FY13

Description	**Approval**	**Closure**
Base Growth – Install Main	Page 1 of 286	Page 15 of 286
Base Growth – Install Services		
Base Growth – Install Meter/Regulator		
Base Growth – Fitting		
Base Growth – Sales Fullfillment		
Base Growth – Meter Purchase/Operations	Page 22 of 286	Page 38 of 286
Purchase Meters Replacement		
Gas System Reinforcement	Page 44 of 286	Page 66 of 286
City State Construction - Non Reimbursable	Page 72 of 286	Page 87 of 286
City State Construction – Reimbursable		
Leak Prone Pipe	Page 95 of 286	Page 120 of 286
Main Replacement – Maintenance	Page 127 of 286	Page 137 of 286
CI Joint Encapsulation	Page 143 of 286	Page 155 of 286
BS HP Leak Prone Service	Page 162 of 286	Page 177 of 286
Service Replacements – Leaks	Page 183 of 286	Page 137 of 286
Service Replacements –Non-Leaks/Other		
Gas Planning	Page 195 of 286	Page 213 of 286
I&R Reactive Program*	-	-
LNG Projects	Page 220 of 286	Not Required
Pressure Regulating Facilities	Page 238 of 286	Page 253 of 286
System Automation	Page 260 of 286	Page 281 of 286

* Could not locate approval.

US Sanction Paper

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Title:	FY13 Rhode Island Growth Capital Budget	**Sanction Paper #:**	USSC-12-327
Project #:	CON050; CON054	**Sanction Type:**	Sanction
Operating Company:	Narragansett Electric Co	**Date of Request:**	06/27/2012
Author:	Peter Duggan	**Sponsor:**	Terry Sobolewski, VP Sales and Program Operations
Utility Service:	Gas	**Project Manager:**	Sean Mongan

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests sanction of **CON050 and CON054** in the amount of $14.25M with a tolerance of +/- 10% for the purposes of installing mains and services to serve projected customer growth in Rhode Island.

*This sanction amount is $**14.25M** broken down into:*
$14.25M Capex
With a CIAC/Reimbursement of $2.1M

1.2 Brief Description:

This program involves the installation of new main, services and meters to serve projected customer growth in Rhode Island. The $14.25M for FY13 will fund the installation of over 1,630 services and 31,200 feet of main associated with new customers.

Demand is continuing to grow supported by a continued forecast of a significant spread between natural gas price and oil. This sanctioning paper requests approval for mains; services and meter installation for the anticipated growth. We have worked with Resource Planning and Customer Fulfillment in preparing this document and assessing the ability to support the anticipated level of work.

Last year (fiscal 2012), this market delivered $3.0M in incremental gas margin at a Capex spend of $10.2M which provided an IRR of over 17% This success was supported by a significant gas to oil price advantage.

The FY13 Cap/GPM ratio of 3.80, excluding reinforcements and meter purchases, is higher due to a meter and fitting cost re-allocation. We are projecting an increase in margin as well at $3.2M. The IRR, with reinforcement and meter purchases, is 11.9%.

1.3 Summary of Projects:

Project Number	Project Title	Estimate Amount
CON050, CON054	FY13 RI Gas Growth	$ 14.25
	Total	$ 14.25

1.4 Associated Projects:

Project Number	Project Title	Company	Estimate Amount ($)
	Narragansett Electric Co Reinforcement		**$2,000,000**
	Narragansett Electric Co Meter Purchases		**$827,005**
		Total	**$2,827,005**

1.5 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
March 2013	Closure

US Sanction Paper

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1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
X Mandatory ☐ Policy-Driven ☐ Justified NPV	Regulatory agreements require National Grid to provide gas service and main. National Grid provides gas service using consistent up charge processes with targeted IRR returns across the portfolio.

1.8 Asset Management Risk Score

Asset Management Risk Score: _49____

Primary Risk Score Driver: (Policy Driven Projects Only)

O Reliability O Environment O Health & Safety ⊙ Not Policy Driven

1.9 Complexity Level: (if applicable)

O High Complexity O Medium Complexity O Low Complexity ⊙ N/A

Complexity Score: _____

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

O Yes ⊙ No

1.11 Business Plan:

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Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
RI Gas Capital Plan Budget 2013-2017	⊙ Yes ○ No	⊙ Over ○ Under	$6.39M

1.12 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements

1.13 Current Planning Horizon:

		Current Planning Horizon						
	Prior Yrs	Yr. 1 2012/13	Yr. 2 2013/14	Yr. 3 2014/15	Yr. 4 2015/16	Yr. 5 2016/17	Yr. 6 + 2017/18	Total
CapEx	$ -	$ 14.25	$ -	$ -	$ -	$ -	$ -	$ 14.25
OpEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CIAC/Reimbursement	$ -	$ (2.10)	$ -	$ -	$ -	$ -	$ -	$ (2.10)
Total	$ -	$ 12.15	$ -	$ -	$ -	$ -	$ -	$ 12.15

1.14 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☐ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☐ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	⊙ Amber	○ Green
Availability of external resources to deliver project:	○ Red	⊙ Amber	○ Green
Operational Impact			

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Outage impact on network system:	O Red	O Amber	⊙ Green
Procurement impact on network system:	O Red	O Amber	⊙ Green

1.15 Key Issues (include mitigation of Red or Amber Resources):

1	Internal and external Resources need to be secured to help manage the Supported plan as well as the expected volume increases. We are anticipating having 350-500 customers delayed by year end with the possibility to move their installations into Spring '13.
2	
3	

1.16 Key Milestones:

Milestone	**Target Date: (Month/Year)**
Approval	June 27, 2012
Closure	June , 2013

1.17 Climate Change:

Are financial incentives (e.g. carbon credits) available?		O Yes	⊙ No
Contribution to National Grid's 2050 80% emissions reduction target:	O Neutral	⊙ Positive	O Negative
Impact on adaptability of network for future climate change:	⊙ Neutral	O Positive	O Negative

1.18 List References:

US Sanction Paper

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1	National Grid US Gas Distribution Fiscal Year 2013 Annual Work Plan
2	
3	

2 ***Decisions***

Use this box for full project sanctions

The US Sanctioning Committee (USSC) at a meeting held on June 27, 2012:

(a) APPROVED this paper and the investment of $14.25M and a tolerance of +/- 10%

(b) NOTED that Sean Mongan is the Project Manager and has the approved financial delegation.

Signature.....Date..9/21/12

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee

US Sanction Paper

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3 *Sanction Paper Detail*

Title:	FY13 RI Growth Capital Budget Plan	**Sanction Paper #:**	USSC-12-327
Project #:	CON050; CON054	**Sanction Type:**	Sanction
Operating Company:	Narragansett Electric Co	**Date of Request:**	06/27/2012
Author:	Peter Duggan	**Sponsor:**	Terence Sobolewski, VP Sales and Program Operations
Utility Service:	Gas	**Project Manager:**	Sean Mongan

3.1 Background

The Customer organization is responsible for projecting growth rates. With the Jurisdictions, Resource Planning, Engineering, Customer Fulfillment and Operations they develop the projected growth rates and the necessary capital and O& M requirements with input from other departments of the Company including finance, operations and construction, gas planning, marketing and engineering. It is a collaborative process.

3.2 Drivers

As a regulated utility we are required to offer delivery of service to prospective customers while obtaining a return on our investment that allows us to be profitable.

There are several factors that drive overall GPM projections and the associated capital/ O&M expenditures:

- Rate Plans
- Fuel Pricing – oil versus natural gas
- Inventory levels and turnover ratios
- Saturation levels
- Marketing Lead performance
- Designs and resourcing that supports the delivery of capital at efficient pricing.
- Economic Conditions / Building Starts
- Gas system constraints

3.3 Project Description

The proposal is intended to establish the 12/13 Customer GPM goal, $3.2M, and the accompanying capital budgets of $14.25M. The document takes into account current, and projected, market and pricing conditions and contains provisions should conditions worsen.

3.4 Benefits Summary

Execution of this plan will deliver 1,635 services and 31,200 feet of gas main to enable customers to benefit from safe, reliable and economical natural gas for their homes and businesses.

The plan should generate approximately $3.2M in incremental annual Gas Profit Margin and an IRR of 11.9% with reinforcements and meter purchases.

3.5 Business Issues

- Meeting the incremental demand with constrained construction resources.
- Approval of a Capex spend in excess of the approved 5 year plan
- Deploying consistent capital contribution policies while pursuing changes to existing rate provisions relating to capital contributions. Result = Increase in capital contributions and improved IRR's for gas growth.

3.6 Alternatives

Alternative 1: Provide reactive only support for gas growth requests. This would greatly reduce the most profitable commercial gas growth opportunities that are executed through our streamlined sales force. This would have an additional impact on the number customers delayed for service, impacting customer satisfaction and our relationships with the regulators.

Alternative 2:

Alternative 3:

3.7 Safety, Environmental and Project Planning Issues

It is expected that there would be no safety, environmental, or planning issues associated with this proposal.

3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	SAP Implementation may result in delays in processing work	2	2	3	4	6	Accept	Work with SAP team to ensure seamless transition	Develop work around contingency plans	Implement contingency plans as needed
2	Resource Constraints to complete Planned Growth Work	3	4	4	12	12	Accept	Work with Resource Planning and Operations to monitor	Develop work around contingency plans	Implement contingency plans as needed

3.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

The budgetary projections contained in the appendices of this document have been developed by Sean Mongan, in conjunction with the Customer fulfillment team and resource planning. The proposal factors in requirements/ assumptions of responsibility as dictated by the applicable regulatory bodies/ tariffs.

3.10.2 Customer Impact

The project results in an indicative first full year revenue requirement when the asset is place in service equal to approximately $2.038M. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

3.10.3 CIAC / Reimbursement

$M	Prior Yrs	Yr. 1 2012/13	Yr. 2 2013/14	Yr. 3 2014/15	Yr. 4 2015/16	Yr. 5 2016/17	Yr. 6 + 2017/18	Total
CIAC/Reimbursement	$ -	$ 2.10	$ -	$ -	$ -	$ -	$ -	$ 2.10

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

Project Number	Project Title	Project Estimate	Spend	Prior Yrs	Yr. 1 2012/13	Yr. 2 2013/14	Yr. 3 2014/15	Yr. 4 2015/16	Yr. 5 2016/17	Yr. 6 + 2017/18	Total
CON050, CON054	FY13 RI Gas Growth	Est Lvl	CapEx	$ -	$ 14.25	$ -	$ -	$ -	$ -	$ -	$ 14.25
			OpEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
			Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
			Total	$ -	$ 14.25	$ -	$ -	$ -	$ -	$ -	$ 14.25

3.11.2 Project Budget Summary Table

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Project Costs per Business Plan

		Current Planning Horizon						
	Prior Yrs (Actual)	Yr. 1 2012/13	Yr. 2 2013/14	Yr. 3 2014/15	Yr. 4 2015/16	Yr. 5 2016/17	Yr. 6 + 2017/18	Total
CapEx	$ -	$ 7.86	$ -	$ -	$ -	$ -	$ -	$ 7.86
OpEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Cost in Bus. Plan	$ -	$ 7.86	$ -	$ -	$ -	$ -	$ -	$ 7.86

Variance (Business Plan-Project Estimate)

		Current Planning Horizon						
	Prior Yrs (Actual)	Yr. 1 2012/13	Yr. 2 2013/14	Yr. 3 2014/15	Yr. 4 2015/16	Yr. 5 2016/17	Yr. 6 + 2017/18	Total
CapEx	$ -	$ (6.39)	$ -	$ -	$ -	$ -	$ -	$ (6.39)
OpEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Cost in Bus. Plan	$ -	$ (6.39)	$ -	$ -	$ -	$ -	$ -	$ (6.39)

3.11.3 Cost Assumptions

The first step of the process is to determine the number of potential new customers for the upcoming sales year. These potential new customers are identified by service classification, (residential or commercial), gas application, (heating or non-heating) and location. After this number is developed, the capital spending requirements are calculated using **unit costs** that are supplied to Customer by the Construction and Operations area and Resource Planning to develop the estimates for main and service. Unit costs are based on the average rates for the close of the previous fiscal year.

The costs for Install meter/regulator and meter purchase are based on prior year's quantities and estimates.

The costs for reinforcement projects are based on projects that have gone through preliminary level estimates using average per foot costs from the prior year.

Marketing and Sales spend is based on the costs of capital associated with Project Management; some allocated labor and the labor and non-labor costs for a workforce that sets new meters.

3.11.4 Net Present Value / Cost Benefit Analysis

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Economic measures	5yr	10yr	20yr	Comment
NPV @ Discount rate				
IRR				
MIRR				
Simple Payback in Years				
Total O&M				
Total Capital Investment				
Total Savings				

3.11.5 Additional Impacts

3.12 Statements of Support

3.12.1 Supporters

Role	Name	Responsibilities
Sponsor/ Asset Manager/ Asset Owner/ Process Owner	Sean Mongan	Endorses the project aligns with jurisdictional objectives
Investment Planning	Michelle Roche	Endorses relative to 5-year business plan or emergent work
Resource Planning	Artie Georgacopolous	Endorses Resources, cost estimate, schedule, and Portfolio Alignment

3.12.2 Reviewers

Reads paper for content / language. Recommends edits if necessary

Reviewer List	Name
Finance	Joseph Bellettiere
Regulatory	Gideon Katch
Procurement	John Kavanaugh
Jurisdictional Delegates	Walter Fromm

4 Appendices

4.1 Project Cost Breakdown

Project Cost Breakdown		
Cost Category	**Company Name ($ Amount)**	**Description of Cost Category**
Total:		

4.2 Other Appendices

4.3 NPV Summary (if applicable)

4.4 Customer Outreach Plan (if applicable)

USSC Closure Paper

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Title:	FY13 Rhode Island Growth Capital Budget	**Sanction Paper #:**	USSC-12-327C
Project #:	Various – (See Appendix)	**Sanction Type:**	Closure
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	3/30/2017
Author:	Kevin Rennick/Kerrie Doyle/Jeff Marshall/Dave Mirabella	**Sponsor:**	James A. Cross, VP Sales & Program Operations
Utility Service:	Gas	**Project Manager:**	Fortier, Joseph

1 Executive Summary

This paper is presented to close various projects - (See Appendix). The total spend was $9.892M. The sanctioned amount for this project was $14.250M.

The final spend amount is $9.892M broken down into:
$8.840M Capex
$0.000M Opex
$1.052M Removal
With a CIAC/Reimbursement of $1.267M

2 Project Summary

This program involves the installation of new main, services and meters to serve projected customer growth in Rhode Island. The $14.250 for FY13 will fund the installation of 1,630 services and 31,200 feet of main associated with new customers.

The Cap/GPM ratio of 3.80, excluding reinforcements and meter purchases which is higher due to meter and fitting cost re-allocation. The IRR with reinforcement and meter purchases is 11.9%.

3 Over / Under Expenditure Analysis

3.1 Summary Table

Actual Spending ($M)			
Project #	Description		Total Spend
Various - See Appendix	Various - See Appendix	Capex	8.840
		Opex	0.000
		Removal	1.052
		Total	9.892
Total		Capex	8.840
		Opex	0.000
		Removal	1.052
		Total	9.892

Project Sanction Summary Table			
Project Sanction Approval ($M)			Total Spend
		Capex	14.250
		Opex	0.000
		Removal	0.000
		Total Cost	14.250
Sanction Variance ($M)			Total Spend
		Capex	5.410
		Opex	0.000
		Removal	(1.052)
		Total Variance	4.358

3.2 Analysis

FY13 Rhode Island Growth Capital Budget Blanket is 31% under plan. There are multiple contributing factors to the underruns. Resource limitations contributed to the under spend. In addition, cycle time of obtaining permits and long lead materials delayed work. There were challenges with estimates on larger projects within the blanket. Timing of restoration scheduling due to colder weather continues to effect progress of work.

4 *Improvements / Lessons Learned/Root Cause*

- Improve development of estimating practices.
- Work with Finance and Resource Planning to create better financial metrics.
- Create Long Term resource requirements for future Capital planning.
- Identify carryover or deferred projects in a timely fashion.

5 *Closeout Activities*

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	(•) Yes ( ) No
All relevant costs have been charged to project	(•) Yes ( ) No
All work orders and funding projects have been closed (1)	( ) Yes (•) No
All unused materials have been returned	(•) Yes ( ) No
All as-builts have been completed (2)	( ) Yes (•) No
All lessons learned have been entered appropriately into the lesson learned database (3)	( ) Yes (•) No

(1) All work orders and funding projects have been closed
Program/Blanket projects may contain work orders and or funding projects which have not yet been closed for reasons including but not limited to:

- the same work order(s) are used annually. They will remain open until Asset Management and/or Resource Planning have determined work orders are no longer needed .
- construction may cross multiple fiscal years
- the work order closing process is within the late charge waiting period
- other accounting processes or final system closing activities have not yet completed

The Program/Blanket projects are approved annually for the current year expected spend and remain open until Asset Management and/or Resource Planning have determined the project is no longer required.

(2) All as-builts have been completed

Program/Blanket projects may contain work orders for which no as-builts have yet been recorded for reasons including but not limited to:

- design and/or construction have not yet completed
- construction may cross multiple fiscal years
- work has completed recently and as-builts have not yet been processed into the system
- does not apply. Work order(s) are not linked to work management systems. (example: Meter Purchases, Meter Changes, AMR Installations Purchase Misc Capital Tools/Equipment, etc.)
- does not apply to Information systems projects.

(3) All lessons learned have been entered appropriately into the lesson learned database

Program/Blanket projects usually contain short cycle work which the Company has been performing over several fiscal years. No new Lessons Learned which have not already been identified and recorded within section 4.

6 Statements of Support

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planning	Pensabene, Patrick	Endorses relative to 5-year business plan or emergent work
Resource Planning	Falls, Jonathon	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Project Management	Fortier, Joseph	Endorses Resources, cost estimate, schedule
Gas Project Estimation	Paul, Art	Endorses Cost Estimate

6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Collision, Mark
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Currie, John
Procurement	Curran, Art
Control Center	Loiacono, Paul

USSC Closure Paper

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7 Decisions

The US Sanctioning Committee (USSC) approved this paper on March 30, 2017.

Signature Ross W. Turrini Date April 27, 2017

Executive Sponsor – Ross Turrini, Senior Vice President, Gas Process & Engineering and Chief Gas Engineer

8 *Appendix*

Paper Name	Project	CAP	COR	Grand Total
FY13 Rhode Island Growth Capital Budget	CON0050	$ 594,803	$ 236,887	$ 831,690
	CON0054	$ 1,265,879	$ 526,720	$ 1,792,599
	CON036	$ 5		$ 5
	CON050	$ 1,427,148	$ (987)	$ 1,426,161
	CON054	$ 5,082,190	$ 33,319	$ 5,115,509
	CRCC102	$ 229,814	$ 179,513	$ 409,327
	CRCC104	$ 240,444	$ 76,832	$ 317,276
		$ 8,840,283	**$ 1,052,284**	**$ 9,892,567**

US Sanction Paper

nationalgrid

Title:	Gas Meter Purchases	**Sanction Paper #:**	USSC-12-054
Project #:	CON063	**Sanction Type:**	Sanction
Operating Company:	The Narragansett Electric Company	**Date of Request:**	February 22, 2012
Author:	Philip DiGiglio	**Sponsor:**	Cheryl A. Warren
Utility Service:	Gas		

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests sanction of project CON063 in the amount **$ 1.899M**, and a tolerance of +/- **10%** for the purposes of purchase and test of new gas meters and instrumentation to support mandated and growth meter change requirements

*This sanction amount is $**1.899 M** broken down into:*

$ 1.899 M Capex
$ 0.0 Opex
$ 0.0 Removal

1.2 Summary of Projects:

CON063	Narragansett Electric Co. Purchase Gas Meters

Each year, National Grid is required to change/replace meters in order to comply with the state regulations governing gas metering, to ensure the accuracy of the measurement of usage used to generate customer's consumption bills, and install new meters in support of the Company's growth initiatives.

This project provides for the purchase and testing of Residential and Commercial/Industrial Gas meters to support the above requirements.

1.3 Associated Projects:

Gas Meter Purchases - Boston Gas Company USSC-12-050
Gas Meter Purchases - Energy North USSC-12-051
Gas Meter Purchases - The Brooklyn Union Gas Company USSC-12-052
Gas Meter Purchases - Niagara Mohawk Power Corp USSC-12-053

US Sanction Paper

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1.4 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
N/A				

1.5 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review

1.6 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
☒ Mandatory ☐ Policy-Driven ☐ Justified NPV	Support Gas Meter requirements for Mandated Meter Change Program, and system growth targets

1.7 Asset Management Risk Score

Asset Management Risk Score: 48

Primary Risk Score Driver: (Policy Driven Projects Only)

☒ Reliability ☐ Environment ☐ Health & Safety

1.8 Complexity Level: (if applicable)

☐ High Complexity ☐ Medium Complexity ☐ Low Complexity

Complexity Score: N/A

1.9 Business Plan:

US Sanction Paper

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Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
Gas Meter Purchases	☒ Yes ☐ No	☐ Over ☐ Under	$ 0.00 M

1.10 If cost > approved Business Plan how will this be funded?

Costs equal approved Business Plan.

1.11 Current Planning Horizon:

Company Name	Current planning horizon							
$M	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 +	*Total*
Proposed Capex Investment	2.813	1.899	1.917	1.985	2.054	2.124		12.792
Proposed Opex Investment								0.000
Proposed Removal Investment								0.000
CIAC / Reimbursement								0.000
Total	$2.813	$1.899	$1.917	$1.985	$2.054	$2.124	$0.000	$12.792

1.12 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☒ Internal	☐ Contractor	
Construction/Implementation Resources to be provided	☒ Internal	☐ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	☐ Red	☐ Amber	☒ Green
Availability of external resources to deliver project:	☐ Red	☐ Amber	☒ Green
Operational Impact			
Outage impact on network system:	☐ Red	☐ Amber	☒ Green
Procurement impact on network system:	☐ Red	☐ Amber	☒ Green

US Sanction Paper

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1.13 Key Issues (include mitigation of Red or Amber Resources):

1	Provide Sufficient Supply of Gas Meters to support Mandated Meter Change Programs
2	Provide Sufficient Supply of Gas Meters to support Growth Targets

1.14 Key Milestones:

Milestone	**Target Date: (Month/Year)**
Provide meter vendors with annual requirements and product delivery schedule for first half of FY	3/1/2012
Monitor Inventory levels	6/1/2012
Provide meter vendors with delivery schedule for second half of FY	7/1/2012

1.15 Climate Change:

Are financial incentives (e.g. carbon credits) available?		☐ Yes	☒ No
Contribution to National Grid's 2050 80% emissions reduction target:	☒ Neutral	☐ Positive	☐ Negative
Impact on adaptability of network for future climate change:	☒ Neutral	☐ Positive	☐ Negative

1.16 List References:

1	
2	
3	

US Sanction Paper

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2 Recommendations:

The USSC Board, is invited to:

(a) APPROVE the investment of $*1.899 M* and a tolerance of +/- 10 %

(b) NOTE that Cheryl A Warren is the Project Manager and has the approved financial delegation.

Signature..... Date 3/15/12

Cheryl A Warren, VP Asset Management

I approve the recommendation made in this paper.

Signature..... Date 3/19/12

Christopher E. Root

Senior Vice President, Network Strategy

3 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on February 22, 2012.

Signature..... Date 3/21/12

Lee S. Eckert

US Chief Financial Officer

Chairman, US Sanctioning Committee

US Sanction Paper

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4 Sanction Paper Detail

Title:	Gas Meter Purchases	**Sanction Paper #:**	USSC-12-054
Project #:	CON063	**Sanction Type:**	Sanction
Operating Company:	The Narragansett Electric Company	**Date of Request:**	
Author:	Philip DiGiglio	**Sponsor:**	Cheryl A. Warren
Utility Service:	Gas		

4.1 Background

Each year, National Grid is required to change/replace meters in order to comply with the state regulations governing gas metering, to ensure the accuracy of the measurement of usage used to generate customer's consumption bills, and install new meters in support of the Company's growth initiatives.

On an annual basis, a zero based meter purchase strategy is developed to meet the metering needs of the mandated, company change initiated and growth programs. The volume of meters to be purchased is based upon meter accuracy, age and asset condition of the meters that are planned to be /and are returned from the field. An average condemn rate based on program type and age of assets is calculated utilizing historical information from each of the areas. The meter purchase plan is developed using this historical metering data, the growth forecast and the planned mandated program work volumes.

The number and mix of meter types is developed at the beginning of the year and is reviewed and adjusted as the year progresses and CMS completes its work. In the states with remediation and random sample programs the development of the forecasts is based on known meter types and sizes with the exception of the growth meters where the mix is unknown. In the states where periodic change programs exists, the on-going review of inventory and condition of meters returned from the field is essential in determining the meters to be purchased as the mandated program does not require specific volumes of a meter type (250, 210, 450, 630) be changed but is instead driven

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by the time the asset is in service as well as the ability to gain access to the customer's premises. The on-going review is necessary in order to ensure that the correct mix of inventory is available to meet the demands of CMS while not over purchasing.

Gas meters required for the Narragansett Electric Company are purchased, tested, and delivered to the National Grid Rhode Island Meter Operations Facilities In Providence, and Cumberland, Rhode Island.

Meter Changes resulting from FY2013 CMS Work Plan;

Totals FY 2013	Classification	RI
Sales	Growth	2,005
Sets / Resets	Cust Driven	1,231
Random Sample - Sample	PSC	16,593
Random Sample Remediation	PSC	
Tin Meter Replacements	Tag Along	-
Cause (High bill, Tamper, DNR, Leak)	Cust Driven	3,504
AMR - Customer Req	Cust Driven	401
Total Changes		**24,334**
Marshall Removals	Cust Driven	1,620

This plan yields the following Capex Investment Plan for FY 2013

2013 Capital Allocation			
Non Growth	$ -	RI	Total
Sub-Total Non Growth Material	$ -	$ 1,351,324	$ 1,351,324
Tax	$ -	$ 67,566	$ 67,566
Shipping	$ -	$ 702,688	$ 702,688
Total Material	$ -	$ 2,121,578	$ 2,121,578
Labor	$ -	$ -	$ -
Totals	$ -	$ 2,121,578	$ 2,121,578
% non growth allocation	0.00%	100.00%	100.00%

Growth	0	RI	Total
Materials	$ -	$ 526,755	$ 526,755
Tax	$ -	$ 26,338	$ 26,338
Shipping	$ -	$ 273,912	$ 273,912
Total Materials	$ -	$ 827,005	$ 827,005
Labor	$ -	$ -	$ -
Total	$ -	$ 827,005	$ 827,005
% growth allocation	0.00%	100.00%	100.00%
		RI	Total
Total	$ -	$ 2,948,583	$ 2,948,583
Total % allocation	0.00%	100.00%	100.00%

	Growth	Non Growth	Total
	$ -	$ -	$ -
RI	$ 827,005	$ 2,121,578	$ 2,948,583
Total	$ 827,005	$ 2,121,578	$ 2,948,583

Reducing plan for AMR Purchase (already sanctioned);

FY 2013 Capital Allocation		
Non Growth	RI	Total
Sub-Total Non Growth Material	$ 1,351,324	$ 1,351,324
Tax	$ 67,566	$ 67,566
Shipping	$ 702,688	$ 702,688
Total Material	$ 2,121,578	$ 2,121,578
Labor	$ -	$ -
Sub Total Non Growth	$ 2,121,578	$ 2,121,578
ERTS Previously Sanctioned	$ 755,501	$ 755,501
Meter Sanction Total - Non Growth	**$ 1,366,077**	**$ 1,366,077**
Growth	RI	Total
Materials	$ 526,755	$ 526,755
Tax	$ 26,338	$ 26,338
Shipping	$ 273,912	$ 273,912
Total Materials	$ 827,005	$ 827,005
Labor	$ -	$ -
Sub Total Growth	$ 827,005	$ 827,005
ERTS Previously Sanctioned	$ 294,499	$ 294,499
Meter Sanction Total - Growth	**$ 532,506**	**$ 532,506**
Total Meter Sanction	**$ 1,898,583**	**$ 1,898,583**

This process is used to develop the full 5 year Capital Plan for Gas Meter Purchases

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Jurisdiction - Rhode Island

	FY12-13	FY13-14	FY14-15	FY15-16	FY16-17	Total
Rhode Island						
Base Growth - Meter Purchases	$ 827,005	$ 866,726	$ 884,060.08	$ 901,741	$ 919,776	$ 4,399,308
Mandated - Purchase Meters Replacement	$ 2,121,578	$ 2,513,607	$ 2,563,880	$ 2,615,157	$ 2,667,460	$ 12,481,683
Rhode Island Jurisdiction Total	$ 2,948,583	$ 3,380,333	$ 3,447,940	$ 3,516,898	$ 3,587,236	$ 16,880,991

Jurisdiction - Rhode Island
Net Meters Only

	FY12-13	FY13-14	FY14-15	FY15-16	FY16-17	Total
Rhode Island						
Base Growth - Meter Purchases	$ 532,506	$ 456,390	$ 473,725	$ 491,406	$ 509,441	$ 2,463,467
Mandated - Purchase Meters Replacement	$ 1,366,077	$ 1,460,943	$ 1,511,215	$ 1,562,492	$ 1,614,796	$ 7,515,523
Rhode Island Jurisdiction Total	$ 1,898,583	$ 1,917,333	$ 1,984,940	$ 2,053,898	$ 2,124,236	$ 9,978,991

Jurisdiction - Rhode Island
Meter Units

	FY12-13	FY13-14	FY14-15	FY15-16	FY16-17
Rhode Island					
Base Growth - Meter Purchases	2,280	2,280	2,280	2,280	2,280
Mandated - Purchase Meters Replacement	7,869	7,869	7,869	7,869	7,869
Rhode Island Jurisdiction Total	10,149	10,149	10,149	10,149	10,149

4.2 Drivers

The primary driver for meter and metering instrumentation purchases is compliance with state regulations governing meter accuracy and measurement of gas usage for customer bills. Each of the states in which National Grid does business requires that testing of meters be done to ensure that accuracy requirements are met. The programs required by each state vary.

