfaction with service marking has ranged from 0 to 3 percent. Customer satisfaction averaged 98.7 percent during this period for both meter moves and service marking combined.

It is important that management has committed to surveying customers about their experiences with the AMRP program. This process gives customers a chance to share their feedback with the Company. It also provides management with critical information about the effectiveness of communications and how the program is impacting customers. Liberty would expect this process to continue throughout the life of the construction program.

We met with management on June 22, 2017 to discuss further efforts to measure AMRP related customer satisfaction. Management continues to measure satisfaction with the construction process, including service marking and meter moves. The We Care program paused following go-live of the new Customer System and resumed measurement activity in early June.

We reviewed We Care customer satisfaction results from March through June 2017—99.9 percent of customers surveyed were satisfied with AMRP-related service marking and meter moves.

Management actions and results show continuing efforts to improve the customer experience in connection with replacement activities.

General Observations

None.

U.5 – Customer Satisfaction with AMRP

Peoples Gas should measure on a regular basis: (a) customer satisfaction with AMRP, and (b) the effectiveness of AMRP Communications and Customer Service.

Peoples Gas should begin measuring customer satisfaction with the AMRP process. An AMRP project can extend over weeks and months. Peoples Gas should measure satisfaction for individual components of the process, such as customer letters, program information, website, appointment setting, service marking, service installation, meter installation, and restoration.

Peoples Gas should measure and track satisfaction with program components to identify opportunities to improve the customer experience and internal policies and procedures.

In order to measure the effectiveness of AMRP Communications and Customer Service, Peoples Gas needs to identify and routinely chart performance against specific metrics. These metrics should include, but not be limited to, customer satisfaction, complaints per customer, missed or late appointments (by Peoples Gas), average time to respond to inquiries and complaints, and time to resolve complaints. Performance should be trended and reported along with other Project Management Office metrics on a weekly or monthly basis throughout the life of the program.

Underlying Conclusions

U.7 Peoples Gas does not measure the AMRP customer experience.

Peoples Gas routinely measures transactional customer service, both in the Contact Center and in the field. The Company also participates in the JD Power and Associates Residential Customer Satisfaction program. However, the Company does not, specifically track customer satisfaction with AMRP-related work.

Peoples Gas attempted to measure satisfaction with AMRP very early in the program. It discontinued measurement, citing difficulties due to the length of the AMRP customer experience. Months can pass between construction and restoration. Peoples Gas is not measuring customer satisfaction with the AMRP program.

PGL Action Plan Steps

Item	Task	Due Date
1	Begin making calls to customers who have had an AMRP Service Marking Appointment	Completed/Ongoing
2	Begin making calls to customers who have had an AMRP Meter Move Appointment*	Completed/Ongoing
3	Begin analysis to track trends, investigate them and put process improvements in place.	Completed/Ongoing
4	Formalize and report meaningful metrics that measure customer satisfaction; continually update	Completed/Ongoing
5	Track, separate out, measure and report on AMRP specific complaints pertaining to appointments and scheduling	Completed/Ongoing
6	Begin making calls to customers who have had their property restored as part of AMRP	Completed/Ongoing

Expected Post-Implementation Conditions and Factors

Liberty would expect to see clear procedures defining the measurement, analysis, and reporting customer satisfaction with AMRP and the effectiveness of AMRP communications and customer service.

Summary of Liberty's Steps to Verify Implementation

On June 8, 2016, we met with the Vice President of Customer Service to discuss actions taken and to review implementation progress. We discussed and reviewed the PGL Daily We Care Report (U.5.2 Atch01 and Atch02). Following the onsite meeting, management provided a sample report of Customer Dissatisfaction Root/Cause analysis of We Care results.

On September 20, 2016 we met with management to discuss progress on this recommendation. Since our last meeting, Management has begun surveying homeowners about their AMRP restoration experience. To date, management has surveyed about a dozen homeowners and has begun to accumulate the results in a SharePoint site for reporting. Management expects to be in production with reporting by the end of September. We also reviewed the script that management provides employees who call to survey customers about their AMRP restoration experience.

Observed Conditions and Factors

The Customer Effectiveness organization has responsibility for the monitoring and oversight of customer satisfaction. Customer Effectiveness reports to PGL Strategy & Performance, which reports directly to PGL's President. Customer Effectiveness administers the "We Care" customer satisfaction initiative and holds weekly "dissatisfied meetings" to discuss We Care results with all business units. We Care currently surveys customers who have had a meter marking appointment, a meter moved, and now restoration as part of AMRP to better understand satisfaction/dissatisfaction with that process.

The We Care program began surveying satisfaction with AMRP service marking last fall. During 1Q 2016, We Care began surveying customer satisfaction with AMRP-related meter moves. Management began surveying customers regarding satisfaction with AMRP restoration efforts in September.

Implementation Complete and Satisfactory?

Yes, we concur with management's request to close this recommendation.

Remaining Gaps, Needs

None.

PGL Position

Management has requested to close this recommendation.

Future Liberty Verification Activities

None.

Final Liberty Verification Activities

We met with management on March 23, 2017, learning that it has been measuring customer satisfaction (through its We Care program) with AMRP related Meter Moves since 1Q 2016. Service marking was added to We Care in the late summer, and in September, management began surveying customers regarding satisfaction with AMRP restoration efforts.

We reviewed weekly AMRP customer satisfaction reports from September 2016 through the end of March 2017. Customer dissatisfaction with AMRP related meter moves has ranged from 0 to 5 percent of customers responding to the survey, while dissatisfaction with service marking has ranged from 0 to 3 percent. Customer satisfaction averages 98.7 percent during this period for both meter moves and service marking combined.

We met with management on June 22, 2017 to discuss further efforts to measure AMRP related customer satisfaction. Management continues to measure satisfaction with the construction process, including service marking and meter moves. The We Care program paused following go-live of the new Customer System and resumed measurement activity in early June.

We reviewed We Care customer satisfaction results from March through June 2017—99.9 percent of customers surveyed were satisfied with AMRP-related service marking and meter moves.

PGL began a pilot last fall to measure customer satisfaction with the restoration process. At the conclusion of the pilot, management decided to continue these surveys when the restoration process resumed the following construction season. Liberty requested an update from management on the status of this effort. Liberty spoke with PGL on July 28, 2017 regarding the We Care results for service restoration activities. PGL continues to survey customers whose property requires restoration following AMRP-related construction. Dissatisfied customers whose concerns do not get resolved on the spot by We Care referral agents are rolled over to Sharepoint, for handling as part of the regular customer complaints process, and management codes their complaints to “restoration.” These unresolved complaints undergo discussion in weekly customer complaints meeting.

It is important that management has committed to surveying customers about their experiences with the AMRP program. This process gives customers a chance to share their feedback with the Company. It also provides management with critical information about the effectiveness of communications and how the program is impacting customers. Liberty would expect this process to continue throughout the life of the construction program.

General Observations

None.