Rhode Island requires that residential meters (500CFH and lower) are replaced on a 15 year cycle, and Commercial/Industrial Meters (greater than 500CFH) are replaced on a 10 year cycle. To comply with this regulation, gas meters are removed from service and returned to the Meter Operations Facility where they are tested and/or adjusted where necessary to assure compliance with accuracy standards. In addition, AMR endpoints (ERTS) are checked for age and functionality and replaced as necessary.

In addition to the mandated meter change program, meters are required to support growth targets, as well as to support Customer Meter Services (CMS) operational requirements (load change, meter and/or service relocations, damage, stopped meters, high bill complaints etc.). The quantity of miscellaneous meter changes is estimated each year based upon a rolling historical average.

4.3 Project Description

This project includes the purchase, test, processing, and delivery of Gas Meters to support the Rhode Island Mandated Meter Test/Replacement Program, Growth Targets, and continued CMS Operations

4.4 Benefits Summary

The project enables National Grid to continue to comply with all Mandated Programs, provide for growth, and assure the reliability and accuracy of our overall meter asset population thereby safeguarding revenue.

4.5 Business Issues

None

4.6 Options Analysis

Recommended Option:

- Fully fund project
  - Assures Compliance with Mandated Programs
  - Supports Growth Initiatives
  - Supports Operations, Safety, and Customer Satisfaction
  - Protects Revenue

Alternative 1:

- Do Nothing

Alternative 2:

- Defer or Partially Fund Project

Both Alternative 1 and 2 are rejected for the following reasons:

Regulatory Conformance - Alternatives 1 and 2 would result in missing mandated program replacement targets which could result in penalty.

Growth – Alternatives 1 and 2 would result in our inability to support growth targets.

Safety, Operations, and Customer Satisfaction – Alternatives 1 and 2 would limit our ability to provide replacement equipment to support meter changes for customer complaint, damage, suspected tampering, or other performance issues.

4.7 Safety, Environmental and Project Planning Issues

None

4.8 Execution Risk Appraisal

Number	Status (Active, Dormant, Retired)	Category	Detailed Description of Risk / Opportunity	Cause/Trigger	Probability	Impact		Score		Strategy	Risk Owner	Comments/Actions
						Cost	Schedule	Cost	Schedule			
1	Active	Stakeholders/ Outreach/Partnerships	Risk of inadaquate Meter Supply or incorrect meter model mix to support all programs	Predicted / Historical Mix of meter size and model varries greatly from actuals	2	2	2	4	4	Accept	P. DiGiglio	Meter inventory monitored monthly and delivery schedules continually adjusted to meet actual demand. PYE Cost impact due to variations in accutals also revised monthly

4.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date

4.10 Investment Recovery

4.10.1 Investment Recovery and Regulatory Implications

Capex spend to support the Rhode Island gas meter requirements are included in the current overall Capital Plan and the Gas ISR program, and are fully remunerated.

Meter purchases under this proposal assure compliance with mandated meter change programs, and maintains the accuracy level of the overall installed meter population within regulatory limits.

4.10.2 Customer Impact

Sanctioning this project maintains the accuracy of the Narragansett Electric Co. Gas meter population, maintains the integrity of customer bills, and reduces billing complaints.

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately $400,000. This is indicative only. The actual revenue requirement will differ depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

4.10.3 CIAC / Reimbursement

None

	CIAC/Reimbursement							
$M	**Prior YR'S**	**Yr 1 11/12**	**Yr 2 12/13**	**Yr 3 13/14**	**Yr 4 14/15**	**Yr 5 15/16**	**Yr 6 16/17**	***Total***
CIAC / Reimbursement								

4.11 Financial Impact to National Grid

4.11.1 Cost Summary Table

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				Current Planning Horizon								
Project #	Project Description	Project Estimate level	$M	Prior YR Spending	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR7+	Total
CON063	Nar. Gas Meter Purchases	10%	Capex		1.899	1.917	1.985	2.054	2.124			9.979
			Opex									0.000
			Removal									0.000
			Total	0.000	1.899	1.917	1.985	2.054	2.124	0.000	0.000	9.979
		10%	Capex									0.000
			Opex									0.000
			Removal									0.000
			Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Proposed Sanction												
			Capex	0.000	1.899	1.917	1.985	2.054	2.124	0.000	0.000	9.979
			Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

4.11.2 Project Budget Summary Table

Project Budget Summary Table

Project Costs per Business Plan		Prior Year Spending*	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR 7	Total
	Capex	0.000	1.899	1.917	1.985	2.054	2.124	0.000	0.000	9.979
	Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total Cost in B Plan	0.000	1.899	1.917	1.985	2.054	2.124	0.000	0.000	$9.979

* P/Y Actuals

Variance (Business Plan-Project Estimate)		Prior Year Spending	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR 7	Total
	Capex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total Variance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	$0.000

4.11.3 Cost Assumptions:

- Meter and Instrumentation costs are based upon current procurement contracts. Rotary meter unit cost is a weighted average of all sizes.
- Labor rates fully burdened.
- Labor costs for Growth/Non-Growth are proportional to the Growth/Non-Growth total meter purchase.
- 3 New Set sizes for Residential are split 85% 250 Class, 15% 400 Class meters.

4.11.4 Net Present Value / Cost Benefit Analysis

Not NPV Driven

4.11.5 Additional Impacts

None

4.12 Statements of Support

4.12.1 Supporters

Role	Name	Responsibilities
Sponsor	Cheryl A Warren	Asset Strategy
Investment Planning	Ray Morey	Manager Investment Planning

4.12.2 Reviewers

Reads paper for content / language. Recommends edits if necessary

Reviewer List	Name
Finance	Joe Bellettierre
Regulatory	Peter Zschokke
Procurement	Tom Morgan
Jurisdictional Delegates	Laurie Brown

5 Appendices

Narragansett Electric Co. Gas Meter Operations Plan Estimate for 2013

6 Project Cost Breakdown

Project Cost Breakdown		
Cost Category	**Company Name ($ Amount)**	**Description of Cost Category**
Materials	Narragansett Electric Co. ($ 1,898,583)	Gas Meters, Meter

		Instrumentation
Total:	$ 1,898,583	

6.1 Other Appendices

6.2 NPV Summary (if applicable)

N/A

6.3 Customer Outreach Plan (if applicable)

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Title:	Gas Meter Purchases	**Sanction Paper #:**	USSC-12-054C
Project #:	CON063, CON0063	**Sanction Type:**	Closure
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	3/30/17
Author:	Saadat Khan/Ryan Geiger	**Sponsor:**	John John S. Stavrakas – VP Gas Asset Management
Utility Service:	Gas	**Project Manager:**	Joseph Fortier

1 *Executive Summary*

This paper is presented to close CON063 and CON0063. The total spend was $2.597M. The sanctioned amount for this project was $1.899M.

The final spend amount is $2.597 broken down into:

2.580MCapex
0.000M Opex
0.016M Removal

2 *Project Summary*

Each year, National Grid changed/replaced meters in order to comply with the state regulations governing gas metering, to ensure the accuracy of the measurement of usage used to generate customer's consumption bills, and install new meters in support of the Company's growth initiatives.

This project provided for the purchase and testing of Residential and Commercial/Industrial Gas meters in the support the above requirements.

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3 Over / Under Expenditure Analysis

3.1 Summary Table

Actual Spending ($M)			
Project #	Description		Total Spend
CON0063	Gas Meter Purchase Blanket-RI	Capex	0.004
		Opex	0.000
		Removal	0.013
		Total	0.017
Project #	Description		Total Spend
CON063	Gas Meter Purchase Blanket-RI	Capex	2.577
		Opex	0.000
		Removal	0.003
		Total	2.580
Total		Capex	2.581
		Opex	0.000
		Removal	0.016
		Total	2.597

Project Sanction Summary Table			
Project Sanction Approval ($M)			Total Spend
		Capex	1.899
		Opex	0.000
		Removal	0.000
		Total Cost	1.899
Sanction Variance ($M)			Total Spend
		Capex	(0.681)
		Opex	0.000
		Removal	(0.016)
		Total Variance	(0.697)

3.2 Analysis

The Gas Meter Purchase blanket is 37% over plan. There are multiple contributing factors to the overruns. Lack of communications around job scope changes affected the estimates. In addition, continued Safety requirement improvements caused delays/increases in costs.

4 *Improvements / Lessons Learned/Root Cause*

- Improve development of estimating practices.
- Work with Finance and Resource Planning to create better financial metrics.
- Create Long Term resource requirements for future Capital planning.
- Identify carryover or deferred projects in a timely fashion.

5 *Closeout Activities*

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	(•) Yes ( ) No
All relevant costs have been charged to project	(•) Yes ( ) No
All work orders and funding projects have been closed (1)	( ) Yes (•) No
All unused materials have been returned	(•) Yes ( ) No
All as-builts have been completed (2)	( ) Yes (•) No
All lessons learned have been entered appropriately into the lesson learned database (3)	( ) Yes (•) No

(1) All work orders and funding projects have been closed
Program/Blanket projects may contain work orders and or funding projects which have not yet been closed for reasons including but not limited to:

- the same work order(s) are used annually. They will remain open until Asset Management and/or Resource Planning have determined work orders are no longer needed .
- construction may cross multiple fiscal years
- the work order closing process is within the late charge waiting period
- other accounting processes or final system closing activities have not yet completed

The Program/Blanket projects are approved annually for the current year expected spend and remain open until Asset Management and/or Resource Planning have determined the project is no longer required.

(2) All as-builts have been completed

Program/Blanket projects may contain work orders for which no as-builts have yet been recorded for reasons including but not limited to:

- design and/or construction have not yet completed
- construction may cross multiple fiscal years
- work has completed recently and as-builts have not yet been processed into the system
- does not apply. Work order(s) are not linked to work management systems. (example: Meter Purchases, Meter Changes, AMR Installations Purchase Misc Capital Tools/Equipment, etc.)
- does not apply to Information systems projects.

(3) All lessons learned have been entered appropriately into the lesson learned database

Program/Blanket projects usually contain short cycle work which the Company has been performing over several fiscal years. No new Lessons Learned which have not already been identified and recorded within section 4

6 Statements of Support

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planner	Pensabene, Patrick M.	Endorses relative to 5-year business plan or emergent work
Resource Planning	Falls, Jonathon	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Project Management	Fortier, Joseph Jr.	Endorses Resources, cost estimate, schedule
Gas Project Estimation	Paul, Art	Endorses Cost Estimate

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6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Easterly, Patricia
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Currie, John
Procurement	Curran, Art
Control Center	Loiacono, Paul

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7 ***Decisions***

I approve this paper.

Signature Ross W. Turrini Date April 27, 2017

Executive Sponsor – Ross Turrini, Senior Vice President, Gas Process & Engineering and Chief Gas Engineer

US Sanction Paper

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Title:	Rhode Island 2012/2013 System Reinforcement Program	**Sanction Paper #:**	USSC-12-100
Project #:	CON032	**Sanction Type:**	Sanction
Operating Company:	Rhode Island Gas Company	**Date of Request:**	3/14/2012
Author:	Ramona Butler / John Stavrakas	**Sponsor:**	Tim Small – Gas Systems Engineering
Utility Service:	Gas		

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests sanction of the fiscal year 2012/13 System Reinforcement program in the amount of $1,980,500 and a tolerance of +/- 10% for the purpose of full implementation.

This sanction amount is $1,980,500 broken down into:

$1.98M Capex
$0 Opex
$0 Removal

1.2 Brief Description:

The Planning Reinforcement program contains projects that ensure minimum system design pressures are maintained throughout the gas distribution system during periods of peak demand to allow continuous service to every customer. Federal Code 49 CFR 192.632 requires minimum pressures to be maintained in the gas system. The peak demand for each territory is based on the same corporate forecast used to develop the gas supply portfolio, and the System Reinforcement program is a critical component to enable the gas to be delivered to the customer. If the System Reinforcement program is not constructed, approximately 975 customers would be expected to see delivery pressures below minimum design levels and be at risk of losing service during periods of peak demand.

Examples of System Reinforcement projects include, but are not limited to:

- Replace existing undersized mains with larger diameter mains. "Leak-prone" pipe is targeted whenever practical.
- Loop or connect system endpoints with new main to integrate distribution systems with the same MAOP.

- System Pressure Uprates (e.g. 45psig to 60psig).
- Install new district regulators, replace and/or rebuild existing undersized district regulators.
- Automate Low Pressure (LP) district regulator outlet pressure set points (e.g., time/temperature). Note that automation work performed for system reinforcement purposes is complementary to the overall system automation plan (reference the System Automation and Control sanctioning papers).
- Transfer existing LP customers to an adjacent High Pressure (HP) main (i.e., load shedding).

There are four (6) projects and miscellaneous budgetary placeholders identified in Appendix 1, which are estimated to cost a total of $1.98M.

1.3 Summary of Projects:

Project Number	Project Title	Estimate Amount ($)
CON032	Rhode Island 2012/2013 System Reinforcement Program.	$1,980,500
	Total	**$1,980,500**

1.4 Associated Projects:

Project Number	Project Title	Company	Estimate Amount ($)
None			
		Total	

1.5 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
None				

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review

US Sanction Paper

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1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
☐ Mandatory ☒ Policy-Driven ☐ Justified NPV	Federal Code 49CFR 192.623 requires that the minimum pressures are maintained in the gas system. National Gird has established system minimum pressures to be maintained for all pressure levels.

1.8 Asset Management Risk Score

Asset Management Risk Score: 36

Primary Risk Score Driver: (Policy Driven Projects Only)

☒ Reliability ☐ Environment ☐ Health & Safety

1.9 Complexity Level: (if applicable)

☐ High Complexity ☐ Medium Complexity ☐ Low Complexity

Complexity Score: *N/A*

1.10 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
Rhode Island System Reinforcement Program FY 12/13 through 16/17	☒ Yes ☐ No	☐ Over ☐ Under	$0
	☐ Yes ☐ No	☐ Over ☐ Under	

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1.11 If cost > approved Business Plan how will this be funded?

1.12 Current Planning Horizon:

Company Name	Current planning horizon							
$M	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 +	*Total*
Proposed Capex Investment	0.297	1.980	0.437	0.359	0.200	0.100		3.373
Proposed Opex Investment								0.000
Proposed Removal Investment								0.000
CIAC / Reimbursement								0.000
Total	$0.297	$1.980	$0.437	$0.359	$0.200	$0.100	$0.000	$3.373

A five (5) year CapEx forecast has been provided for planning purposes. The program will be submitted for sanctioning on an annual basis.

1.13 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☒ Internal	☒ Contractor	
Construction/Implementation Resources to be provided	☒ Internal	☒ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	☐ Red	☐ Amber	☒ Green
Availability of external resources to deliver project:	☐ Red	☐ Amber	☒ Green
Operational Impact			
Outage impact on network system:	☐ Red	☐ Amber	☒ Green
Procurement impact on network system:	☐ Red	☐ Amber	☒ Green

1.14 Key Issues (include mitigation of Red or Amber Resources):

1	Reliability – 975 customers are predicted to experience pressures below

	minimum design levels and/or are at risk of losing service if the identified projects are not constructed in the event of design condition temperatures, -3°F (68 HDD). The estimated restoration cost (i.e., relight, plus claims) for these customers is $975K, based on $1,000/customer (See Appendix 2 for a detailed summary of the restoration costs).
2	Safety/Integrity – The program will install approximately 3,500 LF of main and abandon 1,300 LF of "leak-prone" pipe in the system. Based on these numbers, the replacement rate for this program is 37%. Based on the 2011/12 average replacement unit cost ($165/ft) in the Rhode Island territory, this is a potential cost savings of $215K to Asset Replacement.
3	Synergy Opportunities – Capital work is being coordinated with the following activities: - Integrity Main Replacement Program - Public Work Activities - Customer Driven Construction

1.15 Key Milestones:

Milestone	**Target Date: (Month/Year)**
Sanctioning Approval	3/2012
Begin construction	4/2012
Projects in Service	3/2013
Construction Complete	3/2013

1.16 Climate Change:

Are financial incentives (e.g. carbon credits) available?		☐ Yes	☒ No
Contribution to National Grid's 2050 80% emissions reduction target:	☐ Neutral	☒ Positive	☐ Negative
Impact on adaptability of network for future climate change:	☒ Neutral	☐ Positive	☐ Negative

1.17 List References:

1	U.S. Enterprise Wide 5-Year Distribution System Reinforcement & Reliability Plan (November, 2011)
2	U.S. Enterprise Wide Model Verification and Winter Performance Report

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	(June, 2011)

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2 Recommendations:

The US Sanctioning Committee (USSC) is invited to:

(a) APPROVE up to the investment of $1.98M and a tolerance of +/- 10%.

(b) NOTE that _____ is the Project Manager and has the approved financial delegation.

Signature..... Date 3/15/2012

Tim Small

VP Gas Systems Engineering

I hereby approve the recommendations made in this paper.

Signature..... Date 3/21/12

Christopher E. Root, Senior Vice President Network Strategy

3 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on March 14, 2012.

Signature..... Date 4/4/12

Lee S. Eckert

US Chief Financial Officer

Chairman, US Sanctioning Committee

4 Sanction Paper Detail

Title:	2012/2013 Rhode Island System Reinforcement Program	**Sanction Paper #:**	USSC-12-200
Project #:	CON032	**Sanction Type:**	Sanction
Operating Company:	Rhode Island Gas Company	**Date of Request:**	3/14/2012
Author:	Ramona Butler / John Stavrakas	**Sponsor:**	Tim Small – Gas Systems Engineering
Utility Service:	Gas		

4.1 Background

Each year Long Term Planning and Project Development performs a hydraulic analysis on the U.S. gas distribution network to determine the reinforcement projects, and associated costs, that need to be constructed over the following five (5) years to support the forecasted customer growth. Reinforcement projects are identified in order to maintain minimum design pressures throughout the distribution system under peak-hour conditions. These projects ensure that continuous service is maintained to all customers on the gas distribution network throughout the year in compliance with Federal and State Codes. The results of the analysis are documented in the US GDx 5-Year Reinforcement & Reliability Plan. The plan is issued each year because it must be adjusted for changes to the gas supply send-out forecast. These changes could include differences between actual load growth and estimated load growth, reinforcement project deferrals, public works activity, main replacement program activity, Sales and Program Operations supported growth reinforcements, and updates/improvements to the SynerGEE computer network analysis models. The plan described herein is year one (1) of the 5 year plan for Rhode Island covering the fiscal year 2012/13.

It should be noted that the SynerGEE computer models used for the hydraulic analysis of the distribution network are validated on an annual basis. Field data from one of the coldest days of the year along with the highest distribution send-out is collected from across the entire network. The computer model is configured to match the system load experienced on that day and calculated pressures are compared with field charts and SCADA data. Discrepancies are investigated to determine where the model might require an update and/or warrant a field investigation. Conditions such as broken valves and mains filled with debris identified through the investigation process are remediated. For the 2010 -11 verification period, there was excellent correlation on most pressure systems with

90.7% of the total system's points being within the acceptable model tolerance range. This shows that the model is reasonably accurate in predicting future problem areas. Further details and results of the analysis are contained in the US Enterprise Wide 2010-11 Winter Performance Report.

Long Term Planning and Project Development uses a combination of historic and current sales prospects data to allocate forecasted customer growth to the validated SynerGEE computer models. By better simulating where the customer growth is expected to occur, the overall accuracy of the reinforcement plan/program is improved. In general, Long Term Planning and Project Development looks at the geographical distribution of new customers added in recent years along with a component of new customer prospects to come up with the method of allocating the forecasted customer growth to the SynerGEE models. Once the SynerGEE computer models are loaded with the forecasted customer growth, specific distribution system reinforcement projects are identified that must be constructed in order to support the region's average annual system growth. The peak demand for a given territory is based on the same corporate forecast used to develop the gas supply portfolio, and the Planning Reinforcement program is a critical component to enable the gas supply to be delivered to the firm customer. Design weather conditions have been established for Rhode Island as -3°F (68 HDD).

The 5-year gas send out forecast for Rhode Island received from the forecasting group is as follows:

GAS SENDOUT (DT/DAY)**						
Current Yr 11/12	**Yr 1 12/13**	**Yr 2 13/14**	**Yr 3 14/15**	**Yr 4 15/16**	**Yr 5* 16/17**	**Total Growth**
319,649	329,375	326,398	325,349	330,600	329,254	**9,605**

* The forecast only extends to 15/16; the 16/17 growth is based on the average growth for the prior years.

** Firm utility customers only included in forecast, actual design day load also includes Firm Transportation customers which is approximately 20,574 dth of additional load.

The forecast used in the network analysis is the same gas supply plan forecast filed annually with the RI PUC (This forecast was last updated in December, 2011). This is to ensure that the models are built to the same forecast which gas supply uses to determine the capacity requirements from the pipelines. Planning works with Gas Supply to ensure that the supply nominated to the gates can be moved throughout the system.

It should be noted that National Grid contracted with ICF international to develop a twenty-five (25) year forecast for long term planning purposes. ICF is the same firm that developed the forecast for the NY State Energy Plan. One of the primary differences with ICF's forecast compared to the corporate forecast is that it provides a geographic analysis of system demand by locality. Once the ICF

forecast is received for Rhode Island, the reinforcement analysis will be reviewed to ensure that the proposed projects are supporting the forecasted growth in each locality

Examples of distribution system reinforcement projects include, but are not limited to, the following:

- Replace undersized mains with larger diameter mains
- Transfer existing LP customers to an adjacent HP main (i.e., load shedding)
- System pressure uprates
- Loop or connect system endpoints with new main to integrate distribution systems with the same MAOP.
- Install new district regulators and replace existing undersized district regulators
- Automate LP district regulator outlet pressure set points (e.g., time/temperature). Note that automation work performed for system reinforcement purposes is complementary to the overall system automation plan (reference the System Automation and Control sanctioning papers).

Reinforcement projects that ensure continuous service to customers in a cost efficient manner are identified and proposed for construction. Prospective projects are evaluated for additional system benefits and synergies with other proposed capital projects, which often has the added benefit to increase the overall system reliability and improve the network's operability. In addition, many of these projects create the opportunity to be combined with public works activities or replace/abandon aging infrastructure (e.g., "leak-prone" pipe), providing a benefit to the integrity program.

Current conditions on the Rhode Island gas distribution system require contingency operations in order to manage the system during periods of peak demand. These operations involve an adjustment of five (5) LP district regulator set-points above the standard 10 inches water column setting.

4.2 Drivers

The goal of the program is to maintain continuous service to all customers on the Rhode Island gas distribution network during periods of peak demand (i.e., design weather conditions). If the growth prediction rates are accurate, the results of the analysis (described above) performed on the gas distribution network for the 2012/13 winter using the current gas supply send-out forecast predicts that approximately 975 customers could experience pressures below minimum design

and could be at risk of losing service in the event of design conditions. The estimated restoration cost (i.e., relight, plus claims) for this number of customers is $975K, based on $1,000/customer (See Attachment A2 for a discussion of the $1,000/customer basis). The projects contained in this reinforcement program have been designed to address this issue. These projects are designed for aggregate growth of all new customers; they are not for any specific customer.

A secondary goal of the program is to eliminate "leak-prone" pipe whenever practicable. The program will install approximately 3,500 LF of main and facilitate the abandonment of approximately 1,300 LF of existing "leak-prone" pipe on the system. This represents a replacement rate of 37% for this program. Based on the 2011/12 average replacement unit cost ($165/ft) in the Rhode Island territory, this represents a potential savings of $215K to the Asset Replacement program.

4.3 Project Description

The reinforcement program includes the design, procurement, construction, testing and completion of capital projects. The program contains various types of projects designed to cost effectively reinforce areas of the gas distribution network that are predicted to experience pressures below minimum design levels (affecting 975 customers) due to the forecasted growth. A full list of the Gas Planning Reinforcement Program for Rhode Island projects is in Appendix 1. The projects, totaling $1.98M, are organized by the following work types:

- New Main – One (1) Project $1,500,000
  In most cases, new main projects are designed to bring pressures on systems above minimum design levels by connecting areas of systems with strong pressure to areas with weaker pressures. A total of 2,200 LF of new coated steel main will be installed under this project.

- Relay Main – Two (2) Projects $324,500
  Relay main projects are designed to bring pressures on systems above minimum design levels by replacing small diameter mains that often cause bottlenecks in the system, with larger diameter mains. Whenever practicable, "leak-prone" pipe is targeted for replacement. For this year, 1,300 feet of larger-diameter main will be installed and 1,300 feet of "leak-prone" pipe will be abandoned.

- Carryover Costs from Fiscal Year 2011/12 $100,000
  These costs are associated with projects that began construction during the 2011/12 fiscal year and have capital costs carried into the 2012/13 fiscal year. The primary driver for these carryover costs includes permanent restoration that cannot be completed during winter months and remaining service tie-overs. See Appendix A1 for a breakdown of these costs by project.

- Engineering Costs for Fiscal Year 2013/14 – $36,000
  These are costs associated with the design of complex projects that are planned for construction during 2013/14 by the Project Engineering Department. The Level 1 estimate was determined by Project Engineering and based on historical data.

Individual Projects Exceeding $1M

One (1) reinforcement project is estimated to cost more than $1M. Thus, additional information is provided below.

Middletown, RI – Install (99 psig) new coated steel main $1,500,000

This project will install approximately 2,200 feet of 12 inch (99 psig) coated steel main parallel to the existing 8 inch (99 psig) coated steel main in Green End Ave from Third Beach Ave to Trout Dr in Middletown, Rhode Island. This project is the second phase of a multi-phase project needed to support the load growth on Aquidneck Island instead of relying on the portable LNG facility at the Middletown Navy Base.

Several modifications have been made to the Aquidneck Island distribution system to reduce the company's dependency on LNG and to continue to deliver a reliable and safe gas supply to the customers (approximately 13,000) that reside there. In November of 2010, the amended contract with Spectra was executed that provided an additional 300 dth/hr of pipeline gas to the Portsmouth take station. However, the existing 8 inch coated steel main could not transport the additional pipeline gas needed to support the distribution system. Therefore, the first phase of the multi-phase project was installed in 2011 in parallel with the existing 8 inch (99 psig) main in Wapping Rd. Yet, since the installation of the pipeline project in Wapping Rd, the projected growth rate for the Island increased by 7% for the 2012 project year compared to the 2011 forecast projections for the same year. Additionally, the forecast provided by ICF shows that the Newport area accounts for nearly 50% of the load on the island and is expanding at a faster growth rate than Middletown and Portsmouth over the next 25 years. Without the reinforcement, 930 customers are at risk of experiencing pressures below minimum design standards during design day temperatures. If the company opts to do nothing, then portable LNG will have to be trucked onto Aquidneck Island in subsequent heating seasons.

4.4 Benefits Summary

This work will improve reliability to all downstream customers by removing the foreseen issues identified by the previously mentioned projects. Such as, the possible 975 customers at risk to experience pressures below the minimum design criteria for the upcoming heating season. Additionally, these projects assist the main replacement program in its efforts to eliminate "leak-prone" pipe from the distribution system. Specifically, these projects will abandon approximately 1,300 ft of the "leak prone" pipe, which is a potential savings of $215K to the Asset Replacement program (based on the 2011/12 average replacement unit cost of $165/ft in Rhode Island). Lastly, the projects identified for the Reinforcement program in this document will ensure that the company maintains its regulatory requirements for the distribution system performance (i.e., providing continuous gas service to customers by preventing the system pressures from dropping below minimum design criteria).

4.5 Business Issues

This program is a capital improvement program that supports customer growth and has to be sanctioned annually. This sanctioning document covers the 2012/13 projects which have been included in the 5 year budget plan. A five (5) year CapEx forecast has been provided for planning purposes. The program will be submitted for sanctioning on an annual basis. Reinforcements are included in the profitability analysis of the Rhode Island growth program and capital to GPM ratios.

4.6 Options Analysis

Recommended Option: Construct reinforcement projects
This option has the largest benefit because it improves the overall reliability of the gas distribution system by complying with regulatory requirements, reducing the company's reliance on portable LNG for vulnerable areas of the system, and abandoning "leak-prone" pipe. This option will also support the forecasted system growth anticipated for the Rhode Island jurisdiction.

Alternative 1: Do nothing
The consequence of not constructing the reinforcement projects is noncompliance of regulatory requirements (i.e., not providing adequate gas pressure/service throughout the distribution system) to existing customers. Specifically, 975 customers would be at risk of losing service. As a contingency, the Company would need to rely on portable LNG operations at the Portsmouth Navy Base during peak conditions or risk losing service to approximately 930 customers on Aquidneck Island. The estimated restoration cost (i.e., relight, plus claims) for the total 975 customers system wide is $975K, based on $1,000/customer. In addition, the existing infrastructure cannot support the

projected system growth and sales restrictions in pressure constrained areas will be required (i.e., pressures below standard minimum design).

4.7 Safety, Environmental and Project Planning Issues

There may be environmental permits required for some projects. It is not anticipated that there will be any planning or safety issues.

4.8 Execution Risk Appraisal

Number	Status (Active, Dormant, Retired)	Category	Detailed Description of Risk / Opportunity	Cause/Trigger	Probability	Impact		Score		Strategy	Risk Owner
						Cost	Schedule	Cost	Schedule		
1	Active	Construction	Will not have resources to complete the work	Large work plan, increased from previous year	3	3	3	9	9	Mitigate	Constrution
2	Active	Outage Planning and Availability	Customer outages resulting from improper main and/or regulator shutdowns required during construction.	Incorrect SOPs or failure to perform SOP properly	3	3	3	9	9	Mitigate	Gas Control/ Constrution/System Planning
3	Active	Permitting	Denial of permits (e.g., street opening) from jurisdictional authorities	Late permit submittals as well as delays in the start of projects into late Fall. Recently paved streets.	2	2	2	4	4	Accept	Enginnering / Construction

Construction risks will be mitigated by including the Construction and I&R departments in the design phase of the projects prior to the start of the construction to identify risks and risks response strategies. Additionally, the appropriate departments (i.e., Project Engineering and Design, Construction, I&R, and Operations Engineering) will provide field support during project construction to address all field /design changes that are necessary.

Outage risks will be mitigated by performing the project work during the spring, summer, and fall periods when the customer demand (i.e., gas usage) on the system is at its lowest. In addition, Long Term Planning and Project Development and Gas Control will assist by devising alternative system configurations to maintain system reliability.

Environmental risks will be mitigated through the involvement of parties in the initial design stages of the program projects

4.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
Street Opening	Certain	1 year	Not Applied	3/31/2012

4.10 Investment Recovery

The investment classification is Policy Driven

4.10.1 Investment Recovery and Regulatory Implications

This program supports forecasted customer growth across the U.S. distribution network.

*This project enables the Company to comply with required gas system regulations that pertain to maintaining sufficient pressure on the gas distribution network such that continuous service is provided to all customers. For example, 49 CFR 192.623 states that "*No person may operate a low pressure distribution system at a pressure lower than the minimum pressure at which the safe and continuing operation of any connected and properly adjusted low-pressure gas burning equipment can be assured."

4.10.2 Customer Impact

Minimal customer impact is expected during the construction of these projects; they are intended to ensure continuous service to customers.

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately $0.416 million. This is indicative only. The actual revenue requirement will differ depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

4.10.3 CIAC / Reimbursement

$M	CIAC/Reimbursement							
	Prior YR'S	Yr 1 11/12	Yr 2 12/13	Yr 3 13/14	Yr 4 14/15	Yr 5 15/16	Yr 6 16/17	*Total*
CIAC / Reimbursement								

4.11 Financial Impact to National Grid

4.11.1 Cost Summary Table

				Current Planning Horizon								
Project #	Project Description	Project Estimate level	$M	Prior YR Spending	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6 16/17	YR7+	Total
Project #	Description		Capex			1.980	0.437	0.359	0.200	0.100		3.076
			Opex									0.000
			Removal									0.000
			Total	0.000	0.000	1.980	0.437	0.359	0.200	0.100	0.000	3.076
Project #	Description											
			Capex									0.000
			Opex									0.000
			Removal									0.000
			Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Proposed Sanction												
			Capex	0.000	0.000	1.980	0.437	0.359	0.200	0.100	0.000	3.076
			Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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4.11.2 Project Budget Summary Table

Project Budget Summary Table

Project Costs per Business Plan	Prior Year Spending*	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6 16/17	YR 7	Total
Capex	0.000	0.000	2.000	0.437	0.359	0.200	0.100	0.000	3.096
Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Cost in B Plan	0.000	0.000	2.000	0.437	0.359	0.200	0.100	0.000	$3.096

* P/Y Actuals

Variance (Business Plan-Project Estimate)	Prior Year Spending	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6 16/17	YR 7	Total
Capex	0.000	0.000	0.040	0.000	0.000	0.000	0.000	0.000	0.040
Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Variance	0.000	0.000	0.040	0.000	0.000	0.000	0.000	0.000	$0.040

4.11.3 Cost Assumptions

The estimate was developed in 2011. The accuracy level of the estimate for the projects is Level 1. We are asking for a full sanction for these projects. Re-Sanctioning will be sought as/if required.. See Appendix 3 for estimate level guidelines.

4.11.4 Net Present Value / Cost Benefit Analysis (N/A)

4.11.5 Additional Impacts

None

4.12 Statements of Support

These departments have been consulted for the projects listed in this document: Project Engineering & Design and Project Management.

4.12.1 Supporters

Role	Name	Responsibilities
Sponsor/ Asset Manager/ Asset Owner/ Process Owner	J Stavrakas T Small	Endorses the project aligns with jurisdictional objectives
Investment Planning	Michelle Roche	Endorses the 5-year plan work
Resource Planning	Artie Georgacopoulos	Endorses Resources, Cost estimates, Schedule, and

		Portfolio alignment
Project Manager	Kevin King	Endorses Cost, Scope, Schedule, and Quality
Project Engineering & Design	Dave Iseler	Endorses Scope, Design, and Conformance with design standards
Gas Control	Tom Amerige	Endorses Scope and Need
Instrumentation & Regulation	John Barrett	Endorses Scope, Need, and Conformance with design standards

4.12.2 Reviewers

Reads paper for content / language. Recommends edits if necessary

Reviewer List	**Name**
Finance	Karen Hamel
Regulatory	Gideon Katsh
Procurement	John Kavanaugh
Jurisdictional Delegates	Laurie Brown

5 Appendices

5.1 Project Cost Breakdown

Project Cost Breakdown		
Cost Category	**Company Name ($ Amount)**	**Description of Cost Category**
Growth – Gas System Reinforcement	Rhode Island ($1.98M)	Reinforcement
Total:	$1.98M	

5.2 Other Appendices

US Sanction Paper

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Appendix 1: 2012-13 Reinforcement Projects

Project Year	Work Type	Town	Project Description	Length	Size	Material	MAOP	Budget Loaded Cost Estimate	Reason for Project
2012	Carryover	Various	2011 Project Carryover Costs					$20,000	
2012	Unknown	Unknown	2011-12 Winter Operations Related Projects					$100,000	Address system problems discovered during cold weather.
2012	New Main	Middletown	Install 2,200' of 12" CS (99 psig) parallel main in Green End Av from Third Beach Av to Trout Dr. Test for possible future MAOP of 200 psig.	2,200	12	CS	99	$1,500,000	Project is necessary to maintain adequate minimum system pressures during periods of peak demand
2012	Relay Main	Cranston	Relay existing 4" CI main on Oakland Ave between Pontiac Ave and Spring St	680	6	PL	LP	$170,000	Project is necessary to maintain adequate minimum system pressures during periods of peak demand
2012	Relay Main	Cranston	Relay existing 4"CI main on Chestnut Ave between Pontiac Ave and Spring St	618	6	PL	LP	$154,500	Project is necessary to maintain adequate minimum system pressures during periods of peak demand
2012	Engineering	various	Engineering costs for 2013/14 projects					$36,000	Engineering design for 2013 projects

Appendix 2: Outage Restoration Costs

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Estimates for relighting customers and recovering from a system outage have been prepared to quantify the impact of outages related to insufficient system capacity during periods of peak demand and severe winter cold.

Actual relight costs have been captured from recent incidents to quantify company expenses related to restoring service. These were all related to outages that occurred for reasons other than insufficient system capacity and operations were conducted under benign weather conditions. It is likely that during severe winter weather, costs would increase.

Claims related to frozen buildings, burst pipes and equipment damage due to a lack of heat during severe cold weather were captured from the only incident in recent times the company experienced – e.g. the outage in Hull, Ma during the peak day of January 16th, 2004.

Relight Costs

Tiverton (2008): 900 customers out and relight costs of $299,692 for an average relight cost of $322.99 per customer.

Cutchogue (2003): 1,800 customers out and relight costs of $2,367,401 with an average relight cost of $1,315.22

Glen Cove (2008): 1,016 customers out and relight cots of $275,000 for an average relight cost of $270.67 per customer

Average cost to relight for combined instances above equals $792 per customer

Claims

Hull (2004): 297 customers affected with claims totaling $206,336 for an average claim of $694.73 per customer

Combined cost of relight and claims

The combined cost of relighting customers and resolving claims averages out to $1,486 per customer.

Recognizing the amount of variability in different incidents such as weather conditions, different types of neighborhoods, variable labor costs, economies of scale, etc., for purposes of evaluating the benefits of reinforcement projects, an average value of service restoration costs and claims of $1,000 per customer is used.

Appendix3: Complex Project Estimating Levels

Estimate Level	Definition	Performed By (as appropriate)	Cost Estimate Basis	Applicability
Level I • **Strategy** • **Analysis** • **Decision**	A strategy is developed to meet future system needs by the project sponsor. Analysis of alternatives ultimately leads to a decision to execute a project. The sponsor develops a scope document meeting their requirements and collaboratively seeks to satisfy the requirements of other stakeholders in the project. Project objectives are stated in the document and a preliminary investigation has shown that the project is feasible. The project objectives are well defined but key components of the design and construction are not clearly defined since no detailed design has been done. Stakeholders will include but are not be limited to Network Strategy, Project Management (PM Projects), Construction Instrumentation & Regulation and Field Operations.	Integrity, Reliability Planning, Sales, Production, PED, PM (for PM projects)	Conceptual Based on historical information such as unit cost or a similar project. Estimate accuracy +/- 50%.	Level I estimates may typically be found in 5 year plans
Level II • **30% Design**	A level II estimate meets the requirements of the stakeholders. Most permit requirements have been identified and costs associated with materials are being refined. Some but not all constructability issues have been identified. Test holes have been used, where necessary, to determine field conditions.	PE&D, CDC (Growth Projects), Construction, PM for PM Projects	Based on 30% Design Estimate accuracy +/- 25%.	Level II estimates may typically be available for projects occurring in 2 to 3 years.
Level III • **100% Design**	A level III estimate includes all materials, expected permit costs, and costs associated with field conditions. The job site specific conditions have been identified utilizing mapping, survey, and combined with the previously obtained test hole information. Permit applications for sanctioned projects are submitted for long lead permits. Requests for long lead permits for projects that do not require sanctioning will be submitted. Applications for easements/ right of ways are submitted.	PE&D, CDC (Growth Projects), Construction, PM for PM Projects	Based on 100% Design Estimate accuracy +/- 15%.	Level III estimates may typically be available for projects scheduled for construction in 1 to 2 years.
Level IV • **Projection to Build**	At this level Engineering is 100% complete. Resources have been identified to construct the project. Estimates/bids from in-house Construction, contractors and other in-house implementing groups based on identified/observed field conditions, permit stipulations, etc. are in hand. The costs of special items such as easements, permits, etc. are known. The compilation of these estimates/bids will become the basis for the Projected Spend for the project.	PM (when managed by PM), Process Owner, PE&D, I&R, Production and Construction	100% Design plus bids, permit fees Estimate accuracy +/- 10%.	Level IV (Includes proposed start date)

5.3 NPV Summary (if applicable)

5.4 Customer Outreach Plan (if applicable)

USSC Closure Paper

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Title:	Rhode Island 2012/2013 System Reinforcement Program	**Sanction Paper #:**	USSC-12-100C
Project #:	CON032, CON036	**Sanction Type:**	Closure
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	3/30/ 2017
Author:	Eric Aprigliano/Adnan Malik	**Sponsor:**	John S. Stavrakas – VP Gas Asset Management
Utility Service:	Gas	**Project Manager:**	Fortier, Joseph Jr.

1 *Executive Summary*

This paper is presented to close CON032 and CON036. The total spend was $0.242M. The sanctioned amount for this project was $1.980M.

The final spend amount is $0.242M broken down into:
0.242M Capex
0.000M Opex
0.000M Removal

2 *Project Summary*

The Planning Reinforcement program contained projects that ensured minimum system design pressures are maintained throughout the gas distribution system during periods of peak demand to allow continuous service to every customer. Federal Code 49 CFR 192.632 requires minimum pressures to be maintained in the gas system. The peak demand for each territory is based on the same corporate forecast used to develop the gas supply portfolio, and the System Reinforcement program was a critical component to enable the gas to be delivered to the customer. If the System Reinforcement program was no constructed, approximately 975 customers would be expected to see delivery pressures below minimum design levels and be at risk of losing service during periods of peak demands.

Examples of System Reinforcement projects include, but are not limited to:

- Replace existing undersized mains with larger diameter mains. "Leak-prone" pipe is targeted whenever practical.
- Loop or connect system endpoints with new main to integrate distribution systems with the same MAOP.
- System Pressure Uprates (e.g. 45psig to 60psig).

- Install new district regulators, replace and/or rebuild existing undersized district regulators.
- Automate Low Pressure (LP) district regulator outlet pressure set points (e.g., time/temperature). Note that automation work performed for system reinforcement purposes is complementary to the overall system automation plan (reference the System Automation and Control sanctioning papers).
- Transfer existing LP customers to an adjacent High Pressure (HP) main (i.e., load shedding).

There are four (6) projects and miscellaneous budgetary placeholders identified in Appendix 1, which are estimated to cost a total of $1.980M.

3 *Over / Under Expenditure Analysis*

3.1 Summary Table

Actual Spending ($M)			
Project #	**Description**		**Total Spend**
CON032	Rhode Island 2012/2013 System Reinforcement Program	Capex	0.000
		Opex	0.000
		Removal	0.000
		Total	0.000
CON036	Rhode Island 2012/2013 System Reinforcement Program	Capex	0.242
		Opex	0.000
		Removal	0.000
		Total	0.242
Total		Capex	0.242
		Opex	0.000
		Removal	0.000
		Total	0.242

Project Sanction Summary Table			
Project Sanction Approval ($M)			**Total Spend**
		Capex	1.980
		Opex	0.000
		Removal	0.000
		Total Cost	1.980
Sanction Variance ($M)			**Total Spend**
		Capex	1.738
		Opex	0.000
		Removal	0.000
		Total Variance	1.738

3.2 Analysis

The Rhode Island 2012/2013 System Reinforcement Program is 88% under plan. There are multiple contributing factors to the underruns. Resource limitations contributed to the under spend. In addition, cycle time of obtaining permits and long lead materials delayed work. There were challenges with estimates on larger projects within the program. Timing of restoration scheduling due to colder weather continues to effect progress of work.

4 Improvements / Lessons Learned/Root Cause

- Improve development of estimating practices.
- Work with Finance and Resource Planning to create better financial metrics.
- Create Long Term resource requirements for future Capital planning.
- Identify carryover or deferred projects in a timely fashion.

5 Closeout Activities

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	◉ Yes ○ No
All relevant costs have been charged to project	◉ Yes ○ No
All work orders and funding projects have been closed (1)	○ Yes ◉ No
All unused materials have been returned	◉ Yes ○ No
All as-builts have been completed (2)	◉ Yes ○ No
All lessons learned have been entered appropriately into the lesson learned database (3)	○ Yes ◉ No

(1) All work orders and funding projects have been closed
Program/Blanket projects may contain work orders and or funding projects which have not yet been closed for reasons including but not limited to:

- the same work order(s) are used annually. They will remain open until Asset Management and/or Resource Planning have determined work orders are no longer needed .
- construction may cross multiple fiscal years
- the work order closing process is within the late charge waiting period
- other accounting processes or final system closing activities have not yet completed

The Program/Blanket projects are approved annually for the current year expected spend and remain open until Asset Management and/or Resource Planning have determined the project is no longer required.

(2) All as-builts have been completed

Program/Blanket projects may contain work orders for which no as-builts have yet been recorded for reasons including but not limited to:

- design and/or construction have not yet completed
- construction may cross multiple fiscal years
- work has completed recently and as-builts have not yet been processed into the system
- does not apply. Work order(s) are not linked to work management systems. (example: Meter Purchases, Meter Changes, AMR Installations Purchase Misc Capital Tools/Equipment, etc.)
- does not apply to Information systems projects.

(3) All lessons learned have been entered appropriately into the lesson learned database

Program/Blanket projects usually contain short cycle work which the Company has been performing over several fiscal years. No new Lessons Learned which have not already been identified and recorded within section 4.

6 Statements of Support

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planner	Pensabene, Patrick M.	Endorses relative to 5-year business plan or emergent work

Resource Planning	Falls, Jonathon	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Project Management	Fortier, Joseph Jr.	Endorses Resources, cost estimate, schedule
Gas Project Estimation	Paul, Art	Endorses Cost Estimate

6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Easterly, Patricia
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Currie, John
Procurement	Curran, Art
Control Center	Loiacono, Paul

USSC Closure Paper

nationalgrid

7 ***Decisions***

I approve this paper.

Signature Ross W. Turrini Date April 27, 2017

Executive Sponsor – Ross Turrini, Senior Vice President, Gas Process & Engineering and Chief Gas Engineer

US Sanction Paper

nationalgrid

Title:	City/State Construction Program for Narragansett Electric Company, RI Company 49 (Public Works Process)	**Sanction Paper #:**	USSC-12-103
Project #:	CON 060, 066	**Sanction Type:**	Sanction
Operating Company:	Narragansett Electric Company, RI Company 49	**Date of Request:**	March 14, 2012
Author:	Thomas Mulkeen, Thomas Gavula	**Sponsor:**	John Flint, VP New England Gas
Utility Service:	Gas		

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests sanction of the FY 2012/2013 City/State Construction Program for the Narragansett Electric Company in the amount of **$3.06 M** and a tolerance of **+/- 10%** for the purpose of completing the program. The estimated miles main replacement quantity is 17,182 liner feet (3.25 miles) at a cost of $178/LF.

This sanction amount of $3.06 M for the FY 2012/2013 program can be broken down into:

Public Works Reimbursable (CAPEX)	$ 1,275,000
Public Works Non Reimbursable (CAPEX)	$ 1,785,000
OPEX	$ 0
Removals	$ 0
Reimbursements	$ 1,275,000

1.2 Brief Description:

The City/State Construction (CSC) Program for the Narragansett Electric Company consists of work driven by the Narragansett Bay Commission (NBC), Rhode Island DOT (RIDOT) and the numerous municipalities that National Grid serves, as well as, various third party private entities within the Narragansett Electric Company. The CSC budget is

subdivided into three components: Reimbursable, Non-Reimbursable, and Reimbursements. Projects are categorized into these buckets based on the project funding source. Capital projects initiated by the RIDOT are normally 100% reimbursable. Capital projects initiated by NBC are typically reimbursable to some degree depending on criteria.

1.3 Summary of Projects:

Project Number	Project Title	Estimate Amount ($)
	Total	**$0 M**

1.4 Associated Projects:

Project Number	Project Title	Company	Estimate Amount ($)
CON 060, 066	City/State Construction Program for the Narragansett Electric Company, RI Company 49	Narragansett Electric Company RI, Company 49	$3.06
		Total	**$3.06**

1.5 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
N/A	N/A	N/A	N/A	N/A

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
June 2013	Closure Report - FY 12/13 City/State Construction Program for Boston Gas Company (01), Colonial Gas Company (03/04), Narragansett Electric Company (49) and Energy North Gas Company (06).

US Sanction Paper

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1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
☒ Mandatory ☐ Policy-Driven ☐ Justified NPV	National Grid is required to relocate its facilities within the project limits that are in direct interference of the proposed construction and installation of new infrastructure facilities. National Grid is also required to follow the Regulatory Authority (Damage Prevention Procedure No. 25), which is mandated.

1.8 Asset Management Risk Score

Asset Management Risk Score: **49 – Public Works**

Primary Risk Score Driver: (Policy Driven Projects Only)

☐ Reliability ☐ Environment ☐ Health & Safety

1.9 Complexity Level: (if applicable)

☐ High Complexity ☐ Medium Complexity ☐ Low Complexity

Complexity Score: **N/A**

1.10 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
CSC Construction Program, Narragansett Electric Company, RI Company 49, April 1, 2012–March 31, 2013	☒ Yes ☐ No	☐ Over ☐ Under	$0

US Sanction Paper

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	☐ Yes	☐ No	☐ Over ☐ Under	

1.11 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

1.12 Current Planning Horizon:

Company Name	Current planning horizon							
$M	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 +	*Total*
Proposed Capex Investment		3.060						3.060
Proposed Opex Investment								0.000
Proposed Removal Investment								0.000
CIAC / Reimbursement								0.000
Total	$0.000	$3.060	$0.000	$0.000	$0.000	$0.000	$0.000	$3.060

1.13 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☒ Internal	☐ Contractor	
Construction/Implementation Resources to be provided	☐ Internal	☒ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	☐ Red	☐ Amber	☒ Green
Availability of external resources to deliver project:	☐ Red	☐ Amber	☒ Green
Operational Impact			
Outage impact on network system:	☐ Red	☐ Amber	☒ Green
Procurement impact on network system:	☐ Red	☐ Amber	☒ Green

US Sanction Paper

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1.14 Key Issues (include mitigation of Red or Amber Resources):

1	Existing National Grid network is in direct interference with proposed utility infrastructure or is encroached and is required to be relocated per the Regulatory Authority (Damage Prevention Procedure No. 25).
2	Projected reimbursements of $1,275,000 from a number of Reimbursable Agreements.
3	$1.78M CSC RI main replacement is contributory to the annual ISR Program.
4	Synergistic opportunities are realized through the integration with other operational program work including but not limited to: Main & Service Replacement, Sales Fulfillment, and Long Term Planning.
5	Regulatory Commitments: RI rate settlement agreement, and State and Federal Codes.
6	Effective communication achieved through municipal Government Liaisons to promote National Grid's interests with key stakeholders such as local community boards, city and state agencies, and third party utilities.
7	Program to be sanctioned by National Grid US Sanctioning Committee on an annual basis. Approval of individual projects will adhere to Corporate Sanction/DOA guidelines.
8	The Narragansett Electric Company spend is dependent upon planned State and municipal funding and schedules. Although the anticipated spend is likely, the State and municipalities may change and/or add infrastructure work scopes to accommodate last minute additional spending resulting in unplanned gas relocation work. Additionally, reimbursements during the year may increase/decrease due to timing of projects.

1.15 Key Milestones:

Milestone	**Target Date: (Month/Year)**
Sanction Approval	March 2012
Completion	March 31, 2013
Closure Report	June 2013

US Sanction Paper

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1.16 Climate Change:

Are financial incentives (e.g. carbon credits) available?		☒ Yes	☐ No
Contribution to National Grid's 2050 80% emissions reduction target:	☐ Neutral	☒ Positive	☐ Negative
Impact on adaptability of network for future climate change:	☐ Neutral	☒ Positive	☐ Negative

1.17 List References:

1	N/A
2	
3	

US Sanction Paper

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2 *Recommendations:*

The **Sanctioning Authority** i.e. USSC is invited to:

(a) APPROVE the investment of **$3.06 M** and a tolerance of **+/- 10 %**

(b) NOTE that City/State Construction Narragansett Electric Company is the Project Manager and has the approved financial delegation.

Signature..... Date...3/27/12.

John Flint

Vice President New England Gas

I hereby approve the recommendations made in this paper.

Signature.....Date...4/2/12

Christopher E. Root

Senior Vice President Network Strategy

3 *Decisions*

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on March 14, 2012.

Signature.....Date...4/10/12

Lee S. Eckert

US Chief Financial Officer

Chairman, US Sanctioning Committee

US Sanction Paper

nationalgrid

4 Sanction Paper Detail

Title:	City/State Construction Program for Narragansett Electric Company, RI Company 49 (Public Works Process)	**Sanction Paper #:**	USSC-12-103
Project #:	CON 060, 066	**Date of Request:**	March 14, 2012
Company Name:	Narragansett Electric Company, RI Company 49	**Sponsor:**	John Flint, VP New England Gas
		Author:	Thomas Mulkeen Thomas Gavula

4.1 Background

The City/State Construction (CSC) Program for the Narragansett Electric Company consists of work driven by the Narragansett Bay Commission (NBC), Rhode Island DOT (RIDOT) and the numerous municipalities that National Grid serves, as well as, various third party private entities within the Narragansett Electric Company. The CSC budget is subdivided into three components: Reimbursable, Non-Reimbursable, and Reimbursements. Projects are categorized into these buckets based on the project funding source. Capital projects initiated by the RIDOT are normally 100% reimbursable. Capital projects initiated by NBC are typically reimbursable to some degree depending on criteria.

The estimated quantity for main replacement is 17,182 liner feet (3.25 miles). Approximately 80% of the CSC Main Relays for the Narragansett Electric Company Territories will contribute ~13,746 linear feet (2.6 miles) of Leak Prone Pipe (LPP) retirement. This program allows National Grid to replace approximately 52.6 miles of LPP annually.

4.2 Drivers

National Grid is obligated to relocate its facilities in advance of municipal construction to avoid direct interferences or encroachments within project scope limits.

4.3 Project Description

Public Works Reimbursable (CAPEX)	$ 1,785,000
Public Works Non Reimbursable (CAPEX)	$ 1,275,000
OPEX	$ 0
Removals	$ 0
Reimbursements	$ 1,275,000

The above data is based on historical information and current schedule of municipal work.

4.4 Benefits Summary

- ~$1.78M of CSC RI main replacement is eligible for the ISR Program.
- Synergies are realized through the integration with other Operational Program Work.
- Includes ~13,746 linear feet (2.6 miles) of LPP retirements.
- Community relations benefits from coordinating with State and Municipal public works activities.

4.5 Business Issues

This proposed investment is within the approved capital plan. Narragansett Electric Company rate agreement allows for remuneration of $1.78M of the program costs. Capital projects initiated by the RIDOT are normally 100% reimbursable. Capital projects initiated by NBC are typically reimbursable to some degree depending on criteria.

4.6 Options Analysis

Recommended Option:

Approve the requested investment such that National Grid shall replace/relocate gas mains and services to accommodate State and Municipal capital infrastructure improvements and shall focus on elimination of leak prone pipe (LPP) in conjunction with public works activities. National Grid's Government Liaisons will work closely with State and Municipalities and Construction Engineers and consultants to minimize, to the maximum extent possible, any direct conflicts to the existing gas non-LPP infrastructure located in the Narragansett Electric Company Territory.

Alternative 1: *NONE*

4.7 Safety, Environmental and Project Planning Issues

In most cases, National Grid construction needs to be completed prior to the start of work by the municipalities.

Replacement of the existing cast iron gas main will be performed in accordance with company standards and procedures.

National Grid Environmental and Safety personnel will be included on the project team to address issues related to the replacement and abandonment of existing cast iron gas pipes. All company standards and procedures related to safety and environmental issues will be followed throughout construction.

4.8 Execution Risk Appraisal

Number	Status (Active, Dormant, Retired)	Category	Detailed Description of Risk / Opportunity	Cause/Trigger	Probability	Impact		Score		Strategy	Risk Owner
						Cost	Schedule	Cost	Schedule		
1	Active	Management and Funding	National Grid relocation requirements are driven by the annual Municipal Capital Plan.	Municpal capital Plans flucuates as per financial conditions	3	3	3	9	9	Mitigate	NE CSC
2	Active	Permitting	Traffic Stips	Various Traffic Departments	2	2	2	4	4	Accept	NE CSC
								-	-		
								-	-		
								-	-		

4.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
Various Street opening permit	Certain	Varies – (1 week -3 months)	In Progress	Ongoing

4.10 Investment Recovery

4.10.1 Investment Recovery and Regulatory Implications

Approximately $1.78M of the funds is eligible for recovery through the 2012 ISR program.

4.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately $642,600. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

4.10.3 CIAC / Reimbursement

US Sanction Paper

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$M	CIAC/Reimbursement							
	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 17/18	*Total*
CIAC / Reimbursement		$1.27						$1.27

4.11 Financial Impact to National Grid

4.11.1 Cost Summary Table

				Current Planning Horizon									
Project #	Project Description	Project Estimate level	$M	Prior YR Spending	YR 1 12/13	YR 2	13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR7+	Total
Project #	Description		Capex		3.060								3.060
			Opex										0.000
			Removal										0.000
			Total	0.000	3.060	0.000		0.000	0.000	0.000	0.000	0.000	3.060
Project #	Description												
			Capex										0.000
			Opex										0.000
			Removal										0.000
			Total	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000
Total Proposed Sanction													
			Capex	0.000	3.060	0.000		0.000	0.000	0.000	0.000	0.000	3.060
			Opex	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000

4.11.2 Project Budget Summary Table

Project Budget Summary Table

Project Costs per Business Plan		Prior Year Spending*	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR 7	Total
	Capex	0.000	3.060	0.000	0.000	0.000	0.000	0.000	0.000	3.060
	Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total Cost in B Plan	0.000	3.060	0.000	0.000	0.000	0.000	0.000	0.000	$3.060

* P/Y Actuals

Variance (Business Plan-Project Estimate)		Prior Year Spending	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR 7	Total
	Capex	0.000	3.060	0.000	0.000	0.000	0.000	0.000	0.000	3.060
	Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total Variance	0.000	3.060	0.000	0.000	0.000	0.000	0.000	0.000	$3.060

4.11.3 Cost Assumptions

The cost estimate is based on the following assumptions:

- Materials will be readily available for on time delivery without the need for special order equipment
- Construction schedule allows for five day work weeks, and does not include weekend or night shifts

Paving in accordance with National Grid standards.

4.11.4 Net Present Value / Cost Benefit Analysis

Not Applicable

4.11.5 Additional Impacts

None

4.12

4.13 Statements of Support

After review it was determined by NE Project Engineering & Design and City/State Construction NE that action by National Grid is mandatory based on the projected scope of work by the municipalities and as stipulated by the Regulatory Authority (Damage Prevention Procedure No. 25).

NE Project Engineering & Design and City/State Construction and the Public Works Process Team agree with this recommendation.

4.13.1 Supporters

Role	Name	Responsibilities
Sponsor/ Asset Manager/ Asset Owner/ Process Owner	Walter Fromm	Endorses the project aligns with jurisdictional objectives
Construction	Gerard Lundquist	Constructability & Schedule
Project Engineering	Tom Gavula	Design & System Reliability
Investment Planning	Michelle Roche	Endorses Emergent Work
Resource Planning	Thomas Bennett	Endorses Resources

4.13.2 Reviewers

Reads paper for content / language. Recommends edits if necessary

Reviewer List	Name
Finance	Karen Hamel
Regulatory	Gideon Katsh
Procurement	John Kavanaugh
Jurisdictional Delegates	Walter Fromm

5 Appendices

5.1 Project Cost Breakdown

CSC Reimbursable - $1.27M
CSC Non-Reimbursable - $1.78M
CSC Reimbursements ~$1.27M

5.2 Other Appendices

Damage Prevention Procedure No. 25. – On File
National Grid Design Plan - On File
RI ISR Program - On File
Public Works Design Philosophy – On File
Various Reimbursement Agreements – On File

5.3 NPV Summary (if applicable)

Not Applicable

5.4 Customer Outreach Plan (if applicable)

Not Applicable

USSC Closure Paper

nationalgrid

Title:	City/State Construction Program for Narragansett Electric Company, RI Company 49 (Public Works Process)	**Sanction Paper #:**	USSC-12-103C
Project #:	Various – (See Appendix)	**Sanction Type:**	Closure
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	March 30, 2017
Author:	Mike Zerella/Joe Santaro	**Sponsor:**	Thomas Bennett VP Gas System Engineering
Utility Service:	Gas	**Project Manager:**	Fortier, Joseph Jr.

1 *Executive Summary*

This paper is presented to close various projects – (See Appendix). The total spend was $4.783M. The sanctioned amount for this project was $3.060M.

The final spend amount is $4.783M broken down into:

2.362M Capex
0.000M Opex
2.421M Removal
With a CIAC/Reimbursement of $0.950M

2 *Project Summary*

The City/State Construction (CSC) Program for the Narragansett Electric Company consisted of work driven by the Narragansett Bay Commission (NBC), Rhode Island DOT (RIDOT) and the numerous municipalities that National Grid serves, as well as various third party private entities within the Narragansett Electric Company. The CSC budget was subdivided into three components: Reimbursable, Non-Reimbursable, and Reimbursements. Projects were categorized into these buckets based on the project funding source. Capital Projects initiated by the RIDOT are normally 100% reimbursable. Capital projects initiated by NBC are typically reimbursable to some degree depending on criteria.

3 *Over / Under Expenditure Analysis*

3.1 *Summary Table*

Actual Spending ($M)			
Project #	**Description**		**Total Spend**
Various (See Appendix)	FY13 City/State Construction Program for Narragansett Electric Company, RI (Public Works Process)	**Capex**	2.362
		Opex	
		Removal	2.421
		Total	4.783
Total		**Capex**	2.362
		Opex	0.000
		Removal	2.421
		Total	4.783

Project Sanction Summary Table			
Project Sanction Approval ($M)			**Total Spend**
		Capex	3.060
		Opex	0.000
		Removal	0.000
		Total Cost	3.060
Sanction Variance ($M)			**Total Spend**
		Capex	0.698
		Opex	0.000
		Removal	(2.421)
		Total Variance	(1.723)

3.2 Analysis

The City/State Construction Program for Narragansett Electric Company, RI Company 49 (Public Works Process) is 56% over plan. Multiple unforeseen influences caused an increase in the overall spend of this project. Government municipalities amended the overall scope of their public improvement project, resulting in additional gas interferences, requiring the scope of gas relocation work to increase. In addition, inclement weather and resource allocation challenges required additional weekend and overtime work.

4 Improvements / Lessons Learned/Root Cause

- Improve development of estimating practices.
- Work with Finance and Resource Planning to create better financial metrics.
- Create Long Term resource requirements for future Capital planning.
- Identify carryover or deferred projects in a timely fashion.

5 Closeout Activities

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	(•) Yes ( ) No
All relevant costs have been charged to project	(•) Yes ( ) No
All work orders and funding projects have been closed (1)	( ) Yes (•) No
All unused materials have been returned	(•) Yes ( ) No
All as-builts have been completed (2)	( ) Yes (•) No
All lessons learned have been entered appropriately into the lesson learned database (3)	( ) Yes (•) No

(1) All work orders and funding projects have been closed
Program/Blanket projects may contain work orders and or funding projects which have not yet been closed for reasons including but not limited to:

- the same work order(s) are used annually. They will remain open until Asset Management and/or Resource Planning have determined work orders are no longer needed .
- construction may cross multiple fiscal years
- the work order closing process is within the late charge waiting period
- other accounting processes or final system closing activities have not yet completed

The Program/Blanket projects are approved annually for the current year expected spend and remain open until Asset Management and/or Resource Planning have determined the project is no longer required.

(2) All as-builts have been completed

Program/Blanket projects may contain work orders for which no as-builts have yet been recorded for reasons including but not limited to:

- design and/or construction have not yet completed
- construction may cross multiple fiscal years
- work has completed recently and as-builts have not yet been processed into the system
- does not apply. Work order(s) are not linked to work management systems. (example: Meter Purchases, Meter Changes, AMR Installations Purchase Misc Capital Tools/Equipment, etc.)
- does not apply to Information systems projects.

(3) All lessons learned have been entered appropriately into the lesson learned database

Program/Blanket projects usually contain short cycle work which the Company has been performing over several fiscal years. No new Lessons Learned which have not already been identified and recorded within section 4.

6 Statements of Support

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planner	Pensabene, Patrick M.	Endorses relative to 5-year business plan or emergent work
Resource Planning	Falls, Jonathon	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Project Management	Fortier, Joseph Jr.	Endorses Resources, cost estimate, schedule
Gas Project Estimation	Paul, Art	Endorses Cost Estimate

6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Easterly, Patricia
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Currie, John
Procurement	Curran, Art
Control Center	Loiacono, Paul

USSC Closure Paper

nationalgrid

7 ***Decisions***

I approve this paper.

Signature Ross W. Turrini Date April 27, 2017

Executive Sponsor – Ross Turrini, Senior Vice President, Gas Process & Engineering and Chief Gas Engineer

8 *Appendix*

Sanction #	Paper Name	Project	CAP	COR	Grand Total
USSC-12-103	FY13 City/State Construction Program for Narragansett Electric Company, RI (Public Works Process)	C015526	$ 4,197	$ 11,224	$ 15,421
		C017035	$ 9		$ 9
		C017142	$ 251		$ 251
		C033051	$ 50,505	$ 53,914	$ 104,420
		C037342	$ 1,375	$ 1,340	$ 2,715
		C039553	$ 2,284		$ 2,284
		C039844	$ (96)		$ (96)
		C039946	$ 7,343		$ 7,343
		C041683	$ 14,226	$ 3,681	$ 17,907
		C042434	$ (14,786)	$ (1,686)	$ (16,472)
		C042863	$ 1,596	$ 1,398	$ 2,993
		C042904	$ 853		$ 853
		C043243	$ 1,129		$ 1,129
		C043465	$ 854		$ 854
		C043875	$ 276,922	$ 88,511	$ 365,433
		C044157	$ 33,445		$ 33,445
		C044214	$ 380,336	$ 100,677	$ 481,012
		C044593	$ 57,434	$ 42,477	$ 99,911
		C044658	$ 12,087		$ 12,087
		C044752	$ 2,359		$ 2,359
		C045095	$ 7,753	$ 2,763	$ 10,517
		C045358	$ 10,239		$ 10,239
		C047830	$ 1,834	$ 1,717	$ 3,550
		C047935	$ 732		$ 732
		C048242	$ 6,450	$ 3,034	$ 9,483
		C048398	$ 129		$ 129
		C16926	$ 39,943	$ 1,058	$ 41,001
		C16944	$ -		$ -
		C16946	$ -		$ -
		C16970	$ 1,835	$ (1,590)	$ 245
		C17038	$ 28		$ 28
		C18250	$ (45,677)	$ 45,677	$ -
		C31771	$ (244,432)		$ (244,432)
		C33051	$ 96,940	$ 6,154	$ 103,095
		C37062	$ 937		$ 937
		C37145	$ 11,087		$ 11,087
		C37342	$ 85,740		$ 85,740
		C37407		$ 370	$ 370
		C37442	$ 219,293	$ 3,617	$ 222,910
		C39943	$ 53,904	$ 1,450	$ 55,354
		C39944	$ 96		$ 96
		C39945	$ 21,485		$ 21,485
		C39946	$ 7,238		$ 7,238
		C40543	$ 1,443		$ 1,443
		C40803	$ 1,797		$ 1,797
		C41204	$ 1,892		$ 1,892
		C42484	$ 97	$ 150	$ 247
		C42544	$ 1,634		$ 1,634
		C42571	$ 73,070		$ 73,070
		C42863	$ 4,639		$ 4,639
		C42868	$ 8,931		$ 8,931
		C43243	$ 69,187	$ 5,273	$ 74,460
		C43365	$ 2,646		$ 2,646
		C43465	$ 795		$ 795

USSC Closure Paper

nationalgrid

Summary #	Project Name	Project	CAP	COR	Grand Total
		GM3575	$ 41,618		$ 41,618
		GM3825	$ 125,539		$ 125,539
		GM4257	$ 41,727	$ 566	$ 42,293
		GM4234	$ 60,426		$ 60,426
		GM4752	$ 854		$ 854
		CDPR0260	$ 79,354	$ 25,356	$ 104,551
		CDPR0266	$ 83,499	$ 24,157	$ 107,656
		CDPR0284	$ 29		$ 29
		CDPR0260	$ 327,534	$ 1,930,265	$ 2,257,799
		CDPR0266	$ 243,080	$ 6,606	$ 249,686
		CRCE306	$ 19,279	$ 21,615	$ 40,895
		CRCE308	$ 7,833	$ 21,847	$ 29,679
		CRCE311	$ 57,775	$ 18,930	$ 76,704
USSC-12-103 Total			$ 2,362,427	$ 2,420,589	$ 4,783,016
USSC-12-103 CIAC			$ (899,879)	$ (50,342)	$ (950,219)

US Sanction Paper

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Title:	Rhode Island Main Replacement Program	**Sanction Paper #:**	USSC-12-168
Project #:	CON034	**Sanction Type:**	Sanction
Operating Company:	Narragansett Electric Company	**Date of Request:**	April 25, 2012
Authors:	Walter Fromm, Laeyeng Hunt, Tom Finneral, Saadat Khan and Artie Georgacopoulos	**Sponsor:**	Tim Small - Gas Systems Engineering
Utility Service:	Gas		

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests sanction of the FY2013 Gas Distribution Proactive Main Replacement Program in the amount of $33.362M, with a tolerance of +/- ten percent (10%), for the purpose of replacing fifty (50) miles of leak prone gas mains (and associated services) in the Rhode Island service territory.

This sanction amount of $33.362M is broken down into:

- $30.026M Capex
- $0.000M Opex
- $3.336M Removal

1.2 Brief Description:

Leak Prone Pipe (LPP) is defined as non-cathodically protected ("unprotected") steel whether bare or coated (collectively "unprotected steel") as well as cast or wrought iron mains. Annual replacements are prioritized based on performance issues related to leaks and breaks.

The current inventory of LPP is 1,456 miles [581 miles (40%) of unprotected steel and 875 miles (60%) of cast iron/wrought iron], which represents approximately 47% of the distribution system in Rhode Island. As demonstrated in Appendix 5.2: "Other Appendices" (Leak Rate Graph), the current leak rate for all distribution piping is 0.53 leaks per mile, which is the same as the 0.53 leaks per mile in 2004. The current leak rate for LPP is 0.98 leaks per mile, slightly higher than the 0.94 leaks per mile in 2004.

The replacement of LPP and associated services is also supported by the Company's recently developed Distribution Integrity Management Plan (DIMP), which specifies that the Company implement measures to: know its system; understand the threats to its distribution piping system; and evaluate risks and prepare replacement programs to help mitigate the risks to its leak prone mains and services inventory.

The remuneration method for costs included in this FY2013 program, and for future years, will be provided through the Gas Infrastructure, Safety and Reliability (ISR) Plan. The Gas ISR Plan covers the majority of Capital Spend ($61.59 million out of $71.01 million; excluded is capital Growth spending). The primary benefits to the ISR Plan, include expanding the scope of "covered spend" and the ability to begin remuneration for Capital spend prior to the construction season.

1.3 Summary of Projects:

Project Number	Project Title	Estimate Amount ($)
CON034	Mandated Replacements, Proactive Programs, Leak Prone Pipe	$33.362M
	Total	$33.362M

1.4 Associated Projects:

Project Number	Project Title	Company	Miles of main
N/A			
		Total	

1.5 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
N/A				

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
June 2013	Closure

US Sanction Paper

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1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
☐ Mandatory ☒ Policy-Driven ☐ Justified NPV	The classification of this program is policy. The program is in accordance with the Company's policy to deliver safe and reliable gas service to its customers. The program is also in accordance with the Company's recently developed DIM Plan (as specified by US DOT, 49 CFR Part 192, Subpart P, entitled; "Gas Distribution Pipeline Integrity Management Plan") The program meets the requirements set forth in the RI Gas Infrastructure, Safety and Reliability ("ISR") Plan.

1.8 Asset Management Risk Score

Asset Management Risk Score: **44**

Primary Risk Score Driver: (Policy Driven and Mandatory Projects)

☐ Reliability ☐ Environment ☒ Health & Safety

1.9 Complexity Level: (if applicable)

☐ High Complexity ☐ Medium Complexity ☐ Low Complexity

Complexity Score: **N/A**

1.10 Business Plan:

FY2013 – 2017 Gas Capital Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
Rhode Island - FY2013 Main Replacements – Proactive Programs;	☒ Yes ☐ No	☐ Over ☐ Under	$0M

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Leak Prone Pipe			
	☐ Yes ☐ No	☐ Over ☐ Under	

1.11 If cost > approved Business Plan how will this be funded?

Business plan equals project cost. Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

1.12 Current Planning Horizon:

$M	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 +	Total
Proposed Capex Investment	$0.000	$30.026	$0.000	$0.000	$0.000	$0.000		$30.026
Proposed Opex Investment	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000		$0.000
Proposed Removal Investment	$0.000	$3.336	$0.000	$0.000	$0.000	$0.000		$3.336
CIAC / Reimbursement	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000		$0.000
Total	$0.000	$33.362	$0.000	$0.000	$0.000	$0.000	$0.000	$33.362

1.13 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☒ Internal	☐ Contractor	
Construction/Implementation Resources to be provided	☒ Internal	☒ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	☐ Red	☐ Amber	☒ Green
Availability of external resources to deliver project:	☐ Red	☐ Amber	☒ Green
Operational Impact			
Outage impact on network system:	☐ Red	☐ Amber	☒ Green
Procurement impact on network system:	☐ Red	☐ Amber	☒ Green

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1.14 Key Issues (include mitigation of Red or Amber Resources):

1	Remaining Inventory of LPP in Rhode Island is 1,456 miles (47% of the Gas Distribution System) • 581 miles of unprotected steel • 875 miles of cast iron
2	Program is in accordance with the Company's recently developed DIM Plan, which specifies that the Company implement measures to: knows its system; understands the threats to its distribution piping system; and to evaluate risks and prepare replacement programs to help mitigate the risks to its leak prone mains and associated services inventory
3	National Grid, considering all of its operating companies, owns ~18% of the CI inventory in the US. The reauthorization of the Pipeline Safety Act is expected to include focus on the management of cast iron mains. The Senate recently passed Bill S.275. It includes a provision requiring PHMSA to survey CI management by gas operators and track progress on CI replacement. The House may consider more stringent requirements, up to and including mandated replacement timetables.
4	Regulatory • Program within current rate settlement agreement • Rate recovery [remuneration starts prior to construction season] • Quarterly/Annual program review and submittals
5	Permitting • Requires municipal/governmental/environmental outreach by Process Team prior to construction season to ensure availability of municipal/state/environmental permits to support increased volume of main replacement work
6	OPEX • Increased main replacement will result in reduced leak rates resulting in reduced OPEX spend related to leak repairs (impact may be delayed and take few years to reduce leak activity)
7	Leak Prone services are replaced as part of the main replacement projects
8	Program maximizes synergy opportunities to replace leak prone gas mains and services via close coordination with public works activity and Company-proposed gas system reinforcements
9	Program maximizes synergy opportunities to improve the efficiency and reliability of the distribution system via; removal of redundant mains, system pressure upgrades (LP to HP) and the retirement of aging regulator stations
10	As we reduce the inventory of LPP, remaining mains are larger diameter and on heavily traveled state and county roads which have costlier restoration requirements. Some larger Cites in the Rhode Island territory have stringent permitting requirements and require curb to curb restoration. All these factors will substantially increase the cost of main replacements.

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1.15 Key Milestones:

Milestone	**Target Date: (Month/Year)**
Identify, Prioritize and Design FY2013 Gas Main Replacement Projects	August 2011
Prepare Work Packages for Resource Planning and Construction	December 2011
Start Applying for Permits	January 2012
Engage Contractors and In-House Resources	January 2012
Project Sanction Approval	April 2012
Construction Start	April 2012
Construction Complete	March 2013
Project Closure Report	June 2013

1.16 Climate Change:

Are financial incentives (e.g. carbon credits) available?		☐ Yes	☒ No
Contribution to National Grid's 2050 80% emissions reduction target:	☐ Neutral	☒ Positive	☐ Negative
Impact on adaptability of network for future climate change:	☒ Neutral	☐ Positive	☐ Negative

1.17 List References:

1	National Grid Gas Distribution Integrity Management Plan (DIMP), dated August 2011
3	National Grid Standard 020053-PL "Identification, Evaluation and Prioritization of Distribution Main Segments for Replacement"

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2 Recommendations:

Use this box for full Project Sanction

The US Sanctioning Committee (USSC) is invited to:

(a) **APPROVE:** the sanction investment of $33.362M, with a tolerance of +/- 10%, for the FY2013 Gas Distribution Proactive Main Replacement Program for the purposes of replacing fifty (50) miles of leak prone gas mains (and associated services) in the Rhode Island service territory

(b) **NOTE:** that Walter Fromm is the Project Manager and has the approved financial delegation to undertake the activities stated in (a).

Signature..... Date 5/18/2012

Timothy F. Small, Vice President of Gas Systems Engineering, Network Strategy

I hereby approve the recommendations made in this paper.

Signature..... Date 5/25/12

Christopher E. Root, Senior Vice President, Network Strategy

3 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on April 11, 2012.

Signature..... Date 6/12/12

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee

US Sanction Paper

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4 Sanction Paper Detail

Title:	Rhode Island Main Replacement Program	**Sanction Paper #:**	USSC-12-168
Project #:	CON034	**Date of Request:**	April 25, 2012
Company Name:	Narragansett Electric Company	**Sponsor:**	Tim Small - Gas Systems Engineering
		Authors:	Walter Fromm, Laeyeng Hunt, Tom Finneral, Saadat Khan and Artie Georgacopoulos

4.1 Background

Leak Prone Pipe (LPP) is defined as non-cathodically protected ("unprotected") steel whether bare or coated (collectively "unprotected steel") as well as cast or wrought iron mains. Annual replacements are prioritized based on performance issues related to leaks and breaks.

The current inventory of LPP is 1,456 miles [581 miles (40%) of unprotected steel and 875 miles (60%) of cast iron/wrought iron], which represents approximately 47% of the distribution system in Rhode Island. As demonstrated in Appendix 5.2: "Other Appendices" (Leak Rate Graph), the current leak rate for all distribution piping is 0.53 leaks per mile, which is the same as the 0.53 leaks per mile in 2004. The current leak rate for LPP is 0.98 leaks per mile, slightly higher than the 0.94 leaks per mile in 2004.

The overall objective of the Gas Distribution Proactive Main Replacement Program is to:

- Reduce the risk associated with Leak Prone Pipe (LPP)
- Reduce the potential for incidents
- Balance risk across the enterprise
- Comply with code and rate agreements
- Reduce/eliminate leaks and CI breaks
- Improve system performance and reliability
- Enhance customer satisfaction while achieving synergy savings through integration with other programs (e.g. public works, reinforcements, reliability, etc.)

Segments of gas distribution mains are identified for replacement during reviews through the use of company procedures/algorithms (National Grid Standard 020053-PL "Identification, Evaluation and Prioritization of Distribution Main Segments for Replacement") that address the risk associated with specific main segment attributes

(i.e. leak history, site conditions, etc.). In addition, field identified candidates for replacements are evaluated by Gas Systems Engineers using the same process/standard. Field recommended main segments are included in the replacement program based on their relative risk ranking and other factors, which may include:

- Segments with open leaks where it is deemed to be more effective to replace vs. repair
- Mains found to be in poor condition during leak repair activity (e.g. graphitization)
- Areas of recent leak repair concentration occurring subsequent to the annual analysis
- Areas of major customer complaints
- Accelerating planned replacements in locations of public works and/or paving projects.

In addition, the main replacement process is closely coordinated with other programs to take advantage of synergy opportunities, including; hooking up customers along the replacement route at lower costs, taking advantage of cost sharing associated with public works projects and reduction of restoration costs by combining with planned reliability projects (which include upgrading distribution system pressures to higher pressure to reduce the overall construction cost).

4.2 Drivers

Current Regulatory Agreement

The remuneration method for costs included in this FY2013 program, and for future years, will be provided through the Gas Infrastructure, Safety and Reliability (ISR) Plan. The Gas ISR Plan covers the majority of Capital Spend ($61.59 million out of $71.01 million; excluded is capital Growth spending). The primary benefits to the ISR Plan, include expanding the scope of "covered spend" and the ability to begin remuneration for Capital spend prior to the construction season.

Reduce risk associated with leak prone mains and associated services (as described above in Section 4.1 Background). Asset Management risk score of 44 (high risk, Health & Safety).

4.3 Project Description

The scope of the FY2013 Gas Distribution Proactive Main Replacement Program involves the replacement of 50 miles of leak prone gas main (19.1 miles of cast iron and 30.9 miles of unprotected steel) and associated services, 6.3 miles of which are associated with public works and 6.9 miles of which are associated with requests from

Field Operations. It should be noted that the Company will be upgrading 7.7 miles of proposed main replacement from low pressure to high pressure. The replacement segments are listed in the Appendix. The leak rate for the identified 50 miles of main replacement is 4.32 leaks per mile, which is higher than the Rhode Island leak rate for LPP of 0.98 leaks per mile. Replacement of these main segments will also result in the elimination of 171 active leaks.

4.4 Benefits Summary

- Reduction of risk associated with leak prone pipe
- Reduce the potential for incidents
- Balance risk across the enterprise
- Comply with federal and state codes ("Active Corrosion")
- Reduce/eliminate leaks over time (O&M spend reduction)
- Enhance customer satisfaction while achieving synergy savings through integration with other programs (e.g. public works, reinforcements, reliability, etc.)
- Improved public, community and government relations due to decreased odor calls and road openings
- Improve system performance
- Contribute positively towards the Company's carbon reduction goals

4.5 Business Issues

The Program is included in the approved FY12/13 capital plan

4.6 Options Analysis

Leak predictive models show that main replacement levels below a certain level will cause leak rates to increase exponentially. Replacement levels below this amount will cause leaks to increase to a point where it will not be physically possible to react to the quantity of incoming leaks. The model shows that there is a practical limit to how many leaks a system can have and continue to operate safely.

Recommended - Replace fifty (50) miles of Leak Prone Pipe (LPP)
Existing regulatory agreement in-place (ISR) which allows for remuneration of capital spend prior to construction season. Balances resource requirements. Reduces risk associated with leak prone pipe.

Alternative 1: Do Nothing
No main replacement will result in increasing leak activity and increased risk to public safety. This will also result in a loss of credibility with the Rhode Island Division of Public Utilities and Carriers (RI DPUC).

Alternative 2: Minimal Replacement
This option should replace only the quantity of main required to hold leak rates to present levels. This will also result in a loss of credibility with the Rhode Island Division of Public Utilities and Carriers (RI DPUC).

4.7 Safety, Environmental and Project Planning Issues

Investigation of the program scope confirmed there are no extraordinary environmental issues. Any previously unidentified Mercury (Hg) Regulators discovered as part of the main/service replacement process will be handled in accordance with Technical Instruction 060010, "Removing Mercury Regulators and Devices". Additionally, since the new main will be tied into existing facilities, customer impact is expected to be minimal.

Municipal, state and/or environmental permits will be required for certain projects included in the Work Plan. Gas Systems Engineering will work closely with Process Team Members (e.g. Environmental, Construction, Resource Planning, Community and Customer Management, etc..) to ensure availability of municipal/state/environmental permits to support the planned main replacement work.

4.8 Execution Risk Appraisal

Number	Status (Active, Dormant, Retired)	Category	Detailed Description of Risk / Opportunity	Cause/Trigger	Probability	Impact		Score		Strategy	Risk Owner	Comments/Actions
						Cost	Schedule	Cost	Schedule			
	Active	Permitting	Municipal/state restoration requirements	notification by municipality/state agency	3	5	3	15	9	Mitigate	Resource Planning	Higher permit and restoration costs will increase the cost of main replacements.
	Active	Construction	Availability of resources	Contractors are too busy with work for other Companies	2	5	3	10	6	Mitigate	Resource Planning	Close coordination between Resource Planning and Field Operations to ensure crews are available to deliver work plan
	Active	Construction	Project cost increases	Unknown field conditions. Material cost increases.	3	3	3	9	9	Mitigate	Resource Planning / Construction	Prepare budgetary estimates for the program building in contingencies for unknowns and applicable materials
	Active	Construction	Inclement Weather	Rain, Snow	3	3	3	9	9	Accept	Resource Planning / Construction	
	Active	Permitting	Municipal / State permitting delays	political, municipal permitting processes	3	3	3	9	9	Mitigate	Resource Planning / Construction	Close coordination with municipalities. Community and Customer Management involvement. Potential use of Permit Expediter

4.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
Municipal (City/Town)	Certain	As required	Not Applied for	As required to support the various project schedules
State (DOT)	Certain	As required	Not Applied for	As required to support the various project schedules
Environmental	Certain	As required	Not Applied for	As required to support the various project schedules

4.10 Investment Recovery

4.10.1 Investment Recovery and Regulatory Implications

The remuneration method for costs included in this FY2013 program, and for future years, will be provided through the Gas Infrastructure, Safety and Reliability (ISR) Plan. The Gas ISR Plan covers the majority of Capital Spend ($61.59 million out of $71.01 million; excluded is capital Growth spending). The primary benefits to the ISR Plan, include expanding the scope of "covered spend" and the ability to begin remuneration for Capital spend prior to the construction season.

Failure to meet the expectations detailed in the Gas ISR may result in a loss of credibility with the Rhode Island Division of Public Utilities and Carriers (RI DPUC).

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4.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the assets are placed in service equal to approximately $6.305M. This is indicative only. The actual revenue requirement will differ depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

Reduced leak activity will result in improve customer satisfaction levels

4.10.3 CIAC / Reimbursement

N/A

4.11 Financial Impact to National Grid

4.11.1 Cost Summary Table

				Current Planning Horizon					
Project #	Project Description	Project Estimate level	$M	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	Total
Project #	Description		Capex	30.026					30.026
			Opex						0.000
			Removal	3.336					3.336
			Total	33.362					33.362
Total Proposed Sanction									
			Capex	30.026	0.000	0.000	0.000		30.026
			Opex						0.000
			Removal	3.336	0.000	0.000	0.000		3.336
			Total	33.362	0.000	0.000	0.000		33.362

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4.11.2 Project Budget Summary Table

Total Project Current Year and Future Years Cost = $33.362 M

Project Budget Summary Table

Project Costs per Business Plan		Prior Year Spending*	YR 1 11/12	YR 2 12/13	YR 3	13/14	YR 4 14/15	YR 5 15/16	YR 6 16/17	YR 7	Total
	Capex	0.000	0.000	30.026	0.000		0.000	0.000	0.000	0.000	30.026
	Opex	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.000	3.336	0.000		0.000	0.000	0.000	0.000	3.336
	Total Cost in B Plan	0.000	0.000	33.362	0.000		0.000	0.000	0.000	0.000	$33.362

*PY Actuals

Variance (Business Plan-Project Estimate)		Prior Year Spending	YR 1 11/12	YR 2 12/13	YR 3	13/14	YR 4 14/15	YR 5 15/16	YR 6 16/17	YR 7	Total
	Capex	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	Opex	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	Total Variance	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	$0.000

4.11.3 Cost Assumptions

FY2013 program cost estimated at $127/ft based on historical information as well as reviewing the planned work scope.

Incorporates the impact of both in-house and contractor labor contracts into the replacement program

Incorporates restoration requirements and permit fees

4.11.4 Net Present Value / Cost Benefit Analysis

N/A

4.11.5 Additional Impacts

N/A

4.12 Statements of Support

4.12.1 Supporters

Role	Name	Responsibilities
Sponsor/ Asset Manager/ Asset Owner/ Process		Endorses the project aligns with jurisdictional objectives

Owner		
Investment Planning	Michelle Roche	
Resource Planning	Artie Georgacopoulos	
Construction	Tom Finneral	

4.12.2 Reviewers

Reads paper for content / language. Recommends edits if necessary

Reviewer List	**Name**
Finance	Karen Hamel
Regulatory	Gideon Katsh
Procurement	John Kavanaugh
Jurisdictional Delegates	Laurie Brown

5 Appendices

5.1 Project Cost Breakdown

Project Cost Breakdown		
Cost Category	**Company Name ($ Amount)**	**Description of Cost Category**
Total:		

5.2 Other Appendices

--See below

5.3 NPV Summary (if applicable)

N/A

5.4 Customer Outreach Plan (if applicable)

Requires municipal/governmental/environmental outreach by Process Team prior to construction season to ensure availability of municipal/state/environmental permits to support the planned main replacement work

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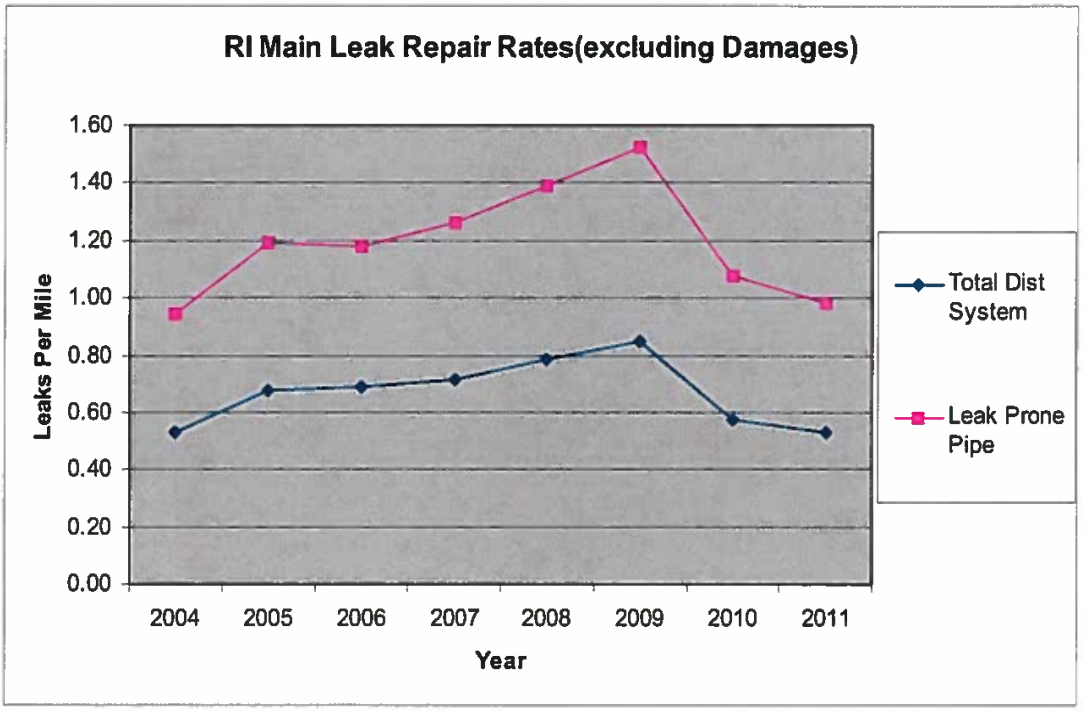
Appendices

A-1 - Rhode Island Leak Rate Graph
A-2 - FY2013 Rhode Island Proactive Main Replacement Program Project List
A-3 - Rhode Island, LPP Steel Main Performance Summary
A-4 - Rhode Island, LPP Cast Iron Main Performance Summary

A-1; Rhode Island Leak Rate Graph



Note(s):

1) **Main leak repairs on leak prone pipe decreased slightly from 1,579 in CY2010 to 1,441 in CY2011**

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A-2 - FY2013 Rhode Island Proactive Main Replacement Program Project List

Item #	Municipality	Location / Street	Project Limits	Exst Dia.	Exst Mat.	System Pressure	Proposed Footage	Total Estimated Cost
1	Cranston	Eldridge	Pontiac Ave to Caporal St	4	CI	Low	4100	$653,500
2	Providence	Peck		3	CI	Low	127	$20,050
3	Providence	Havana St, Burns St	Douglas Avet o Admiral St	6	CI	Low to 35#	3016	$396,480
4	Cranston	Howard St	East St to Slater Hill Ave	6	CI	Low to 99#	1552	$157,440
5	Newport	Connell Hwy, Halsey St	#70 Halsey St	4	BS	LP	250	$37,500
6	Providence	Camden Ave		3	CI	Low	1327	$177,605
7	Warwick	Ottawa Ave Area 1	Oakland Beach Ave to Logan St	2	BS	High 35#	7588	$827,229
8	Warwick	Warwick Ave	Namquid Dr to Lakeside Dr	8	BS	High 35#	6073	$773,964
9	Warwick	Inman Ave	Strawberry to Parkway	2	BS	High 35#	1383	$167,215
10	Warwick	Greylawn, Calcott & Seville		2	BS	High 35#	2102	$251,710
11	Cranston	Valente Dr	Bethel St	4	BS	Low	747	$68,760
12	Coventry	Myra Rd, Lydia Rd	Arnold Rd to Cape Way Dr	3	BS	High 35#	8189	$773,120
13	East Providence	PAWTUCKET AVE	Warren Ave to Rice	4	CI	Low	3930	$395,050
14	East Providence	Wampanoag Tr	Sumack Ave to Buck Thorn Ave	2	BS	5#	296	$36,100
15	Johnston	ROTARY		2	BS	High 35#	3200	$390,110
16	Providence	Carr Street		4	CI	Low	390	$55,500
17	Providence	Jasper Street		3	BS	Low	629	$88,820
18	Providence	Pembroke Ave	Smith to Eaton---- Also Eaton	4	CI	Low	1643	$270,018
19	Providence	General St, West St, East st	West St to East St	6	CI	Low to 35#	3107	$385,702
20	Providence	General St, Phebe St	Phebe St to Crandall St	4	CI	Low to 35#	7385	$887,040
21	Warwick	Warwick Neck Ave, Newton Ave	White Rock Rd to Rocky Point Ave	2	BS	High 35#	2086	$252,977
22	Warwick	Sand Pond Rd, Bucklin Ave	Post Rd to Branch Rd	2	BS	High 35#	2541	$301,805
23	Warwick	Asylum Rd	#178 to Griffin Dr	2	BS	High 35#	1878	$216,190
24	Providence	Armington Ave	Carleton to Academy	4	BS	Low	860	$113,700
25	Cranston	Woodstock Lane	Deerfield Rd to #37 Woodstock	6	BS	Low	2593	$300,265
26	Woonsocket	Edmund St		4	CI	Low	450	$59,250
27	Cranston	Glen Rd, Webb and Pettaconsett	Pontiac Ave to Pettaconsett Ave	6	BS	Low to 99#	1280	$156,400
28	Cranston	Pontiac Ave	Pettaconsett to Howard St Reg Stat	6	CI	Low	0	$23,000
29	Providence	Governor, E Manning				Low & 35#	4537	$453,700
30	Providence	Sabin St	Empire	8	CI	Low	228	$45,600
31	Westerly	Benefit St	School to Cross	3	BS	Low to 60 #	753	$94,830
32	Westerly	George St	School to Cross	4	BS	Low to 60 #	866	$111,260
33	Westerly	Chester	School to Cross	3	BS	Low to 60#	798	$98,780
34	Westerly	Spring St	School to Cross	4	BS	Low to 60#	0	$13,000
35	Westerly	Chester St	School to Granite	4	BS	Low to 60#	689	$83,790

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Item #	Municipality	Location / Street	Project Limits	Exst Dia.	Exst Mat.	System Pressure	Proposed Footage	Total Estimated Cost
36	Westerly	Summer St	School to Granite	4	BS	Low to 60#	953	$122,830
37	Westerly	Chestnut St	School to Granite	4	BS	Low to 60#	0	$22,000
38	Westerly	Rocket & Granite	Granite to end, to Chestnut St	3	BS	Low to 60#	949	$114,390
39	Warwick	Mayflower, Priscilla & Burke	Chapin Ave to Mayflower Ave	2	BS	High 35#	557	$71,200
40	Warwick	Palmer, Camp, Cliff, Surf area	Ogden Ave to Brinton Ave	2	BS	High 35#	2699	$322,395
41	Providence	Payton St /Cactus St	Board St to Cactus St	4	CI	Low	1400	$191,000
42	Johnston	King St	At Killingly St	6	CI	Low	120	$13,200
43	Newport	Almy St	Bliss to County	4	CI	Low	850	$105,500
44	Pawtucket	Grenville St, Nashua St	Pawtucket Ave to stream	6	CI	Low to 99#	110	$14,100
45	Barrington	Alfred Drowne Rd & Short	Third St to Bike Path	4	BS	High 25#	2113	$259,430
46	Barrington	Alfred Drowne Rd & Annawamscutt Rd	Third St to Grove St	4	BS	High 25#	3542	$439,620
47	Barrington	Sunset Dr, Juniper St & Virginia Rd	Martin Ave to #43 Sunset Dr	2	BS	High 25#	1782	$211,265
48	Newport	Pleasant St	#4 to #8	3	BS	Low	118	$16,765
49	Newport	W Extension St	Thames St to end	2	BS	Low	616	$93,638
50	Newport	Victoria Ave	Bellevue Ave to #10A Victoria Ave	2	CI	Low	518	$65,548
51	Newport	Hall Ave	Van Zandt Ave to Warner St	4	CI	Low	937	$150,000
52	Woonsocket	Beacon Ave	Cass Ave to #207 Beacon St	6	CI	Low	1555	$209,000
53	Newport	Pond Ave	Warner St to MF Wheatland Blvd	4	CI	Low	908	$149,400
54	Newport	Wilbur Ave, Wilbur St	Bliss Rd and Eustis Ave	4	BS	Low	381	$42,560
55	Newport	Bowery St	Spring St to Bellevue Ave	6	CI	Low	1332	$204,000
56	Newport	Calvert St	Broadway to Cranston Ave	2	BS	Low	907	$136,545
57	Newport	Casey Ct	Coggeshall Ave to end	4	CI	Low	379	$48,900
58	Newport	Channing Pl	Warner St to Channing St	1	BS	Low	137	$20,100
59	Newport	Cliff Ter	#3 to #10	2	BS	Low	287	$40,000
60	Newport	Gordon St	Coggeshall Ave to Bellevue Ave	4	CI	Low	549	$80,250
61	Newport	Bliss Mine Rd	Bliss Rd to Ellery Rd	4	CI	Low	1815	$275,250
62	Newport	Cliff Ave	Memorial Blvd to #43 Cliff Ave	4	CI	Low	2419	$366,895
63	Newport	Bull St, Mt Vernon St	Spring St to Kay St	4	CI	Low	1315	$207,525
64	Newport	Jeffery Rd	Carroll Ave to Ocean Ave	2.50	BS	Low	1071	$158,785
65	Newport	Everett St	Francis St to #51 Everett St	2.00	BS	Low	165	$22,500
66	Barrington	Bay Spring Ave, Narragansett Ave	Woodbine to Edwin	4	BS	High 25#	1637	$205,885
67	Barrington	Howard St	Crown Rd to #32 Howard St	2	BS	High 25#	670	$81,350
68	Barrington	Echo Dr	Washington Rd to end	2	BS	High 25#	909	$104,445
69	Barrington	Governor Bradford Dr	Lewis St to #37 Gov. Bradford Dr	2	BS	High 25#	2050	$242,250
70	Barrington	Lake Ave	Bay Spring Ave to end	2	BS	High 25#	619	$77,995
71	Barrington	Smith Ave	Fountain Ave to #2 Smith Ave	2	BS	High 25#	440	$49,200
72	Westerly	Franklin St	Wells St to Whipple Ave	6	BS	60#	2605	$430,750
73	Westerly	Pleasant St, High St	Canal St to High St, to Friendship	6	CI	Low	2820	$488,000
74	Johnston	Old Pocasset Rd, Woodlake Dr	Central Ave to 49 Old Pocasset Rd	6	BS	35#	2394	$297,834

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Item #	Municipality	Location / Street	Project Limits	Exst Dia.	Exst Mat.	System Pressure	Proposed Footage	Total Estimated Cost
75	Cumberland	Lilac St and Timberwolf Dr	High St to Norman St	1	BS	60#	1127	$144,335
76	Pawtucket	Franklin St	Mineral Spring Ave to Star St	4	CI	Low	367	$55,500
77	Pawtucket	Conant St, Martin Ct	Mineral Spring Ave to RR tracks	6	BS	Low to 60#	914	$129,640
78	Lincoln	Arnold Ave	Smithfield Ave to end	4	CI	Low	625	$93,700
79	Lincoln	Grove St, N Union St	Front St to Willow Wy	6	CI	Low	3298	$461,584
80	Lincoln	Arnold St	River Rd to Grove St	4	CI	Low	3112	$445,112
81	North Kingstown	Himes St, Elna St	Ten Rod St to #58 Elna St	3	BS	High 35#	1348	$151,540
82	North Kingstown	Ranger Rd, Yorktown Rd, Sachem Rd	Post Rd to Brookside Dr	4	BS	High 35#	9235	$1,129,500
83	North Kingstown	Lake Dr, Nichols Rd, Edwin, Harrington	Lake Dr to Nochols Rd	2	BS	High 35#	1474	$168,770
84	North Kingstown	Sassafras Dr, Juniper Dr	#60 Juniper Dr to end	2	BS	High 35#	2406	$270,600
85	North Kingstown	Grant Dr	#130 to #159	2	BS	High 35#	340	$40,700
86	East Greenwich	Grassland, Overfield, Friendly Rd	Post Rd to Lebaron Dr	2	BS	35#	4928	$537,800
87	East Greenwich	Church St, Rector St, West St	Main St to Eldridge Ave	4	BS	35#	4720	$524,000
88	East Greenwich	Division St, Brayton St	Love Ln to Brayton St	4	BS	35#	2474	$270,400
89	East Greenwich	Marlborough St, Queen St	Main St to RR crossing	3	BS	35#	1198	$140,800
90	East Greenwich	Marlborough St, Bridge St, Vine St	Bridge St to Rocky Hollow Rd	2	BS	35#	1529	$171,900
91	East Greenwich	Marlborough St, King St	Main St to Duke St	3	BS	35#	1091	$132,100
92	East Greenwich	Bayberry St, Lebaron Dr	Birchwood Wa to Lebaron Dr	2	BS	35#	1978	$206,800
93	East Greenwich	Eugene St	S Pierce St to #45 Eugene St	2	BS	35#	487	$51,700
94	Westerly	Park Ave, Summer St & Highland Ave	Narragansett to Granite	4	BS	Low to 60#	4511	$442,573
95	Cranston	Doric Ave	Authur St to Park Ave	4	CI	Low	2384	$301,080
96	Cranston	Cranston St	Cardi Ci to Sherman Ave	2	BS	35#	1800	$258,000
97	Cranston	Sherman Ave	Cranston St to Oaklawn Ave	2	BS	35#	566	$75,920
98	Cranston	Hardy St	#9 to Bateman Ave	2	BS	35#	410	$46,000
99	Cranston	Waite Ave	Mayflower Dr to Warwick Ave	6	CI	Low to 35#	2590	$328,000
100	Cranston	Gladstone St	#75 to #199	6	CI	Low	2013	$276,560
101	East Providence	Greenwich Ave	Pawtucket Ave to Bradford Ave	6	CI	Low	2737	$368,862
102	East Providence	Meadowcrest Dr, Shady Ln	Connors Ln to Plum Rd	2	BS	25#	1803	$224,315
103	East Providence	Anson Dr, Muriel St	Pine Crest Dr to Theresa St	2	BS	25#	1354	$163,170
104	East Providence	Grassy Plain Rd	#93 to #105	3	BS	25#	300	$43,500
105	East Providence	Elson Dr, Estell Dr	Estell Dr to Argyle Ave	2	BS	25#	1659	$183,195
106	East Providence	Bristol Ave	Viola Ave to Willett Ave	2	BS	25#	624	$82,400

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Item #	Municipality	Location / Street	Project Limits	Exst Dia.	Exst Mat.	System Pressure	Proposed Footage	Total Estimated Cost
107	East Providence	Irving Ave, What Cheer, Vanderland	Woodward Ave to Vanderland Ave	6	CI	Low	3552	$513,552
108	East Providence	Padelford Ave	Pawtucket Ave to #16	2	BS	5#	233	$29,800
109	East Providence	Bergin St	Water View Ave to end	2	BS	5#	273	$36,800
110	East Providence	Cove St	Worcester Ave to Bell Ave	4	CI	Low	224	$39,880
111	East Providence	Goldsmith Ave, Woodward, Sutton	Taunton Ave to #44	6	CI	Low to 99#	484	$76,487
112	East Providence	Grosvenor Ave	Taunton Ave to John St	6	CI	Low	595	$84,970
113	East Providence	Grove Ave	#72 to Broadway	4	CI	Low	1371	$204,746
114	East Providence	Industrial way	Pawtucket Ave to #7	2	BS	5#	700	$15,500
115	East Providence	Sutton Ave	N Broadway to #294	4	CI	Low	562	$85,812
116	East Providence	Whipple Ave	Bullocks Point Ave to end	1.5	BS	5#	786	$86,600
117	East Providence	Pawtucket Ave	Waterman Ave to Roslyn Ave	12	CI	Low	1093	$158,660
118	North Kingstown	Post Rd	Camp Ave to Dana Dr	8	BS	High 35#	1250	$219,000
119	North Providence	East Ave	Smith St to Angel Ave	4	CI	Low	512	$78,440
120	North Providence	Smith St, Sheffield Ave	Olney Ave to end	6	CI	Low	3183	$433,773
121	North Providence	Metcalf Ave, Allendale Ave	Woonasqatucket to Fruit Hill Ave	6	CI	Low	2115	$302,490
122	North Providence	Whipple Ct	Taylor St to #14 Whipple Ct	6	CI	Low	1082	$141,512
123	North Providence	Irving St, Hillview Dr	Mineral Spring Ave to Hillview Dr	2	WS	60#	1859	$222,195
124	West Warwick	Andrews Ave	Willow St to #12 Andrews Ave	2	BS	35#	1396	$157,580
125	West Warwick	Ponderosa Dr, Monterey Dr	#178 to #110 Monterey Dr	2	BS	35#	1673	$203,665
126	West Warwick	Walnut St	Washington Rd to #17 Walnut St	2	BS	35#	357	$47,200
127	West Warwick	Baker St	Washington Rd to #19 Baker St	2	BS	35#	419	$50,400
128	West Warwick	Pulaski St	#99 Pulaski St to 4" WS 35#	4	BS	35#	757	$98,382
129	West Warwick	Kent St, Harbour Ave	W Warwick Ave to Loramee Ave	2	BS	35#	1411	$156,155
130	West Warwick	Shippee Ave	Agnes St to McGlynn St	2	BS	35#	1544	$176,120
131	West Warwick	Babcock St, Newell St	Moran St to Providence St	2	BS	35#	3530	$320,900
132	West Warwick	Cochran St	Cowesett Ave to end	3	BS	35#	2103	$237,339
133	West Warwick	Lexington St, Lenox Ave	Legris Ave to Ridge St	2	BS	35#	2067	$240,182
134	West Warwick	Bishop St, Edith St	New London Ave to Edge St	2	BS	35#	588	$66,800
135	West Warwick	Angell St	Wakefield St to #23 Angell St	2	BS	35#	406	$48,100
136	Coventry	Johnson Bl, Lydia Rd	Arnold Rd to Carlson St	3	BS	High 35#	3366	$383,430
137	Coventry	Arnold Rd	Tiogue Ave to Twin Lake Ave	2	BS	High 35#	2205	$247,525
138	Coventry	Rawlinson Dr	Tiogue Ave to #75 Rawlinson Dr	2	BS	High 35#	1061	$118,405
139	Providence	Richmond St, Clifford, Friendship	Ship St to Dorroance St	6	CI	Low to 99#	1665	$231,000
140	Providence	Clofford St	Chestnut St to Claverick St	8	CI	Low to 35#	490	$73,500

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Item #	Municipality	Location / Street	Project Limits	Exst Dia.	Exst Mat.	System Pressure	Proposed Footage	Total Estimated Cost
141	Providence	Point St	Parsonage St to Chestnut St	4	CI	Low to 99#	170	$21,250
142	Providence	Chestnut St - abandonment	Pine St to Clifford St	6	CI	Low	0	$10,000
143	Providence	Dyer, Clifford - Abandonment	Dorrance Pz to Orange St	6	CI	Low	0	$20,000
144	Providence	Point St - Abandonment	Hospital St to Parsonage St	4	CI	Low	0	$10,000
145	Providence	Wickenden St	S Main to Traverse	6	CI	Low	300	$52,350
146	Barrington	Hilltop Ave	County Rd to Cady Rd	2	BS	25#	460	$59,000
147	Cumberland	Davis St	Pleaseant St to #13-15 Davis St	4	CI	Low	322	$47,100
148	Cumberland	Davis St, Eddy St	High St to Davis St	4	CI	Low	1234	$180,484
149	Cumberland	Patt Ave	Eddy St to High St	1.5	BS	Low	218	$31,660
150	Cumberland	Harrison St	High St to #72 Harrison St	4	CI	Low	572	$87,640
151	Cumberland	Old Whipple Rd	#7 to #111 Old Whipple Rd	4	CI	Low	866	$123,920
152	Cumberland	Ora Murphy Ct	Mendon Rd to end	1.25	BS	60#	150	$19,500
153	Cumberland	Valley St	High St to #15 Valley St	1	BS	60#	495	$65,500
154	Newport	Eustis Ave	Bliss Rd to Memorial Bl	4	CI	10#	5506	$728,720
155	Cumberland	E Barrows St	High St to Mineral Ave	4	CI	LP	1067	$153,440
156	Cumberland	Forest St, Hopkins Te	Broad St to Chambers St	4	CI	LP	2733	$398,358
157	East Providence	Patwtucket Ave - Section 1	Railroad to Padelford Ave	6	CI	5#	2739	$372,921
158	Newport	Caleb Earl St	Dr. M Wheatland to Broadway	2	BS	LP	242	$41,670
159	Newport	Barney St	Spring St to #24 Barney St	1.25	BS	LP	687	$105,620
160	Newport	Bridge St	Thames St to America's Cup Ave	4	CI	LP	455	$76,425
161	Newport	Cotton Ct	Thames St to EOM	2	BS	LP	81	$35,103
162	Newport	Kempsen Ave, Toppa Bl	Eustis Ave to #27 Toppa Bl	4	CI	Low to 10#	1280	$148,400
163	Newport	Dexter St	Hillside Ave to W Main Rd, MDT	6	BS	10#	1585	$230,675
164	Providence	Congress Ave	Broad St to Hamilton St	4	CI	LP	993	$159,160
165	Warwick	W Shore Rd	Long St tp Bowen Briggs Ave	8	BS	35#	3095	$543,640
166	Warwick	Tollgate Rd	#470 to #186	3	BS	35#	2894	$331,145
167	Middletown	Boulevard Te	Boulevard to end	4	BS	Low to 10#	639	$76,095
168	Middletown	Fairview Ave	Boulevard to #42	4	BE	Low to 10#	455	$57,000
169	Pawtucket	Johns St, Bates St	Coyle Ave to Roosevelt Ave	4	CI	LP	3131	$467,506
						Total =	263904	$33,450,998
						Miles =	50.0	

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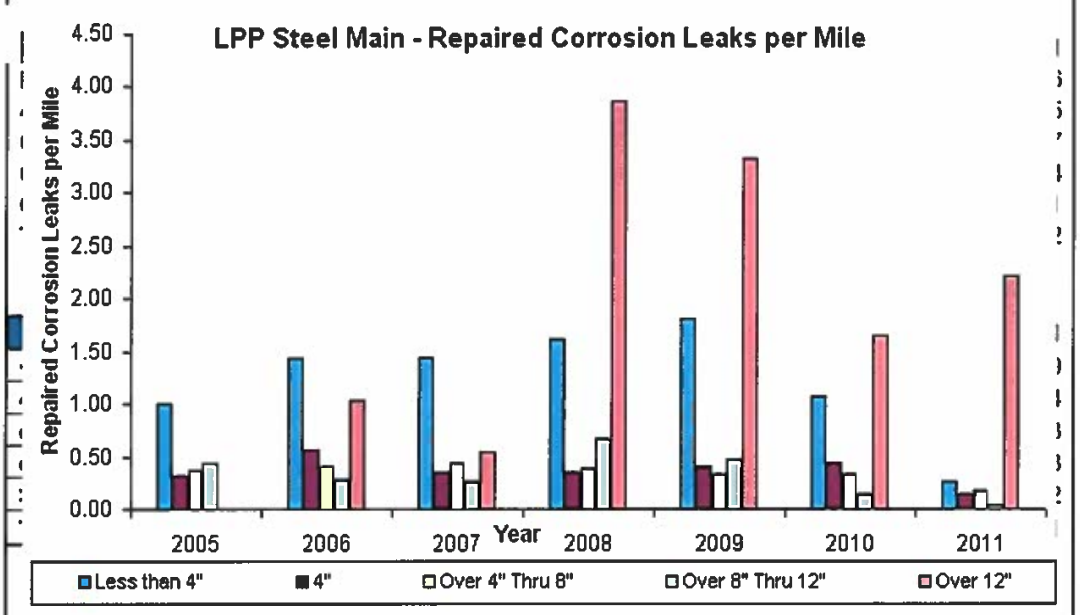
A-3 - Rhode Island, LPP Steel Main Performance Summary

RHODE ISLAND, LPP STEEL MAIN PERFORMANCE SUMMARY						
Year 2011	< 4"	4"	over 4" thru 8"	over 8" thru 12"	over 12"	Total
Mains inventory, Miles	329	94	133	23	2	**581**
Mains inventory, by %	57%	16%	23%	4%	0%	**100%**
Average 3- Yr Attrition rate	4.1%	2.0%	6.3%	-1.2%	0.0%	**4.2%**



LPP STEEL Main Corrosion Leaks Repaired by Diameter and Year								
Diameter	2005	2006	2007	2008	2009	2010	2011	7 Yr Avg
<4"	366	572	555	611	681	349	86	460
4"	31	60	36	36	42	41	14	37
over 4" thru 8"	56	73	74	62	57	50	23	56
over 8" thru 12"	9	7	6	15	11	3	1	7
>12"	0	2	1	7	6	3	4	3
Total	**462**	**714**	**672**	**731**	**797**	**446**	**128**	**564**

LPP STEEL Main Leak Incidents in Last 10 Years						
Year	Facility	Asset Class/Subclass	Street	Town	Leak Cause	Details
None	None	None	None	None	None	None

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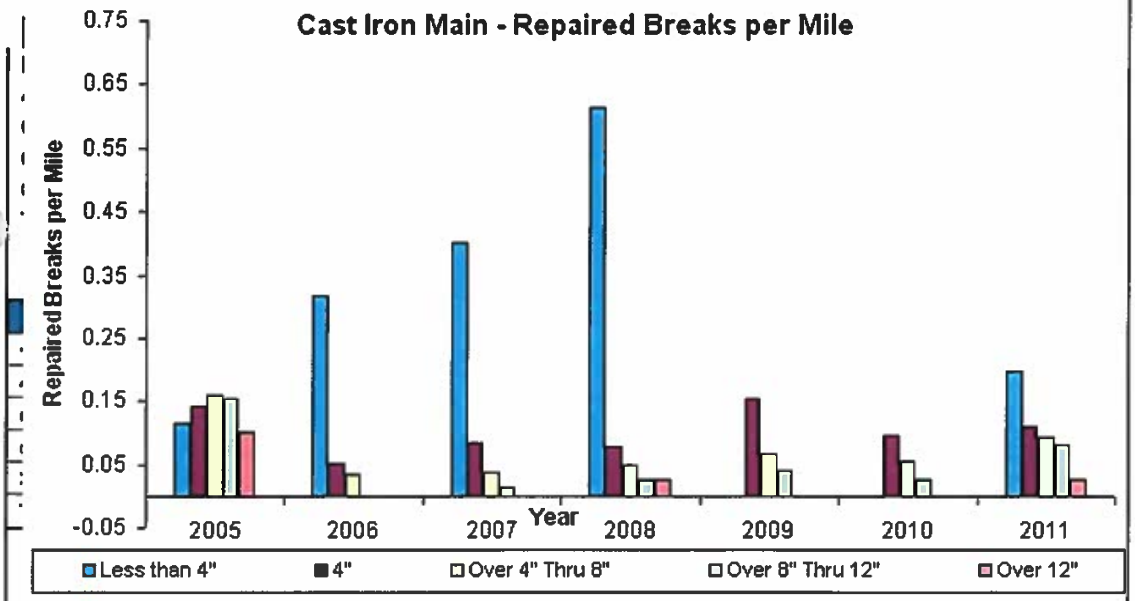
A-4 - Rhode Island, LPP Cast Iron Main Performance Summary

RHODE ISLAND, CAST IRON MAIN PERFORMANCE SUMMARY						
Year 2011	< 4"	4"	over 4" thru 8"	over 8" thru 12"	over 12"	Total
Mains inventory, Miles	10	358	394	75	37	**875**
Mains inventory, by %	1%	41%	45%	9%	4%	**100%**
Average 3- Yr Attrition rate	-1.8%	2.0%	-0.2%	0.6%	1.4%	**0.8%**



Cast Iron Main Repaired Breaks by Diameter and Year								
Diameter	2005	2006	2007	2008	2009	2010	2011	7 Yr Avg
<4"	2	5	5	6	0	0	2	3
4"	55	20	32	30	57	35	39	38
over 4" thru 8"	63	14	15	19	26	21	37	28
over 8" thru 12"	12	0	1	2	3	2	6	4
>12"	4	0	0	1	0	0	1	1
Total	**136**	**39**	**53**	**58**	**86**	**58**	**85**	**74**

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Cast Iron Main Break Incidents in Last 10 Years						
Year	Facility	Asset Class/Subclass	Street	Town	Leak Cause	Details
2003	MAIN	CI/WI - 6" - LP	Stella St	Providence	Natural Force	Main Break
2004	MAIN	CI/WI - 4" - HP(12#)	Tell St	Providence	Natural Force	Main Break
2004	MAIN	CI/WI - 6" - HP(12#)	Eldridge St	Cranston	Natural Force	Main Break

USSC Closure Paper

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Title:	FY13 Rhode Island Main Replacement Program	**Sanction Paper #:**	USSC-12-168C
Project #:	Various – (See Appendix)	**Sanction Type:**	Closure
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	3/30/2017
Author:	Saadat Khan/Dana Wolkiewicz	**Sponsor:**	John S. Stavrakas – VP Gas Asset Management
Utility Service:	Gas	**Project Manager:**	Joseph Fortier Jr.

1 *Executive Summary*

This paper is presented to close various projects – (see appendix). The total spend was $33.867M. The sanctioned amount for this project was $33.362M.

The final spend amount is $33.867M *broken down into:*

$30.862M Capex
$3.005M Removal
$0.000M Opex

2 *Project Summary*

Leak Prone Pipe (LPP) is defined as non-cathodically protected ("unprotected") steel whether bare or coated (collectively "unprotected steel") as well as cast or wrought iron mains. Annual replacements were prioritized based on performance issues related to leaks and breaks.

The current inventory of LPP at the time was 1,456 miles [581 miles (40%) of unprotected steel and 875 miles (60%) of cast iron/wrought iron], which represented approximately 47% of the distribution system in Rhode Island. As demonstrated in Appendix 5.2 of the sanction paper: "Other Appendices" (Leak Rate Graph), the current leak rate at the time for all distribution piping was 0.53 leaks per mile, which is the same as the 0.53 leaks per mile in 2004. The current leak rate for LPP at the time was 0.98 leaks per mile, slightly higher than the 0.94 leaks per mile in 2004.

The replacement of LPP and associated services was also supported by the Company's recently developed Distribution Integrity Management Plan (DIMP), which specifies that the Company implement measures to: know its system;

understand the threats to its distribution piping system; and evaluate risks and prepare replacement programs to help mitigate the risks to its leak prone mains and services inventory.

The remuneration method for costs included in this FY2013 program, and for future years, was provided through the Gas Infrastructure and Reliability (ISR) Plan. The primary benefits to the ISR Plan, included expanding the scope of "covered spend" and the ability to begin remuneration for Capital spend prior to the construction season.

3 *Over / Under Expenditure Analysis*

3.1 Summary Table

Actual Spending ($M)			
Project #	**Description**		**Total Spend**
Various-See Appendix	Various-See Appendix	**Capex**	30.862
		Opex	0.000
		Removal	3.005
		Total	33.867
Total		**Capex**	30.862
		Opex	0.000
		Removal	3.005
		Total	33.867

Project Sanction Summary Table			
Project Sanction Approval ($M)			**Total Spend**
		Capex	30.026
		Opex	0.000
		Removal	3.336
		Total Cost	33.362
Sanction Variance ($M)			**Total Spend**
		Capex	(0.836)
		Opex	0.000
		Removal	0.331
		Total Variance	(0.505)

3.2 Analysis

The Rhode Island Main Replacement Program is 2% over plan which is within the tolerance level.

4 Improvements / Lessons Learned/Root Cause

- Improve development of estimating practices.
- Work with Finance and Resource Planning to create better financial metrics.
- Create Long Term resource requirements for future Capital planning.
- Identify carryover or deferred projects in a timely fashion.

5 Closeout Activities

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	(•) Yes ( ) No
All relevant costs have been charged to project	(•) Yes ( ) No
All work orders and funding projects have been closed (1)	( ) Yes (•) No
All unused materials have been returned	(•) Yes ( ) No
All as-builts have been completed (2)	( ) Yes (•) No
All lessons learned have been entered appropriately into the lesson learned database (3)	( ) Yes (•) No

(1) All work orders and funding projects have been closed
Program/Blanket projects may contain work orders and or funding projects which have not yet been closed for reasons including but not limited to:

- the same work order(s) are used annually. They will remain open until Asset Management and/or Resource Planning have determined work orders are no longer needed .
- construction may cross multiple fiscal years
- the work order closing process is within the late charge waiting period
- other accounting processes or final system closing activities have not yet completed

The Program/Blanket projects are approved annually for the current year expected spend and remain open until Asset Management and/or Resource Planning have determined the project is no longer required.

(2) All as-builts have been completed

Program/Blanket projects may contain work orders for which no as-builts have yet been recorded for reasons including but not limited to:

- design and/or construction have not yet completed
- construction may cross multiple fiscal years
- work has completed recently and as-builts have not yet been processed into the system
- does not apply. Work order(s) are not linked to work management systems. (example: Meter Purchases, Meter Changes, AMR Installations Purchase Misc Capital Tools/Equipment, etc.)
- does not apply to Information systems projects.

(3) All lessons learned have been entered appropriately into the lesson learned database

Program/Blanket projects usually contain short cycle work which the Company has been performing over several fiscal years. No new Lessons Learned which have not already been identified and recorded within section 4.

6 *Statements of Support*

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planner	Pensabene, Patrick M.	Endorses relative to 5-year business plan or emergent work
Resource Planning	Falls, Jonathon	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Project Management	Fortier, Joseph Jr.	Endorses Resources, cost estimate, schedule
Gas Project Estimation	Paul, Art	Endorses Cost Estimate

6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Easterly, Patricia
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Currie, John
Procurement	Curran, Art
Control Center	Loiacono, Paul

USSC Closure Paper

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7 ***Decisions***

The Senior Executive Sanctioning committee (SESC) approved this paper on 3/30/2017.

Signature.....Margaret M Smyth.....Date.....4/28/17

Margaret Smyth
US Chief Financial Officer
Chair, Senior Executive Sanctioning Committee

Appendix

Project	CAP	COR	Grand Total
CON0034	$ 5,900,492	$ 1,779,387	$ 7,679,879
CON0036		$ 382,265	$ 382,265
CON0040	$ 104,828		$ 104,828
CON034	$ 23,105,759	$ 479,221	$ 23,584,980
CON036	$ 477		$ 477
CON040	$ 227,954	$ (6,631)	$ 221,323
CRCC203	$ 939,398	$ 174,071	$ 1,113,469
CRCC207	$ 583,214	$ 196,652	$ 779,865
	$ 30,862,122	**$ 3,004,964**	**$ 33,867,087**

US Sanction Paper

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Title:	Main Replacements, Reactive Programs, Maintenance	**Sanction Paper #:**	USSC-12-299
Project #:	CON034	**Sanction Type:**	Sanction
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	June 27, 2012
Author:	James Finnerty	**Sponsor:**	Tim Small – Vice President - Gas Systems Engineering
Utility Service:	Gas	**Project Manager:**	James Finnerty

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests sanction of the FY2013 Gas Distribution Reactive Main Replacement Program in the amount of $1.02M, with a tolerance of +/- 10 percent, for the purpose of replacing gas mains during urgent or emergency situations which fall outside the normal scope of integrity, reinforcement, reliability, and public works programs

This sanction amount is $1.02 broken down into:

- $0.93M Capex
- $0.0M Opex
- $0.09M Removal

1.2 Brief Description:

For fiscal year 2012/2013, a total of 50 miles of leak prone pipe has been sanctioned for replacement under Rhode Island's Proactive Main Replacement program. However, the 1.470 miles of leak prone pipe across Rhode Island's territory far exceeds the proactive replacement work scope. Therefore, situations arise where a field decision may be required to replace a segment of leaking or damaged pipe that does not meet the established criteria for proactive replacement, or it may be practical and cost effective to replace segments of leak prone pipe that are risk ranked lower than those included in the proactive work scope but are required to be addressed immediately.

1.3 Summary of Projects:

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Project Number	Project Title	Estimate Amount
CON034	Main Replacements-Reactive Programs-Maintenance	$ 1.02
	Total	$ 1.02

1.4 Associated Projects:

There are no projects that are dependent upon this project or that this project depends upon.

1.5 Prior Sanctioning History (including relevant approved Strategies):

There are no previous sanctions for the projects included in this in the scope of this paper.

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
July 2013	Closure

1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
○ Mandatory ◉ Policy- Driven ○ Justified NPV	This program enables the Company to use capital funds to replace leak prone pipe under emergency conditions without engineering review.

1.8 Asset Management Risk Score

Asset Management Risk Score: 40

Primary Risk Score Driver: (Policy Driven Projects Only)

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○ Reliability ○ Environment ◉ Health & Safety ○ Not Policy Driven

1.9 Complexity Level: (if applicable)

○ High Complexity ○ Medium Complexity ○ Low Complexity ◉ N/A

Complexity Score: N/A

1.10 Process Hazard Assessment

A Process Hazard Assessment (PHA) is required for this project:

○ Yes ◉ No

1.11 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY2013-FY2017 Gas Capital Plan	◉ Yes ○ No	○ Over ◉ Under	$0

1.12 If cost > approved Business Plan how will this be funded?

Not applicable.

1.13 Current Planning Horizon:

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		Current Planning Horizon						
	Prior Yrs	Yr. 1 2012/13	Yr. 2 2013/14	Yr. 3 2014/15	Yr. 4 2015/16	Yr. 5 2016/17	Yr. 6 + 2017/18	Total
CapEx	$ -	$ 0.93	$ -	$ -	$ -	$ -	$ -	$ 0.93
OpEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Removal	$ -	$ 0.09	$ -	$ -	$ -	$ -	$ -	$ 0.09
CIAC/Reimbursement	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total	$ -	$ 1.02	$ -	$ -	$ -	$ -	$ -	$ 1.02

1.14 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☑ Internal	☐ Contractor	
Construction/Implementation Resources to be provided	☑ Internal	☑ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	○ Red	○ Amber	◉ Green
Availability of external resources to deliver project:	○ Red	○ Amber	◉ Green
Operational Impact			
Outage impact on network system:	○ Red	○ Amber	◉ Green
Procurement impact on network system:	○ Red	○ Amber	◉ Green

1.15 Key Issues (include mitigation of Red or Amber Resources):

1	Excessive restoration costs in some municipalities may increase costs.
2	
3	

1.16 Key Milestones:

Milestone	**Target Date: (Month/Year)**
Project Close-out	July 2013

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Milestone	Target Date: (Month/Year)

1.17 Climate Change:

Are financial incentives (e.g. carbon credits) available?		O Yes	⊙ No
Contribution to National Grid's 2050 80% emissions reduction target:	O Neutral	⊙ Positive	O Negative
Impact on adaptability of network for future climate change:	⊙ Neutral	O Positive	O Negative

1.18 List References:

1	Not applicable
2	
3	

2 Decisions

Use this box for full project sanctions

The US Sanctioning Committee (USSC) at a meeting held on June 27, 2012:

(a) APPROVED this paper and the investment of $1.02M and a tolerance of +/- 10%.

(b) NOTED that James Finnerty is the Project Manager and has the approved financial delegation.

Signature.....Date...9/21/12

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee

US Sanction Paper

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3 *Sanction Paper Detail*

Title:	Main Replacements, Reactive Programs, Maintenance	**Sanction Paper #:**	USSC-12-299
Project #:	Multiple Projects as required	**Sanction Type:**	Sanction
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	June 27, 2012
Author:	James Finnerty	**Sponsor:**	Tim Small – Vice President - Gas Systems Engineering
Utility Service:	Gas	**Project Manager:**	James Finnerty

3.1 Background

The investment proposal is to provide for the reactive replacement of gas mains during urgent or emergency situations which fall outside the normal scope of integrity, reinforcement, reliability and public works programs.

Proactive replacement programs are in place for all regions to reduce the inventory of leak prone pipe. Segments of distribution main are identified for replacement during reviews through the use of algorithms that address the risk associated with specific main segments attributes (i.e. leak history, site conditions, etc.). National Grid standards are used to ensure that the risk ranking method of selection is applied consistently across the enterprise. In addition, field identified candidates for replacement are evaluated using the same process/standard. Field recommended main segments are included in the replacement program based on their relative risk ranking.

3.2 Drivers

During maintenance activities, Field Operations may determine that it is prudent or necessary to replace a section of leaking main (normally less than 100 feet) instead of repairing it. In some cases, such as emergencies or during off-hours, it may be difficult to obtain an engineering review of the main segment to determine if it can be replaced under the Proactive Main Replacement program. This program accommodates those occurrences so that the section of main can be replaced using capital funds without the need for engineering review.

3.3 Project Description

For fiscal year 2012/2013, a total of 50 miles of leak prone pipe has been sanctioned for replacement under the Boston Gas Company Proactive Main Replacement program. However, the 1,470 miles of leak prone pipe across Rhode Island's territory far exceeds the proactive replacement work scope. Therefore, situations arise where a field decision may be required to replace a segment of leaking or damaged pipe that does not meet the established criteria for proactive replacement, or it may be practical and cost effective to replace segments of leak prone pipe that are risk ranked lower than those included in the proactive work scope.

Investment Planning has developed 'Reactive Main Replacement Guidelines for Spending' to establish consistency in this process.

3.4 Benefits Summary

- Reductions of leak prone pipe inventory and associated costs to maintain.
- Improved public and community relations by reducing leak activity
- Program contributes positively toward carbon reduction goal

3.5 Business Issues

There are no significant business issues beyond what has been described elsewhere.

3.6 Alternatives

Alternative 1: Reduce or eliminate the Proactive Main Replacement Program. This Alternative delay the current plan for replacement of all Leak Prone Pipe in Rhode Island's territory. It would also increase the exposure to risk associated with leak prone pipes, and may increase customer complaints.

3.7 Safety, Environmental and Project Planning Issues

Environmental impacts will be addressed on an individual project basis. A health and safety plan will be developed when necessary and all National Grid safety and environmental rules will be followed on all projects.

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3.8 Execution Risk Appraisal

Number	Detailed Description of Risk / Opportunity	Probability	Impact		Score		Strategy	Pre-Trigger Mitigation Plan	Residual Risk	Post Trigger Mitigation Plan
			Cost	Schedule	Cost	Schedule				
1	Municipalities apply burdensome restoration requirements	3	4	3	12	9	Mitigate	Negotiation with Municipalities to attempt to reduce restoration costs		Continue to repair main to avoid restoration costs, or complete main replacement and absorb higher restoration costs
2	Permitting restrictions and delays	3	3	3	9	9	Mitigate			Continue to repair main to avoid permitting issues, negotiate with municipality to secure required permits.

3.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
Variable depending upon project location	Certain	Various	Various	Various

3.10 Investment Recovery

3.10.1 Investment Recovery and Regulatory Implications

Investment recovery will be through standard rate recovery mechanisms approved by appropriate regulatory agencies.

US Sanction Paper

3.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the assets are placed in service equal to approximately $195,779. This is indicative only. The actual revenue requirement will differ depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

3.10.3 CIAC / Reimbursement

Not Applicable

3.11 Financial Impact to National Grid

3.11.1 Cost Summary Table

Project Number	Project Title	Project Estimate	Spend	Prior Yrs	Current Planning Horizon Yr. 1 2012/13	Yr. 2 2013/14	Yr. 3 2014/15	Yr. 4 2015/16	Yr. 5 2016/17	Yr. 6 + 2017/18	Total
CON034	Main Replacements-Reactive Programs-Maintenance	+/-10%	CapEx	$ -	$ 0.93	$ -	$ -	$ -	$ -	$ -	$ 0.93
			OpEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
			Removal	$ -	$ 0.09	$ -	$ -	$ -	$ -	$ -	$ 0.09
			Total	$ -	$ 1.02	$ -	$ -	$ -	$ -	$ -	$ 1.02
Total Project Sanction			CapEx	$ -	$ 0.93	$ -	$ -	$ -	$ -	$ -	$ 0.93
			OpEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
			Removal	$ -	$ 0.09	$ -	$ -	$ -	$ -	$ -	$ 0.09
			Total	$ -	$ 1.02	$ -	$ -	$ -	$ -	$ -	$ 1.02

3.11.2 Project Budget Summary Table

Project Costs per Business Plan

	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2012/13	Yr. 2 2013/14	Yr. 3 2014/15	Yr. 4 2015/16	Yr. 5 2016/17	Yr. 6 + 2017/18	Total
CapEx	$ -	$ 0.93	$ -	$ -	$ -	$ -	$ -	$ 0.93
OpEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Removal	$ -	$ 0.09	$ -	$ -	$ -	$ -	$ -	$ 0.09
Total Cost in Bus. Plan	$ -	$ 1.02	$ -	$ -	$ -	$ -	$ -	$ 1.02

Variance (Business Plan-Project Estimate)

	Prior Yrs (Actual)	Current Planning Horizon Yr. 1 2012/13	Yr. 2 2013/14	Yr. 3 2014/15	Yr. 4 2015/16	Yr. 5 2016/17	Yr. 6 + 2017/18	Total
CapEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
OpEx	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Removal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Cost in Bus. Plan	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

3.11.3 Cost Assumptions

Since this is a reactive program, estimated requirements are based on historical costs by region.

The accuracy level of estimate is identified in table 3.11.1.

3.11.4 Net Present Value / Cost Benefit Analysis

This is not an NPV project.

3.11.5 Additional Impacts

No additional impacts.

3.12 Statements of Support

3.12.1 Supporters

Role	Name	Responsibilities
Investment Planning	Michelle Roche	Endorses relative to 5-year business plan or emergent work.
Resource Planning	Artie Georgacopoulos	Endorses resources, cost estimate, schedule, and portfolio alignment.
Project Management	Kevin King	Endorses Resources, cost estimate, schedule

3.12.2 Reviewers

Reads paper for content / language. Recommends edits if necessary

Reviewer List	Name
Finance	Karen Hamel
Regulatory	Gideon Katsh
Jurisdictional Delegates	Walter Fromm

4 Appendices

No Appendices

USSC Closure Paper

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Title:	FY13 RI Service & Main Replacement – Reactive	**Sanction Paper #:**	USSC-12-147C/299C
Project #:	Various – See Appendix	**Sanction Type:**	Closure
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	3/30/2017
Author:	Kevin Browne/Fred Pisani	**Sponsor:**	Neil Proudman, VP Maintenance & construction NE Gas
Utility Service:	Gas	**Project Manager:**	James Finnerty

1 *Executive Summary*

This paper is presented to close the various projects (See Appendix) for FY13 RI Service & Main Replacement Reactive. The total spend was $7.802M. The sanctioned amount for this project was $8.220M ($7.2M+1.02M).

The final spend amount is $7.802M broken down into:

$5.193M Capex
$0.000M Opex
$2.609M Removal

2 *Project Summary*

This proposed blanket investment was to provide approved funding for the reactive replacement of gas services as a result of leaks and non-leak work activities that fall outside the normal scope of integrity, reliability, public works and growth programs. These activities included; randomly occurring underground service leaks, damages, service abandonments due to inactivity or demolition requests, customer driven relocations of existing services and other substandard conditions.

The US GDx proactive main and service replacement programs resulted in the upgrade of existing customer services. Although these programs were prioritized by risk based on pressure, material, vintage, location, and select other variables, the potential for leakage and other maintenance activities on the remaining services exists and required a reactive response to correct the deficiency.

3 Over / Under Expenditure Analysis

3.1 Summary Table

Actual Spending ($M)			
Project #	Description		Total Spend
Various - See Appendix	Various - See Appendix	Capex	5.193
		Opex	0.000
		Removal	2.609
		Total	7.802
Total		Capex	5.193
		Opex	0.000
		Removal	2.609
		Total	7.802

Project Sanction Summary Table			
Project Sanction Approval ($M)			Total Spend
		Capex	8.220
		Opex	0.000
		Removal	0.000
		Total Cost	8.220
Sanction Variance ($M)			Total Spend
		Capex	3.027
		Opex	0.000
		Removal	(2.609)
		Total Variance	0.418

3.2 Analysis

The FY13 RI Service & Main Replacement – Reactive Blanket is 5% under plan which is within the tolerance level

4 Improvements / Lessons Learned/Root Cause

- Improve development of estimating practices.
- Work with Finance and Resource Planning to create better financial metrics.
- Create Long Term resource requirements for future Capital planning.
- Identify carryover or deferred projects in a timely fashion.

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5 *Closeout Activities*

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	(•) Yes ( ) No
All relevant costs have been charged to project	(•) Yes ( ) No
All work orders and funding projects have been closed (1)	( ) Yes (•) No
All unused materials have been returned	(•) Yes ( ) No
All as-builts have been completed (2)	( ) Yes (•) No
All lessons learned have been entered appropriately into the lesson learned database (3)	( ) Yes (•) No

(1) All work orders and funding projects have been closed

Program/Blanket projects may contain work orders and or funding projects which have not yet been closed for reasons including but not limited to:

- the same work order(s) are used annually. They will remain open until Asset Management and/or Resource Planning have determined work orders are no longer needed .
- construction may cross multiple fiscal years
- the work order closing process is within the late charge waiting period
- other accounting processes or final system closing activities have not yet completed

The Program/Blanket projects are approved annually for the current year expected spend and remain open until Asset Management and/or Resource Planning have determined the project is no longer required.

(2) All as-builts have been completed

Program/Blanket projects may contain work orders for which no as-builts have yet been recorded for reasons including but not limited to:

- design and/or construction have not yet completed
- construction may cross multiple fiscal years
- work has completed recently and as-builts have not yet been processed into the system

- does not apply. Work order(s) are not linked to work management systems. (example: Meter Purchases, Meter Changes, AMR Installations Purchase Misc Capital Tools/Equipment, etc.)
- does not apply to Information systems projects.

(3) All lessons learned have been entered appropriately into the lesson learned database

Program/Blanket projects usually contain short cycle work which the Company has been performing over several fiscal years. No new Lessons Learned which have not already been identified and recorded within section 4.

6 Statements of Support

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planner	Pensabene, Patrick M.	Endorses relative to 5-year business plan or emergent work
Resource Planning	Falls, Jonathon	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Project Management	Fortier, Joseph Jr.	Endorses Resources, cost estimate, schedule
Gas Project Estimation	Paul, Art	Endorses Cost Estimate

6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Easterly, Patricia
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Currie, John
Procurement	Curran, Art
Control Center	Loiacono, Paul

USSC Closure Paper

7 ***Decisions***

The US Sanctioning Committee (USSC) approved this paper on March 30, 2017.

Signature Ross W. Turrini Date April 27, 2017

Executive Sponsor – Ross Turrini, Senior Vice President, Gas Process & Engineering and Chief Gas Engineer

USSC Closure Paper

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Appendix

Paper Name	Project	CAP	COR	Grand Total
FY13 RI Service & Main Replacement-Reactive	CON0029	$ 193,063	$ 215,800	$ 408,862
	CON0032	$ 67,053		$ 67,053
	CON0040		$ 32,595	$ 32,595
	CON029	$ 218,554	$ 621,031	$ 839,585
	CON030	$ 3,371,026	$ 230,688	$ 3,601,713
	CON040	$ 124,441	$ 5,971	$ 130,412
	CRFN210			
	CRFN219	$ 102,094	$ 143,495	$ 245,589
	CRFN309	$ 4,370	$ 8,489	$ 12,859
	CRFN310	$ 557	$ 1,183	$ 1,740
	CRFS210	$ 83,869	$ 128,459	$ 212,329
	CRFS219	$ 1,027,523	$ 1,105,419	$ 2,132,943
	CRFS309	$ 557	$ 115,827	$ 116,384
		$ 5,193,107	$ 2,608,956	$ 7,802,063

US Sanction Paper

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Title:	Main Replacement – Reactive (Cast Iron Joint Encapsulation	**Sanction Paper #:**	USSC-12-154
Project #:	Blanket	**Sanction Type:**	Project Sanction
Operating Company:	The Narragansett Electric Company	**Date of Request:**	May 23, 2012
Author:	Fred Amaral	**Sponsor:**	William Akley
Utility Service:	Gas		

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests the sanctioning of $2.00m and a tolerance of +/- 10% for the purposes of providing funding for the reactive repair of leaking cast iron bell joints.

This sanction amount of $2.0M is broken down into:

- $1.83M Capex
- $0.00M Opex
- $0.17M Removal

2 Brief Description:

This proposed blanket investment is to provide approved funding for the repair of cast iron bell joints that occur randomly during the proactive leakage surveys or discovered following public odor calls. The US GDx proactive reactive main replacement programs are prioritized by risk based on pressure, material, vintage, location, and select other variables, the potential for bell joint leakage and repair requirements on the remaining main segments exists and requires a reactive response to correct the deficiency.

This is the first full year of separating the cast iron joint encapsulation from the Service Replacement – Reactive capital category. Investment recommendation was made based on an assumed historical spend.

The repairs are recoverable under the Rhode Island ISR.

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2.1 Summary of Projects:

Project Number	Project Title	Estimate Amount ($)
	Main Replacement – Reactive Cast Iron Joint Replacement	$2.00m
	Total	$2.00m

2.2 Associated Projects:

Project Number	Project Title	Company	Estimate Amount ($)
NA	NA		NA
		Total	$NA

2.3 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
NA	NA	NA	NA	NA

2.4 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
5/2013	Closeout

2.5 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
☒ Mandatory	The work activities that are proposed for funding are both

US Sanction Paper

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☒ Policy-Driven ☐ Justified NPV	mandated and policy driven. It is mandated under DOT part 192 that the Company have a maintenance plan and address leakage repair per that plan. mandated activity.

2.6 Asset Management Risk Score

Asset Management Risk Score: 40

Primary Risk Score Driver: (Policy Driven Projects Only)

☐ Reliability ☐ Environment ☒ Health & Safety

2.7 Complexity Level: (if applicable)

☐ High Complexity ☐ Medium Complexity ☐ Low Complexity

Complexity Score: _____

2.8 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY2013 – FY2017 Gas Capital Plan	☒ Yes ☐ No	☐ Over ☐ Under	$0
	☐ Yes ☐ No	☐ Over ☐ Under	

2.9 If cost > approved Business Plan how will this be funded?

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2.10 Current Planning Horizon:

Narr Electric	Current planning horizon							
$M	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 +	*Total*
Proposed Capex Investment		1.830						1.830
Proposed Opex Investment								0.000
Proposed Removal Investment		0.170						0.170
CIAC / Reimbursement								0.000
Total	$0.000	$2.000	$0.000	$0.000	$0.000	$0.000	$0.000	$2.000

2.11 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☒ Internal	☐ Contractor	
Construction/Implementation Resources to be provided	☒ Internal	☒ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	☐ Red	☐ Amber	☒ Green
Availability of external resources to deliver project:	☐ Red	☐ Amber	☒ Green
Operational Impact			
Outage impact on network system:	☐ Red	☐ Amber	☒ Green
Procurement impact on network system:	☐ Red	☐ Amber	☒ Green

2.12 Key Issues (include mitigation of Red or Amber Resources):

1	NA
2	
3	

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2.13 Key Milestones:

Milestone	**Target Date: (Month/Year)**
Project Closure	5/2013

2.14 Climate Change:

Are financial incentives (e.g. carbon credits) available?		☐ Yes	☒ No
Contribution to National Grid's 2050 80% emissions reduction target:	☒ Neutral	☐ Positive	☐ Negative
Impact on adaptability of network for future climate change:	☒ Neutral	☐ Positive	☐ Negative

2.15 List References:

1	
2	
3	

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3 Recommendations:

The **Sanctioning Authority** USSC is invited to:

(a) APPROVE the investment of **$2.0m** and a tolerance of **+/- 10%**.

(b) NOTE that GDx Leak Management Process Team/RI Area Field Operations Management is the Project Manager and has the approved financial delegation.

Signature..... Date 7-31-12

William Akley, Senior Vice President, Maintenance & Construction

I hereby approve the recommendations made in this paper.

Signature..... Date.....

Christopher E. Root, Senior Vice President, Network Strategy

4 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on May 23, 2012

Signature..... Date 8/14/12

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee

US Sanction Paper

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5 *Sanction Paper Detail*

Title:	Service Replacement - Reactive	**Sanction Paper #:**	
Project #:	Blanket	**Date of Request:**	April 11, 2012
Company Name:	The Narragansett Electric Company	**Sponsor:**	William Akley
		Author:	Fred Amaral

5.1 Background

This proposed blanket investment is to provide approved funding for the repair of cast iron bell joints that occur randomly during the proactive leakage surveys or discovered following public odor calls. The US GDx proactive reactive main replacement programs are prioritized by risk based on pressure, material, vintage, location, and select other variables, the potential for bell joint leakage and repair requirements on the remaining main segments exists and requires a reactive response to correct the deficiency.

This is the first full year of separating the cast iron joint encapsulation from the Service Replacement – Reactive capital category. Investment recommendation was made based on an assumed historical spend.

The repairs are recoverable under the Rhode Island ISR.

5.1.1 Drivers

The main drivers of this investment are safety, reliability, and customer satisfaction.

a. Emergency leak response and repairs associated with on cast iron joint.
b. Customer satisfaction resulting from the elimination of existing leaks and natural gas odors.
c. Extend the life of the existing cast iron gas main.

5.2 Project Description

The blanket investment will provide for the funding of the randomly occurring work activities and requests referenced above. The activities and requests occur on a day-to-day basis and are the routine work activities of the Field Operations Organization.

5.3 Benefits Summary

The project approval will ensure regulatory compliance associated with leak repair and emergency response. In addition, customer satisfaction will be enhanced by eliminating leaks and removing natural gas odors.

5.4 Business Issues

- The proposed investment is part of the current business plan.
- Investment is based on historical spend.
- This is the first full year of separating the joint leak encapsulation activity from the Service Replacement – Reactive capital category.

5.5 Options Analysis

Recommended Option: This option is based on an assumption on historical spending trends. The spend is associated with the randomly occurring nature of the work activities. The spend for this category has been separated from the Service Replacement – Reactive category for FY12..

Alternative 1: Reducing the budget line item is not recommended due to the random nature of the work activities. The completion of work activities are required to meet with regulatory requirements, customer satisfaction and company policies.

5.6 Safety, Environmental and Project Planning Issues

None.

5.7 Execution Risk Appraisal

Number	Status (Active, Dormant, Retired)	Category	Detailed Description of Risk / Opportunity	Cause/Trigger	Probability	Impact		Score		Strategy	Risk Owner	Comments/Actions
						Cost	Schedule	Cost	Schedule			
1	Dormant	Management and Funding	Potential for the repair units and customer requests to increase above historical experience. Management of backlogs and anticipation of resource scheduling requirements will mitigate variances.	Increasing backlogs and the increase of resources/overtime to bring schedule back to a managable level.	2	2	2	4	4	Accept	Area Management	Monitoring of backlogs of work actiities requests and the performance against funding.
								-	-			
								-	-			
								-	-			

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5.8 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
NA				

5.9 Investment Recovery

5.9.1 Investment Recovery and Regulatory Implications

The Main Replacement – reactive category costs are recovered as part of the rate recovery for non-growth/mandated capital expenditures under the ISR portion of the Rhode Island rate case.

5.9.2 Customer Impact

None

5.9.3 CIAC / Reimbursement

$M	CIAC/Reimbursement							
	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 17/18	*Total*
CIAC / Reimbursement		NA						

5.10 Financial Impact to National Grid

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US Sanction Paper

5.10.1 Cost Summary Table

					Current Planning Horizon								
Project #	Project Description	Project Estimate level	$M	Prior YR Spending	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR7+	Total
Project #	Cast Iron Joint Encapsulation		Capex		1.830							1.830
			Opex									0.000
			Removal		0.170							0.170
			Total	0.000	2.000	0.000	0.000	0.000	0.000	0.000	0.000	2.000
Project #												
			Capex		0.000							0.000
			Opex									0.000
			Removal									0.000
			Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Proposed Sanction												
			Capex	0.000	1.830	0.000	0.000	0.000	0.000	0.000	0.000	1.830
			Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.170	0.000	0.000	0.000	0.000	0.000	0.000	0.170

5.10.2 Project Budget Summary Table

Project Budget Summary Table

Project Costs per Business Plan		Prior Year Spending*	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR 7	Total
	Capex	0.000	1.830	0.000	0.000	0.000	0.000	0.000	0.000	1.830
	Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.170	0.000	0.000	0.000	0.000	0.000	0.000	0.170
	Total Cost in B Plan	0.000	2.000	0.000	0.000	0.000	0.000	0.000	0.000	$2.000

* P/Y Actuals

Variance (Business Plan-Project Estimate)		Prior Year Spending	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 16718	YR 7	Total
	Capex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total Variance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	$0.000

5.10.3 Cost Assumptions

Cost assumptions are based on the assumption of historical spend. Both internal and external resource rates are included in the previous years spend and provide a basis for the proposed spend based on previous work activity units. The Rhode Island operation does not have a work management system and previously operated with one capital activity number for all work types.

5.10.4 Net Present Value / Cost Benefit Analysis

Not financially driven

5.10.5 Additional Impacts

None

5.11 Statements of Support

5.11.1 Supporters

Role	Name	Responsibilities
Investment Planning	Michelle Roche	
Regional Field Operations	John Flint	
Resource Planning	Artie Georgacopoulos	

5.11.2 Reviewers

Reviewer List	Name
Finance	Karen Hamel
Regulatory	Gideon Katsh
Procurement	John Kavanaugh
Jurisdictional Delegates	Laurie Brown

USSC Closure Paper

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Title:	Main Replacement – Reactive (Cast Iron Joint Encapsulation)	**Sanction Paper #:**	USSC-12-154C
Project #:	Various – (See Appendix)	**Sanction Type:**	Closure
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	March 30, 2017
Author:	Kevin Browne/Fred Pisani	**Sponsor:**	John Stavrakas, VP Gas Asset Management
Utility Service:	Gas	**Project Manager:**	Joseph Fortier, Jr.

1 *Executive Summary*

This paper is presented to close various projects (see appendix) for Main Replacement – Reactive (Cast Iron Joint Encapsulation). The total spend was $2.686M. The sanctioned amount for this project was $2.000M.

The final spend amount is $2.686M broken down into:

$2.074M Capex
$0.000M Opex
$0.612M Removal

2 *Project Summary*

This proposed blanket investment was to provide approved funding for the repair of cast iron bell joints that occur randomly during the proactive leakage surveys or discovered following public odor calls. The US GDx proactive reactive main replacement programs are prioritized by risk based on pressure, material, vintage, location and select other variables, the potential for bell joint leakage and repair requirements on the remaining main segments exists and required a reactive response to correct the deficiency.

This was the first full year of separating the cast iron joint encapsulation from the Service Replacement – Reactive capital category. Investment recommendation was made based on an assumed historical spend.

The repairs are recoverable under the Rhode Island ISR.

USSC Closure Paper

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3 Over / Under Expenditure Analysis

3.1 Summary Table

Actual Spending ($M)			
Project #	Description		Total Spend
Various - See Appendix	Various - See Appendix	Capex	2.074
		Opex	0.000
		Removal	0.612
		Total	2.686
Total		Capex	2.074
		Opex	0.000
		Removal	0.612
		Total	2.686

Project Sanction Summary Table			
Project Sanction Approval ($M)			Total Spend
		Capex	2.000
		Opex	0.000
		Removal	0.000
		Total Cost	2.000
Sanction Variance ($M)			Total Spend
		Capex	(0.074)
		Opex	0.000
		Removal	(0.612)
		Total Variance	(0.686)

3.2 Analysis

The Main Replacement – Reactive (Cast Iron Joint Encapsulation) Blanket is 34% over plan. There are multiple contributing factors to the overruns. There were challenges with estimates on larger projects within the blanket. Lack of communications around job scope changes affected the estimates. Restoration/municipality cost requirements continue to increase. Several carryover jobs were not included in total program costs. In addition, continued Safety requirement improvements caused delays/increases in costs.

4 *Improvements / Lessons Learned/Root Cause*

- Improve development of estimating practices.
- Work with Finance and Resource Planning to create better financial metrics.
- Create Long Term resource requirements for future Capital planning.
- Identify carryover or deferred projects in a timely fashion.

5 *Closeout Activities*

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	(•) Yes ( ) No
All relevant costs have been charged to project	(•) Yes ( ) No
All work orders and funding projects have been closed (1)	( ) Yes (•) No
All unused materials have been returned	(•) Yes ( ) No
All as-builts have been completed (2)	( ) Yes (•) No
All lessons learned have been entered appropriately into the lesson learned database (3)	( ) Yes (•) No

(1) All work orders and funding projects have been closed

Program/Blanket projects may contain work orders and or funding projects which have not yet been closed for reasons including but not limited to:

- the same work order(s) are used annually. They will remain open until Asset Management and/or Resource Planning have determined work orders are no longer needed .
- construction may cross multiple fiscal years
- the work order closing process is within the late charge waiting period
- other accounting processes or final system closing activities have not yet completed

The Program/Blanket projects are approved annually for the current year expected spend and remain open until Asset Management and/or Resource Planning have determined the project is no longer required.

(2) All as-builts have been completed

Program/Blanket projects may contain work orders for which no as-builts have yet been recorded for reasons including but not limited to:

- design and/or construction have not yet completed
- construction may cross multiple fiscal years
- work has completed recently and as-builts have not yet been processed into the system
- does not apply. Work order(s) are not linked to work management systems. (example: Meter Purchases, Meter Changes, AMR Installations Purchase Misc Capital Tools/Equipment, etc.)
- does not apply to Information systems projects.

(3) All lessons learned have been entered appropriately into the lesson learned database

Program/Blanket projects usually contain short cycle work which the Company has been performing over several fiscal years. No new Lessons Learned which have not already been identified and recorded within section 4.

6 Statements of Support

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planner	Pensabene, Patrick M.	Endorses relative to 5-year business plan or emergent work
Resource Planning	Falls, Jonathon	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Project Management	Fortier, Joseph Jr.	Endorses Resources, cost estimate, schedule
Gas Project Estimation	Paul, Art	Endorses Cost Estimate

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6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Easterly, Patricia
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Currie, John
Procurement	Curran, Art
Control Center	Loiacono, Paul

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7 ***Decisions***

I approve this paper.

Signature Ross W. Turrini Date April 27, 2017

Executive Sponsor – Ross Turrini, Senior Vice President, Gas Process & Engineering and Chief Gas Engineer

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Appendix

Paper Name	Project	CAP	COR	Grand Total
FY13 RI Main replacement-Reactive (Cast Iron Joint Encapsulation)	C039267	$ 141,469	$ 73,996	$ 215,464
	C39267	$ 1,042,291	$ 27,438	$ 1,069,729
	CON0030	$ 879,066	$ 501,227	$ 1,380,293
	CON030	$ 8,100		$ 8,100
	CRFN211	$ 1,020	$ 3,381	$ 4,402
	CRFS211	$ 1,825	$ 6,281	$ 8,106
		$ 2,073,772	$ 612,323	$ 2,686,094

US Sanction Paper

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Title:	Rhode Island Service Replacement Program	**Sanction Paper #:**	USSC-12-210
Project #:	CON034	**Sanction Type:**	Sanction
Operating Company:	Narragansett Electric Company	**Date of Request:**	April 25, 2012
Authors:	Walter Fromm, Laeyeng Hunt, Artie Georgacopoulos,Tom Finneral and Saadat Khan	**Sponsor:**	Tim Small - Gas Systems Engineering
Utility Service:	Gas		

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests sanction of the FY2013 Rhode Island Proactive Gas Service Replacement Program in the amount of $3.906M, with a tolerance of +/- ten percent (10%), for the purpose of replacing 1,625 high pressure, unprotected steel services with inside meters/regulators located in the Rhode Island service territory.

This sanction amount of $3.906M is broken down into:

- $3.515M Capex
- $0.000M Opex
- $0.391M Removal

1.2 Brief Description:

Following an engineering assessment of National Grid's steel gas service assets in 2007, a determination was made to replace all high pressure, unprotected steel services with meter/regulators located inside a building over a 5-year period (2008 thru 2012). The engineering assessment included both detailed asset inventory analyses (i.e. age, material, inside vs. outside, etc.), as well as pressure testing on services throughout the enterprise. Although test results varied throughout the enterprise, test program results indicate the "wall piece" is of integrity concern. A total of 548 services were pressure tested in RI with a failure rate of 5.1%. The purpose of the service replacement is to mitigate the risk of failure of the "wall piece", which is the section of service piping that penetrates through the foundation wall of the building. Since this section of pipe is embedded in the foundation wall (or in a sleeve in the foundation wall) it cannot be visually inspected and there is the potential for undetected corrosion of the steel pipe to take place. The method of replacement involves replacing the steel service with plastic tubing, typically by inserting the plastic inside the existing steel service and relocating the meter/regulator outside the building.

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The National Grid US enterprise wide inventory of high pressure, unprotected steel services with inside meter/regulators was 33,330 at the beginning of CY2012. The inventory of services in the Rhode Island operating region was approximately 3,600 at the beginning of CY2012. To date, all of the remaining 3,600 services have been verified and issued to Field Operations. The Company anticipates replacement of these 3,600 services over the next two (2) years (CY2012 through CY2013) through the combined efforts of the Service Replacement Program (SRP), replacement of services that are leaking and replacement of services associated with the Main Replacement Program (MRP).

The replacement of leak prone services is also supported by the Company's recently developed Distribution Integrity Management Plan (DIMP), which specifies that the Company implement measures to: know its system; understand the threats to its distribution piping system; and evaluate risks and prepare replacement programs to help mitigate the risks to its leak prone mains and services inventory.

The remuneration method for costs included in this FY2013 program, and for future years, will be provided through the Gas Infrastructure, Safety and Reliability (ISR) Plan. The Gas ISR Plan covers the majority of Capital Spend ($61.59 million out of $71.01 million; excluded is capital Growth spending). The primary benefits to the ISR Plan, include expanding the scope of "covered spend" and the ability to begin remuneration for Capital spend prior to the construction season.

1.3 Summary of Projects:

Project Number	Project Title	Estimate Amount ($)
CON034	Rhode Island Service Replacement Program	$3.906M
	Total	$3.906M

1.4 Associated Projects:

Project Number	Project Title	Company	Number of Services
N/A			
		Total	

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1.5 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Type of Approval (Sanction)
01/25/12	USSC	$3.2M	Rhode Island Service Replacement Program	Resanctioned

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
July 2013	Closure

1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
☐ Mandatory ☒ Policy-Driven ☐ Justified NPV	The classification of this program is policy. The program is in accordance with the Company's policy to deliver safe and reliable gas service to its customers. The program is also in accordance with the Company's recently developed DIM Plan (as specified by US DOT, 49 CFR Part 192, Subpart P, entitled; "Gas Distribution Pipeline Integrity Management Plan") The program also meets the requirements set forth in the RI Gas Infrastructure, Safety and Reliability ("ISR") Plan.

1.8 Asset Management Risk Score

Asset Management Risk Score: **44**

Primary Risk Score Driver: (Policy Driven Projects Only)

☐ Reliability ☐ Environment ☒ Health & Safety

1.9 Complexity Level: (if applicable)

☐ High Complexity ☐ Medium Complexity ☐ Low Complexity

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Complexity Score: **N/A**

1.10 Business Plan:

FY2013-2017 Gas Capital Plan

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
Rhode Island - FY2013 Mandated Service Replacements – Proactive Programs; BS HP Leak Prone Services	☒ Yes ☐ No	☐ Over ☐ Under	$0M
	☐ Yes ☐ No	☐ Over ☐ Under	

1.11 If cost > approved Business Plan how will this be funded?

Business plan equals project cost. Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

1.12 Current Planning Horizon:

$M	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 +	*Total*
Proposed Capex Investment	$0.000	$3.515	$0.000	$0.000	$0.000	$0.000		$3.515
Proposed Opex Investment	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000		$0.000
Proposed Removal Investment	$0.000	$0.391	$0.000	$0.000	$0.000	$0.000		$0.391
CIAC / Reimbursement	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000		$0.000
Total	$0.000	$3.906	$0.000	$0.000	$0.000	$0.000	$0.000	$3.906

1.13 Resources:

Resource Sourcing		
Engineering & Design Resources to be provided	☒ Internal	☐ Contractor

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Construction/Implementation Resources to be provided	☒ Internal		☒ Contractor
***Resource Delivery**			
Availability of internal resources to deliver project:	☐ Red	☐ Amber	☒ Green
Availability of external resources to deliver project:	☐ Red	☐ Amber	☒ Green
Operational Impact			
Outage impact on network system:	☐ Red	☐ Amber	☒ Green
Procurement impact on network system:	☐ Red	☐ Amber	☒ Green

1.14 Key Issues (include mitigation of Red or Amber Resources):

1	Current inventory of services that meet program criteria in Rhode Island is 3,600
2	Program is in accordance with the Company's recently developed DIM Plan, which specifies that the Company implement measures to: knows its system; understands the threats to its distribution piping system; and to evaluate risks and prepare replacement programs to help mitigate the risks to its leak prone mains and services inventory
3	Engineering analysis has shown that there is risk associated with service wall piece penetration associated with high pressure unprotected steel services with inside meters
4	Leak Prone services score high [Risk Score of 44] on the global risk ranking of all assets
5	Wall piece pressure test program has shown a failure rate of 5.1% in Rhode Island
6	Mercury regulators will be replaced in conjunction with the service replacement program
7	Regulatory Commitments: • Rhode Island Gas ISR in place which allows for remuneration of program costs to begin prior to the construction season
8	Prioritization of replacements is based on risk consistent with the recommendations from the Operations Performance Group which has identified vintage and corrosive environment as the key variables

1.15 Key Milestones:

Milestone	**Target Date: (Month/Year)**
Identify associated leak prone services that meet program criteria and issue to Resource Planning and Field Operations	December 2011
Start Applying for Permits	January 2012

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Milestone	Target Date: (Month/Year)
Engage Required Resources	January 2012
Project Sanction Approval	April 2012
Construction Start	April 2012
Construction Complete	March 2013
Project Closure Report	June 2013

1.16 Climate Change:

Are financial incentives (e.g. carbon credits) available?		☐ Yes	☒ No
Contribution to National Grid's 2050 80% emissions reduction target:	☐ Neutral	☒ Positive	☐ Negative
Impact on adaptability of network for future climate change:	☒ Neutral	☐ Positive	☐ Negative

1.17 List References:

1	National Grid Gas Distribution Integrity Management Plan (DIMP), dated August 2011
2	Wall Piece Pressure Test Results - Summary Sheets

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2 Recommendations:

Use this box for full Project Sanction

The US Sanctioning Committee (USSC) is invited to:

(a) **APPROVE:** the sanction investment of $3.906M, with a tolerance of +/- 10%, for the FY2013 Rhode Island Proactive Gas Service Replacement Program for the purpose of replacing 1,625 high pressure, unprotected steel services with inside meters/regulators located in the Rhode Island service territory

(b) **NOTE:** that Walter Fromm is the Project Manager and has the approved financial delegation to undertake the activities stated in (a).

Signature..... Date.....

Timothy F. Small, Vice President of Gas Systems Engineering, Network Strategy

I hereby approve the recommendations made in this paper.

Signature.....Date.....

Christopher E. Root, Senior Vice President, Network Strategy

3 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on April 11, 2012.

Signature.....Date.....

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee

US Sanction Paper

4 Sanction Paper Detail

Title:	Rhode Island Service Replacement Program	**Sanction Paper #:**	USSC-12-210	
Project #:	CON034	**Date of Request:**	April 11, 2012	
Company Name:	Narragansett Electric Company	**Sponsor:**	Tim Small - Gas Systems Engineering	
Authors:		Walter Fromm, Laeyeng Hunt, Artie Georgacopoulos,Tom Finneral and Saadat Khan	**Sponsor:**	Tim Small Gas Systems Engineerin
Utility Service:		Gas		

4.1 Background

Following an engineering assessment of National Grid's steel gas service assets in 2007, a determination was made to replace all high pressure, unprotected steel services with meter/regulators located inside a building over a 5-year period (2008 thru 2012). The engineering assessment included both detailed asset inventory analyses (i.e. age, material, inside vs. outside, etc.), as well as pressure testing on services throughout the enterprise. Although test results varied throughout the enterprise, test program results indicate the "wall piece" is of integrity concern. A total of 548 services were pressure tested in RI with a failure rate of 5.1%. The purpose of the service replacement is to mitigate the risk of failure of the "wall piece", which is the section of service piping that penetrates through the foundation wall of the building. Since this section of pipe is embedded in the foundation wall (or in a sleeve in the foundation wall) it cannot be visually inspected and there is the potential for undetected corrosion of the steel pipe to take place. The method of replacement involves replacing the steel service with plastic tubing, typically by inserting the plastic inside the existing steel service and relocating the meter/regulator outside the building.

The National Grid US enterprise wide inventory of high pressure, unprotected steel services with inside meter/regulators was 33,330 at the beginning of CY2012. The inventory of services in the Rhode Island operating region was approximately 3,600 at the beginning of CY2012. To date, all of the remaining 3,600 services have been verified and issued to Field Operations. The Company anticipates replacement of these 3,600 services over the next two (2) years (CY2012 through CY2013) through the combined efforts of the Service Replacement Program (SRP), replacement of services that are leaking and replacement of services associated with the Main Replacement Program (MRP).

The replacement of leak prone services is also supported by the Company's recently developed Distribution Integrity Management Plan (DIMP), which specifies that the

Company implement measures to: know its system; understand the threats to its distribution piping system; and evaluate risks and prepare replacement programs to help mitigate the risks to its leak prone mains and services inventory.

4.2 Drivers

Current Regulatory Agreement

The remuneration method for costs included in this FY2013 program, and for future years, will be provided through the Gas Infrastructure, Safety and Reliability (ISR) Plan. The Gas ISR Plan covers the majority of Capital Spend ($61.59 million out of $71.01 million; excluded is capital Growth spending). The primary benefits to the ISR Plan, include expanding the scope of "covered spend" and the ability to begin remuneration for Capital spend prior to the construction season.

The overall goal of the program is to reduce risk associated with unprotected steel services, with specific focus on the wall piece section. As the program continues, it is expected that the service leak rate will decrease. Consequently, both O&M (leak investigation, re-survey, etc.) and Cap Ex (demand leak repair) costs associated with responding to service leaks will decrease.

Reduce risk associated with leak prone services (as described above in Section 4.1 Background). Asset Management risk score of 44 (high risk, Health & Safety).

4.3 Project Description

The scope of the FY2012/2013 program includes the replacement of 1,625 steel services with inside meter sets. Services will be replaced from the curb valve to the meter. Meter sets will be relocated outside where physically possible. It is expected that the service from the main to the curb valve will be replaced as part of the main replacement program at a later date in order to minimize pavement disturbance and/or restoration. Additionally, previously identified mercury regulators will be replaced in conjunction with the service replacement program. If more mercury regulators are found throughout the year, they will be replaced as well.

The Company anticipates replacing the remaining 1,975 services during CY2013 through the combined efforts of the Service Replacement Program (SRP), replacement of services that are leaking and replacement of services associated with the Main Replacement Program (MRP).

Prioritization of replacements is based on risk consistent with the recommendations from the Operations Performance Group, which has identified vintage and corrosive environment as the key variables.

4.4 Benefits Summary

- Reduction of risk associated with leak prone services
- Reduce the potential for incidents
- Balance risk across the enterprise
- Reduce/eliminate leaks over time (O&M spend reduction)
- Removal of mercury regulators as part of service replacements
- Improved public, community and government relations due to decreased odor calls
- Contribute positively towards the Company's carbon reduction goals

4.5 Business Issues

The Program is included in the approved FY12/13 capital plan

4.6 Options Analysis

Recommended - Replace 1,625 High Pressure, Unprotected Steel Gas Services with Inside Meters/Regulators
Existing regulatory agreement in-place (ISR) which allows for remuneration of capital spend prior to construction season. Balances resource requirements. Allows for the reduction of risk associated with this inventory of leak prone services.

Do Nothing/Minimal Replacement
This option will result in an increased risk of a service failure, potentially providing a path for gas to enter the customer's dwelling. Negative impact on relationship with RI DPUC as we must adhere to the safety replacement program commitments agreed to in the Rhode Island Gas ISR.

4.7 Safety, Environmental and Project Planning Issues

Investigation of the program scope confirmed there are no extraordinary environmental issues. Any previously unidentified Mercury (Hg) Regulators discovered as part of the service replacement process will be handled in accordance with Technical Instruction 060010, "Removing Mercury Regulators and Devices". Additionally, since the replacement service will be tied into existing facilities, customer impact is expected to be minimal.

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4.8 Execution Risk Appraisal

Number	Status (Active, Dormant, Retired)	Category	Detailed Description of Risk / Opportunity	Cause/Trigger	Probability	Impact		Score		Strategy	Risk Owner	Comments/Actions
						Cost	Schedule	Cost	Schedule			
	Active	Construction	Availability of resources	In-House Crews are too busy with other work	2	5	3	10	6	Mitigate	Resource Planning	Close coordination between Resource Planning and Field Operations to ensure crews are available to deliver work plan
	Active	Construction	Project cost increases	Unknown field conditions. Material cost increases.	3	3	3	9	9	Mitigate	Resource Planning / Field Operations	Prepare budgetary estimates for the program building in contingencies for unknowns and applicable materials
	Active	Construction	Inclement Weather	Rain, Snow	3	3	3	9	9	Accept	Resource Planning / Field Operations	

4.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
Municipal (City/Town)	Likely	As required	In Progress	As required to support the various project schedules
State (DOT)	Likely	As required	In Progress	As required to support the various project schedules
Environmental	Unlikely	As required	In Progress	As required to support the various project schedules

4.10 Investment Recovery

4.10.1 Investment Recovery and Regulatory Implications

The remuneration method for costs included in this FY2013 program, and for future years, will be provided through the Gas Infrastructure, Safety and Reliability (ISR) Plan. The Gas ISR Plan covers the majority of Capital Spend ($61.59 million out of $71.01 million; excluded is capital Growth spending). The primary benefits to the ISR Plan, include expanding the scope of "covered spend" and the ability to begin remuneration for Capital spend prior to the construction season.

Failure to meet the expectations detailed in the Gas ISR may result in a loss of credibility with the Rhode Island Division of Public Utilities and Carriers (RI DPUC).

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4.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the assets are placed in service equal to approximately $0.738M. This is indicative only. The actual revenue requirement will differ depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

Reduced leak activity will result in improve customer satisfaction levels.

4.10.3 CIAC / Reimbursement

N/A

4.11 Financial Impact to National Grid

4.11.1 Cost Summary Table

				Current Planning Horizon								
Project #	Project Description	Project Estimate level	$M	Prior YR Spending	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6 16/17	YR7+	Total
Project #	Description		Capex			3.515						3.515
			Opex									0.000
			Removal			0.391						0.391
			Total	0.000	0.000	3.906	0.000	0.000	0.000	0.000	0.000	3.906
Project #	Description											
			Capex									0.000
			Opex									0.000
			Removal									0.000
			Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Proposed Sanction												
			Capex	0.000	0.000	3.515	0.000	0.000	0.000	0.000	0.000	3.515
			Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.000	0.391	0.000	0.000	0.000	0.000	0.000	0.391
			Total	0.000	0.000	3.906	0.000	0.000	0.000	0.000	0.000	3.906
				$0.000	$0.000	$3.906	$0.000	$0.000	$0.000	$0.000	$0.000	$3.906

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4.11.2 Project Budget Summary Table

Total Project Current Year and Future Years Cost = $3.906 M

Project Budget Summary Table

Project Costs per Business Plan	Prior Year Spending*	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6 16/17	YR 7	Total
Capex	0.000	0.000	3.515	0.000	0.000	0.000	0.000	0.000	3.515
Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.391	0.000	0.000	0.000	0.000	0.000	0.391
Total Cost in B Plan	0.000	0.000	3.906	0.000	0.000	0.000	0.000	0.000	$3.906

*PY Actuals

Variance (Business Plan-Project Estimate)	Prior Year Spending	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6 16/17	YR 7	Total
Capex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Variance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	$0.000

4.11.3 Cost Assumptions

Program cost estimates were based on the replacement of 1,625 services in FY2012/2013. The established unit price for this program is $2,400 per service, which was based on FY2011/2012 actual costs.

4.11.4 Net Present Value / Cost Benefit Analysis

N/A

4.11.5 Additional Impacts

N/A

4.12 Statements of Support

4.12.1 Supporters

Role	Name	Responsibilities
Sponsor/ Asset Manager/ Asset Owner/ Process Owner		Endorses the project aligns with jurisdictional objectives
Investment Planning	Michelle Roche	
Resource Planning	Artie Georgacopoulos	

Construction	Tom Finneral	

4.12.2 Reviewers

Reads paper for content / language. Recommends edits if necessary

Reviewer List	**Name**
Finance	Karen Hamel
Regulatory	Gideon Katsh
Procurement	John Kavanaugh
Jurisdictional Delegates	Laurie Brown

5 Appendices

5.1 Project Cost Breakdown

Project Cost Breakdown		
Cost Category	**Company Name ($ Amount)**	**Description of Cost Category**
Total:		

5.2 Other Appendices

5.3 NPV Summary (if applicable)

5.4 Customer Outreach Plan (if applicable)

USSC Closure Paper

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Title:	Rhode Island Service Replacement Program	**Sanction Paper #:**	USSC-12-039C
Project #:	C031892 C31892 CON040 CRCC218	**Sanction Type:**	Closure
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	March 30, 2017
Author:	Saadat Khan	**Sponsor:**	Robert DeMarinis, VP Maintenance & Construction - NY
Utility Service:	Gas	**Project Manager:**	Joseph Fortier

1 *Executive Summary*

This paper is presented to close CO31892, C31892, CON040, CRCC218. The total spend was $3.826M . The latest sanctioned amount for this project was $3.2M. The originally sanctioned amount was 3.9M (USSC-12-210).

The final spend amount is $3.826 broken down into:

$3.484 M Capex
$0.000 M Opex
$0.343 Removal

2 *Project Summary*

The scope of the FY2011/2012 program included the replacement of 2,125 steel services with inside meter sets. Services was replaced from the curb valve to the meter. Meter sets have been relocated outside where physically possible.The service from the main to the curb valve was replaced as part of the main replacement program in order to minimize pavement disturbance and/or restoration. Additionally, previously identified mercury regulators were replaced in conjunction with the service replacement program. If more mercury regulators are found throughout the year, they will be replaced as well. As mentioned above, this program asks for USSC Resanction approval to reduce the FY2011/2012 program from the planned replacement of 2,125 high pressure, unprotected steel gas services with inside meter sets to (i) replacing 850 high pressure, unprotected steel gas services with inside meter sets and (ii) remediating 364 farm tap service regulators.

Prioritization of replacements was based on risk consistent with the recommendations from the Operations Performance Group, which identified vintage and corrosive environment as the key variables.

3 Over / Under Expenditure Analysis

3.1 Summary Table

Actual Spending ($M)			
Project #	**Description**		**Total Spend**
C031892	Service Replacement Program	Capex	0.208
		Opex	0.000
		Removal	0.173
		Total	0.381
Project #	**Description**		**Total Spend**
C31892	Service Replacement Program	Capex	3.274
		Opex	0.000
		Removal	0.170
		Total	3.444
Project #	**Description**		**Total Spend**
CON040	RI-Gas-Repl Serv Install-RI Bl	Capex	0.000
		Opex	0.000
		Removal	0.000
		Total	0.000
Project #	**Description**		**Total Spend**
CRCC218	PROACT SERV REPLACE PROG-RI	Capex	0.001
		Opex	0.000
		Removal	0.000
		Total	0.001
Total		Capex	3.483
		Opex	0.000
		Removal	0.343
		Total	3.826

Project Sanction Summary Table			
Project Sanction Approval ($M)			Total Spend
		Capex	3.900
		Opex	0.000
		Removal	0.000
		Total Cost	3.900
Sanction Variance ($M)			Total Spend
		Capex	0.416
		Opex	0.000
		Removal	(0.343)
		Total Variance	0.073

3.2 *Analysis*

The RI Service Replacement Program is 2% under plan which is within the tolerance level.

4 *Improvements / Lessons Learned/Root Cause*

- Improve development of estimating practices.
- Work with Finance and Resource Planning to create better financial metrics.
- Create Long Term resource requirements for future Capital planning.
- Identify carryover or deferred projects in a timely fashion.

5 *Closeout Activities*

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	(•) Yes ( ) No
All relevant costs have been charged to project	(•) Yes ( ) No
All work orders and funding projects have been closed (1)	( ) Yes (•) No
All unused materials have been returned	(•) Yes ( ) No
All as-builts have been completed (2)	( ) Yes (•) No
All lessons learned have been entered appropriately into the lesson learned database (3)	( ) Yes (•) No

USSC Closure Paper

(1) All work orders and funding projects have been closed

Program/Blanket projects may contain work orders and or funding projects which have not yet been closed for reasons including but not limited to:

- the same work order(s) are used annually. They will remain open until Asset Management and/or Resource Planning have determined work orders are no longer needed .
- construction may cross multiple fiscal years
- the work order closing process is within the late charge waiting period
- other accounting processes or final system closing activities have not yet completed

The Program/Blanket projects are approved annually for the current year expected spend and remain open until Asset Management and/or Resource Planning have determined the project is no longer required.

(2) All as-builts have been completed

Program/Blanket projects may contain work orders for which no as-builts have yet been recorded for reasons including but not limited to:

- design and/or construction have not yet completed
- construction may cross multiple fiscal years
- work has completed recently and as-builts have not yet been processed into the system
- does not apply. Work order(s) are not linked to work management systems. (example: Meter Purchases, Meter Changes, AMR Installations Purchase Misc Capital Tools/Equipment, etc.)
- does not apply to Information systems projects.

(3) All lessons learned have been entered appropriately into the lesson learned database

Program/Blanket projects usually contain short cycle work which the Company has been performing over several fiscal years. No new Lessons Learned which have not already been identified and recorded within section 4.

6 Statements of Support

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planner	Pensabene, Patrick M.	Endorses relative to 5-year business plan or emergent work
Resource Planning	Falls, Jonathon	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Project Management	Fortier, Joseph Jr.	Endorses Resources, cost estimate, schedule
Gas Project Estimation	Paul, Art	Endorses Cost Estimate

6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Easterly, Patricia
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Currie, John
Procurement	Curran, Art
Control Center	Loiacono, Paul

USSC Closure Paper

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7 ***Decisions***

I approve this paper.

Signature Ross W. Turrini Date April 27, 2017

Executive Sponsor – Ross Turrini, Senior Vice President, Gas Process & Engineering and Chief Gas Engineer

US Sanction Paper

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Title:	Service Replacement - Reactive	**Sanction Paper #:**	USSC-12-147
Project #:	Blanket	**Sanction Type:**	Project Sanction
Operating Company:	The Narragansett Electric Company	**Date of Request:**	May 23, 2012
Author:	Fred Amaral	**Sponsor:**	William Akley
Utility Service:	Gas		

1 *Executive Summary*

1.1 Sanctioning Summary:

This paper requests the sanctioning of $7.20m and a tolerance of +/- 10% for the purposes of providing funding for the reactive repair and replacement of existing underground services.

The sanction amount of $7.20m is broken down into;

Service Replacement – Leaks	$5.67m Capex
Service Replacement – Non-Leaks/Other	$0.91m Capex
Cost of Removal	$0.62m Capex
	$0.00m Opex

1.2 Brief Description:

This proposed blanket investment is to provide approved funding for the reactive replacement of gas services as a result of leaks and non-leak work activities that fall outside the normal scope of integrity, reliability, public works and growth programs. These activities include; randomly occurring underground service leaks, damages, service abandonments due to inactivity or demolition requests, customer driven relocations of existing services, and other substandard conditions.

The US GDx proactive main and service replacement programs result in the upgrade of existing customer services. Although these programs are prioritized by risk based on pressure, material, vintage, location, and select other variables, the potential for leakage and other maintenance activities on the remaining services exists and requires a reactive response to correct the deficiency.

US Sanction Paper

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1.3 Summary of Projects:

Project Number	Project Title	Estimate Amount ($)
	Service Replacement – Reactive Leaks. Service Replacement – Reactive Non-leak/Other	$6.20m $1.00m
	Total	$7.20m

1.4 Associated Projects:

Project Number	Project Title	Company	Estimate Amount ($)
NA	NA		NA
		Total	$NA

1.5 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
NA	NA	NA	NA	NA

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
5/2013	Closeout

1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
☒ Mandatory ☒ Policy-Driven ☐ Justified NPV	The work activities that are proposed for funding are both mandated and policy driven. It is mandated under DOT part 192 that the Company have a maintenance plan and address leakage repair per that plan. Customer driven requests are policy driven.

US Sanction Paper

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1.8 Asset Management Risk Score

Asset Management Risk Score: _____ Leaks = 40, Non-Leaks/Other = 21

Primary Risk Score Driver: (Policy Driven Projects Only)

☐ Reliability ☐ Environment X Health & Safety

1.9 Complexity Level: (if applicable)

☐ High Complexity ☐ Medium Complexity ☐ Low Complexity

Complexity Score: _____

1.10 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY2013 – FY2017 Gas Capital Plan	☒ Yes ☐ No	☐ Over ☐ Under	$0
	☐ Yes ☐ No	☐ Over ☐ Under	

1.11 If cost > approved Business Plan how will this be funded?

US Sanction Paper

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1.12 Current Planning Horizon:

Narr Electric	Current planning horizon							
$M	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 +	*Total*
Proposed Capex Investment		6.580						6.580
Proposed Opex Investment								0.000
Proposed Removal Investment		0.620						0.620
CIAC / Reimbursement								0.000
Total	$0.000	$7.200	$0.000	$0.000	$0.000	$0.000	$0.000	$7.200

1.13 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☐ Internal	☐ Contractor	
Construction/Implementation Resources to be provided	☒ Internal	☒ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	☐ Red	☐ Amber	☒ Green
Availability of external resources to deliver project:	☐ Red	☐ Amber	☒ Green
Operational Impact			
Outage impact on network system:	☐ Red	☐ Amber	☒ Green
Procurement impact on network system:	☐ Red	☐ Amber	☒ Green

1.14 Key Issues (include mitigation of Red or Amber Resources):

1	NA
2	
3	

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1.15 Key Milestones:

Milestone	**Target Date: (Month/Year)**
Project Closure	5/2012

1.16 Climate Change:

Are financial incentives (e.g. carbon credits) available?		☐ Yes	☒ No
Contribution to National Grid's 2050 80% emissions reduction target:	☒ Neutral	☐ Positive	☐ Negative
Impact on adaptability of network for future climate change:	☒ Neutral	☐ Positive	☐ Negative

1.17 List References:

1	
2	
3	

US Sanction Paper

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2 *Recommendations:*

The **Sanctioning Authority** USSC is invited to:

(a) APPROVE the investment of **$7.20m** and a tolerance of **+/- 10%**

(b) NOTE that GDx Leak Management Process Team/RI Area Field Operations Management is the Project Manager and has the approved financial delegation.

Signature..... Date 7-31-12

William Akley, Senior Vice President, Maintenance & Construction

I hereby approve the recommendations made in this paper.

Signature..... Date 8/6/12

Christopher E. Root, Senior Vice President, Network Strategy

3 *Decisions*

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on May 23, 2012.

Signature..... Date 8/14/12

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee

US Sanction Paper

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4 *Sanction Paper Detail*

Title:	Service Replacement - Reactive	**Sanction Paper #:**	
Project #:	Blanket	**Date of Request:**	April 11, 2012
Company Name:	The Narragansett Electric Company	**Sponsor:**	William Akley
		Author:	Fred Amaral

4.1 Background

This proposed blanket investment is to provide approved funding for the reactive replacement of gas services as a result of leaks and non-leak work activities that fall outside the normal scope of integrity, reliability, public works and growth programs. These activities include; randomly occurring underground service leaks, damages, service abandonments due to inactivity or demolition requests, customer driven relocations of existing services, inside corrosion inspections and other substandard conditions.

The US GDx proactive main and service replacement programs result in the upgrade of existing customer services. Although these programs are prioritized by risk based on pressure, material, vintage, location, and select other variables, the potential for leakage and other maintenance activities on the remaining services exists and requires a reactive response to correct the deficiency.

4.2 Drivers

The main drivers of this investment are safety, reliability, and customer satisfaction.

a. Emergency leak response and repairs associated with leaks on underground service lines caused by facility deterioration or damage.
b. Service abandonment due to inactive status or customer requests (demolitions).
c. Customer requested service relocations.
d. Replacement due to atmospheric or substandard conditions.

4.3 Project Description

The blanket investment will provide for the funding of the randomly occurring work activities and requests referenced above. The activities and requests occur on a day-to-day basis and are the routine work activities of the Field Operations Organization.

4.4 Benefits Summary

The project approval will ensure regulatory compliance associated with leak repair, emergency response, and inactive service abandonment. In addition, customer satisfaction with respect to meeting their specific request such as; relocations and abandonments for demolitions will be met.

4.5 Business Issues

- The proposed investment is part of the current business plan.
- Investment is based on historical spend.

4.6 Options Analysis

Recommended Option: This option is based on historical spending trends. The spend is associated with the randomly occurring nature of the work activities. Total spend for the category has been consistent for the two previous years.

Alternative 1: Reducing the budget line item is not recommended due to the random nature of the work activities. The completion of work activities are required to meet with regulatory requirements, customer satisfaction and company policies.

4.7 Safety, Environmental and Project Planning Issues

None.

4.8 Execution Risk Appraisal

Number	Status (Active, Dormant, Retired)	Category	Detailed Description of Risk / Opportunity	Cause/Trigger	Probability	Impact		Score		Strategy	Risk Owner	Comments/Actions
						Cost	Schedule	Cost	Schedule			
1	Dormant	Management and Funding	Potential for the repair units and customer requests to increase above historical experience. Management of backlogs and anticipation of resource scheduling requirements will mitigate variances.	Increasing backlogs and the increase of resources/overtime to bring schedule back to a managable level.	2	2	2	4	4	Accept	Area Management	Monitoring of backlogs of work actiities requests and the performance against funding.
								-	-			
								-	-			
								-	-			

US Sanction Paper

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4.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
NA				

4.10 Investment Recovery

4.10.1 Investment Recovery and Regulatory Implications

The Service Replacement – Reactive category costs are recovered as part of the Rhode Island ISR rate recovery mechanism.

4.10.2 Customer Impact

None

4.10.3 CIAC / Reimbursement

$M	CIAC/Reimbursement							
	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 17/18	*Total*
CIAC / Reimbursement		NA						

4.11 Financial Impact to National Grid

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4.11.1 Cost Summary Table

				Current Planning Horizon								
Project #	Project Description	Project Estimate level	$M	Prior YR Spending	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR7+	Total
Project #	Service Replacement - Reactive Leaks/Non-leaks		Capex		6.580							6.580
			Opex									0.000
			Removal		0.620							0.620
			Total	0.000	7.200	0.000	0.000	0.000	0.000	0.000	0.000	7.200
Project #												
			Capex		0.000							0.000
			Opex									0.000
			Removal									0.000
			Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Proposed Sanction												
			Capex	0.000	6.580	0.000	0.000	0.000	0.000	0.000	0.000	6.580
			Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.620	0.000	0.000	0.000	0.000	0.000	0.000	0.620

4.11.2 Project Budget Summary Table

Project Budget Summary Table

Project Costs per Business Plan		Prior Year Spending*	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR 7	Total
	Capex	0.000	6.580	0.000	0.000	0.000	0.000	0.000	0.000	6.580
	Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.620	0.000	0.000	0.000	0.000	0.000	0.000	0.620
	Total Cost in B Plan	0.000	7.200	0.000	0.000	0.000	0.000	0.000	0.000	$7.200

* P/Y Actuals

Variance (Business Plan-Project Estimate)		Prior Year Spending	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR 7	Total
	Capex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total Variance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	$0.000

4.11.3 Cost Assumptions

Cost assumptions are based on historical spend. Both internal and external resource rates are included in the previous years spend and provide a basis for the proposed spend based on previous work activity units.

4.11.4 Net Present Value / Cost Benefit Analysis

Not financially driven

4.11.5 Additional Impacts

None

4.12 Statements of Support

4.12.1 Supporters

Role	Name	Responsibilities
Investment Planning	Michelle Roche	
Regional Field Operations	John Flint	
Resource Planning	Artie Georgacopoulos	

4.12.2 Reviewers

Reviewer List	Name
Finance	Karen Hamel
Regulatory	Gideon Katsh
Procurement	John Kavanaugh
Jurisdictional Delegates	Laurie Brown

US Sanction Paper

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Title:	Rhode Island 2012/2013 Planning Reliability Program	**Sanction Paper #:**	USSC-12-101
Project #:	CON036	**Sanction Type:**	Sanction
Operating Company:	Rhode Island Gas Company	**Date of Request:**	2/22/2012
Author:	Ramona Butler John Stavrakas	**Sponsor:**	Tim Small – Gas Systems Engineering
Utility Service:	Gas		

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests sanction of the fiscal year 2012/13 System Reliability program in the amount of $1,888,557 and a tolerance of +/- 10% for the purpose of full implementation.

This sanction amount is $1,888,157 broken down into:

$1.88M Capex
$0 Opex
$0 Removal

1.2 Brief Description:

This sanctioning document covers proposed capital improvements to the legacy Rhode Island gas distribution system as part of the System Reliability program during the 2012/13 fiscal year and identified on the capital by category report under "Gas Planning." The System Reliability program comprises projects that provide operational benefits to customers beyond those of traditional system reinforcement projects, focusing on improving overall system reliability.

Examples of System Reliability projects include:

- Eliminate single-feed distribution systems that often include non-standard pressure systems. This is often completed by uprating or downrating the pressure system and removing the district regulator station.
- Install pipeline connections to integrate distribution systems with the same MAOP.
- Reduce the reliance on LNG facilities and/or equipment used to pressure-balance the system during peak conditions.
- Relocate pressure regulation equipment from severe flood zones
- Transfer existing Low Pressure (LP) customers to an adjacent High Pressure (HP) main (i.e., load shedding).
- Reduce the number of pipelines that transport approximately 5,000 residential heating customers supply at an average temperature of 15 °F (i.e., system resiliency projects).

US Sanction Paper

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Constructing the 2012/13 System Reliability program will improve reliability for approximately 4,820 customers. There are two (2) projects in the program, which are identified in Appendix 1 and estimated to cost $1.88M.

1.3 Summary of Projects:

Project Number	Project Title	Estimate Amount ($)
CON036	2012/13 Rhode Island Gas Planning Reliability Program.	1,888,557
	Total	$1,888,557

1.4 Associated Projects:

Project Number	Project Title	Company	Estimate Amount ($)
None			
		Total	$

1.5 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
None				

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
May/2012	Close Out

1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
☐ Mandatory ☒ Policy-Driven ☐ Justified NPV	National Grid's goal is to maintain a reliable gas distribution system and provide safe and uninterrupted service to all customers.

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1.8 Asset Management Risk Score

Asset Management Risk Score: 37

Primary Risk Score Driver: (Policy Driven Projects Only)

☒ Reliability ☐ Environment ☐ Health & Safety

1.9 Complexity Level: (if applicable)

☐ High Complexity ☐ Medium Complexity ☐ Low Complexity

Complexity Score: N/A

1.10 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
Rhode Island Planning Reliability Program FY 12/13 – 16/17	☒ Yes ☐ No	☐ Over ☐ Under	$0
	☐ Yes ☐ No	☐ Over ☐ Under	

1.11 If cost > approved Business Plan how will this be funded?

US Sanction Paper

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1.12 Current Planning Horizon:

Company Name	Current planning horizon							
$M	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 +	*Total*
Proposed Capex Investment		1.888	1.000	1.864	1.175	1.500		7.427
Proposed Opex Investment								0.000
Proposed Removal Investment								0.000
CIAC / Reimbursement								0.000
Total	$0.000	$1.888	$1.000	$1.864	$1.175	$1.500	$0.000	$7.427

A five (5) year CapEX forecast has been provided for planning purposes. The program will be submitted for sanctioning on an annual basis.

1.13 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☒ Internal		☒ Contractor
Construction/Implementation Resources to be provided	☒ Internal		☒ Contractor
Resource Delivery			
Availability of internal resources to deliver project:	☐ Red	☐ Amber	☒ Green
Availability of external resources to deliver project:	☐ Red	☐ Amber	☒ Green
Operational Impact			
Outage impact on network system:	☐ Red	☐ Amber	☒ Green
Procurement impact on network system:	☐ Red	☐ Amber	☒ Green

1.14 Key Issues (include mitigation of Red or Amber Resources):

1	Reliability – 4,820 customers are at risk of losing service if the identified projects are not constructed in the event of another historic flood in Westerly Rhode Island. The estimated restoration cost (i.e., relight, plus claims) for these customers is $4.82M, based on $1,000/customer (See Appendix 2 for a detailed summary of the restoration costs).
2	Synergy Opportunities - Capital work is coordinated with the following activities: Main Replacement Public Works

US Sanction Paper

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3	

1.15 Key Milestones:

Milestone	Target Date: (Month/Year)
Sanctioning Approval	3/2012
Begin Construction	4/2012
Projects in Service	3/2013
Construction Complete	3/2013

1.16 Climate Change:

Are financial incentives (e.g. carbon credits) available?		☐ Yes	☒ No
Contribution to National Grid's 2050 80% emissions reduction target:	☒ Neutral	☐ Positive	☐ Negative
Impact on adaptability of network for future climate change:	☒ Neutral	☐ Positive	☐ Negative

1.17 List References:

1	U.S. Enterprise Wide: 5 – Year Distribution System Reinforcement & Reliability Plan
2	U.S. Enterprise Wide: Model Verification & Winter Performance Report
3	

US Sanction Paper

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2 Recommendations:

The US Sanctioning Committee (USSC) is invited to:

(a) APPROVE up to the investment of $1.88M and a tolerance of +/- 10%.

(b) NOTE that _____ is the Project Manager and has the approved financial delegation.

Signature..... Date..3/15/2012

Tim Small,
VP Gas Systems Engineering

I hereby approve the recommendations made in this paper.

Signature..... Date..3/26/12

Christopher E. Root, Senior Vice President Network Strategy

3 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on March 14, 2012.

Signature..... Date..4/4/12

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee

US Sanction Paper

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4 Sanction Paper Detail

Title:	2012/2013 Rhode Island Planning Reliability Program	**Sanction Paper #:**	USSC-12-201
Project #:	CON036	**Sanction Type:**	Sanction
Operating Company:	Rhode Island Gas Company	**Date of Request:**	2/22/2012
Author:	Ramona Butler John Stavrakas	**Sponsor:**	Tim Small – Gas Systems Engineering
Utility Service:	Gas		

4.1 Background

The Long Term Planning & Project Development Reliability projects are identified to improve the overall reliability on company transmission and distribution systems. The US gas distribution network consists of over 800 independent distribution and feeder systems operating in four (4) states. Pressure and flow on the system is controlled through a network of cascading feeder and distribution systems supplied by 123 take stations and production facilities that consist of approximately 1,800 regulator stations. Reliability is defined in this context as the likelihood or probability of experiencing customer service outages on all or segments of these systems. The distribution network layout and operation of these systems vastly vary by area and region. Differences in the design practices of legacy companies over decades have resulted in a significant variation in levels of reliability throughout the US service territory. In some cases, expansion of both the customer base and distribution mains has resulted in changes on the system that impact reliability over time (e.g., probability and number of customers at risk increases). Reliability is assessed by reviewing the ability of various operating systems to respond to abnormal operating conditions (e.g., shutdown of pipeline or facility). Gas system reliability concerns include transmission and distribution systems with limited number of feeds (e.g.,, take stations or regulator stations), systems that are poorly integrated or consist of long single-feed laterals, networks that contain a wide variety of operating pressures, pressure-regulating equipment in areas prone to flooding, and varying design philosophies associated with system and equipment redundancy (e.g., production plants, take stations, regulator stations).

Reliability projects which improve reliability and operation of the distribution system in a cost-efficient manner are identified and proposed for construction. Prospective projects are evaluated for additional system benefits and synergy with other proposed capital projects that often have the added benefit of increasing system capacity and improving operability of the network. In addition, many of these projects also create the opportunity to replace or abandon aging infrastructure, which provide a benefit to the integrity program or is combined with public works activities.

4.2 Drivers

The goal of the program is to improve overall system reliability. The program generally includes a variety of project types that create flexibility in how the system is operated and its adaptability for abnormal system operation scenarios.

The major driver for 2012 involves relocating pressure-regulating equipment out of flood zones that are known to be adversely affected during periods of extreme flooding. As previously mentioned, approximately 4,820 customers in the town of Westerly would be at risk of losing service if a flood similar to the one that occurred in the spring of 2010 occurred again. The potential estimated restoration cost for this customer outage is $4.82M.

4.3 Project Description

This program includes the design, procurement, construction, testing and completion of capital additions. A full list of the 2011/12 Gas Planning Reliability Program is in Appendix 1. The projects are organized by the following project types:

- Flood Zone Remediation – Two (2) Projects $1,821,557
  These projects address pipeline facilities (take stations and district regulators) that have experienced severe flooding and that would impact a substantial number of customers if out of service. This year's regulator relocation project addresses the reliability concerns that arose at the Westerly take station and the Canal St regulator stations during the severe flood that occurred in the spring of 2010.

- Engineering – One (1) Project $30,000
  This project installs BTU stabilization equipment in the event imported LNG is received with high BTU and Wobbe index values. (Shipments received at DOMAC from Yemen and Egypt may have high BTU and Wobbe index values requiring treatment prior to sending out into the distribution system.)

- Engineering Costs for Fiscal Year 2013/14 Projects - $17,000
  These are costs associated with the design of complex projects that are planned for construction during 2013/14. The Level 1 estimate was determined by Project Engineering and based on historical data.

Individual Projects Exceeding $1M

One (1) reliability project is estimated to cost more than $1M. Thus, additional information is provided below.

Westerly, RI – Westerly regulator relocations ($1,400,000)
Westerly has two (2) supply sources into the gas distribution network that maintains adequate system pressures and continuous service to approximately 4,820 customers during peak conditions. The two (2) sources are the Westerly take station (primary) and the Yankee Gas supply, which is a pipeline connection from their distribution system and not a take station. Additionally, the Yankee source is at the end of a weak Spectra lateral that supplies gas into the network through an 8–inch plastic main (99 psig) suspended from a bridge that crosses the Pawtucket River. During the historic flood in 2010, the district regulator stations and other equipment on Canal St were submerged under water. This multi-phase project includes the relocation of three (3) district regulators from the flood zone on to higher ground in the same vicinity. Approximately 2,000 LF of coated

steel will be required for the new inlet and outlet piping for the three (3) district regulators at Canal St. and Friendship Ln. to the new location. This district regulator nest, which houses the two (2) 60 psi regulators and one (1) LP regulator, is responsible for transporting gas to 87% of the customers in the system. The purpose of this project is to eliminate the emergency operations to manually bypass the regulators in the event of another severe flood, which will improve the overall system reliability for Westerly.

4.4 Benefits Summary

This work will improve reliability to all downstream customers by eliminating the foreseen issues identified above. Specifically, this project will improve the reliability of the gas distribution network for the 4,820 customers that receive gas from the three (3) district regulators at Canal St. In addition, emergency operations required to manually bypass these particular regulators during flood prone conditions will be eliminated.

4.5 Business Issues

This program is a capital improvement program that enhances system reliability and has to be sanctioned yearly. This sanctioning document covers the 2012/13 projects, which have been included in the 5-year budget plan. A five (5) year CapEx forecast has been provided for planning purposes. The program will be submitted for sanctioning on an annual basis.

4.6 Options Analysis

Recommended Option: Construct reinforcement projects
This option provides the greatest benefit because it improves the overall system reliability by lessening the possibility of potential customer outages in the event of another sever flood. In addition, it minimizes the impact of flooding on the regulator facilities and eliminates the need for emergency operations necessary to manually bypass the equipment during severe weather conditions.

Alternative 1: Do nothing
The consequences of not completing the work above will result in a failure to take advantage of cost-effective ways to improve the reliability of the distribution system in a proactive manner as discussed above. Failure to complete these projects will also result in the continuous efforts to manually bypass these facilities during emergency operations in regards to severe flooding. This would place approximately 4,820 customers at risk of losing service.

4.7 Safety, Environmental and Project Planning Issues

There may be environmental permits required for some projects. It is not anticipated that there will be any planning or safety issues.

4.8 Execution Risk Appraisal

Number	Status (Active, Dormant, Retired)	Category	Detailed Description of Risk / Opportunity	Cause/Trigger	Probability	Impact		Score		Strategy	Risk Owner
						Cost	Schedule	Cost	Schedule		
1	Active	Construction	Will not have resources to complete the work	Large work plan, increased from previous year	3	3	3	9	9	Mitigate	Constrution
2	Active	Outage Planning and Availability	Customer outages resulting from improper main and/or regulator shutdowns required during construction.	Incorrect SOPs or failure to perform SOP properly	3	3	3	9	9	Mitigate	Gas Control/ Constrution/System Planning
3	Active	Permitting	Denial of permits (e.g., street opening) from jurisdictional authorities	Late permit submittals as well as delays in the start of projects into late Fall. Recently paved streets.	2	2	2	4	4	Accept	Enginnering / Construction
								-	-		
								-	-		

Construction risks will be mitigated by including the Construction and I&R departments in the design phase of the projects prior to the start of the construction to identify risks and risks response strategies. Additionally, the appropriate departments (i.e., Project Engineering and Design, Construction, I&R, and Operations Engineering) will provide field support during project construction to address all field /design changes that are necessary.

Outage risks will be mitigated by performing the project work during the spring, summer, and fall periods when the customer demand (i.e., gas usage) on the system is at its lowest. In addition, Gas System Planning and Gas Control will assist by devising alternative system configurations to maintain system reliability.

Environmental risks will be mitigated through the involvement of parties in the initial design stages of the program projects.

4.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
Street Opening	Certain	1 year	Not Applied	3/31/2012

4.10 Investment Recovery

The investment classification is Policy Driven

4.10.1 Investment Recovery and Regulatory Implications

This program is a system reliability program that increases the overall integrity and reliability to the downstream systems.

4.10.2 Customer Impact

Minimal customer impact is expected during the construction of these projects; they are intended to create added reliability to customers.

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately $0.395 million. This is indicative only. The actual revenue requirement will differ depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

4.10.3

4.10.4 CIAC / Reimbursement

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$M	CIAC/Reimbursement							
	Prior YR'S	Yr 1 11/12	Yr 2 12/13	Yr 3 13/14	Yr 4 14/15	Yr 5 15/16	Yr 6 16/17	*Total*
CIAC / Reimbursement								

4.11 Financial Impact to National Grid

4.11.1 Cost Summary Table

				Current Planning Horizon								
Project #	Project Description	Project Estimate level	$M	Prior YR Spending	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6 16/17	YR7+	Total
Project #	Description		Capex	1.574		1.888	1.000	1.863	1.175	1.500		9.000
			Opex									0.000
			Removal									0.000
			Total	1.574	0.000	1.888	1.000	1.863	1.175	1.500	0.000	9.000
Project #	Description											
			Capex									0.000
			Opex									0.000
			Removal									0.000
			Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Proposed Sanction												
			Capex	1.574	0.000	1.888	1.000	1.863	1.175	1.500	0.000	9.000
			Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

4.11.2 Project Budget Summary Table

Project Budget Summary Table

Project Costs per Business Plan		Prior Year Spending*	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6 16/17	YR 7	Total
	Capex	1.574	0.000	1.880	1.000	1.863	1.175	1.500	0.000	8.992
	Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total Cost in B Plan	1.574	0.000	1.880	1.000	1.863	1.175	1.500	0.000	$8.992
	* P/Y Actuals									
Variance (Business Plan-Project Estimate)		Prior Year Spending	YR 1 11/12	YR 2 12/13	YR 3 13/14	YR 4 14/15	YR 5 15/16	YR 6 16/17	YR 7	Total
	Capex	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.011
	Opex	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total Variance	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	$0.011

4.11.3 Cost Assumptions

The estimate for the program was developed in 2011. The accuracy level of the estimate for the projects is Level 1. Re-sanctioning will be sought as/if required. See Appendix 3 for estimate level guidelines.

4.11.4 Net Present Value / Cost Benefit Analysis

Economic measures	5yr	10yr	20yr	Comment
NPV @ Discount rate				
IRR				
MIRR				
Simple Payback in Years				
Total O&M				
Total Capital Investment				
Total Savings				

4.11.5 Additional Impacts

None

4.12 Statements of Support

The following groups have been consulted for the projects included in this program: Project Engineering & Design, Instrumentation and Regulation, Gas Control, and Project Management.

4.12.1 Supporters

Role	Name	Responsibilities
Sponsor/ Asset Manager/ Asset Owner/ Process Owner	J. Stavrakas T. Small	Endorses the project aligns with jurisdictional objectives
Investment Planning	Michelle Roche	Endorses the 5-year plan work
Resource Planning	Artie Georgacopoulos	Endorses Resources, Cost estimates, Schedule, and Portfolio alignment
Project Manager	Kevin King	Endorses Cost, Scope, Schedule, and Quality
Project Engineering & Design	D. Iseler	Endorses Scope, Design, and Conformance with design standards
Gas Control	T. Amerige	Endorses Scope and Need
Instrumentation & Regulation	John Barrett	Endorses Scope, Need, and Conformance with design standards

4.12.2 Reviewers

Reads paper for content / language. Recommends edits if necessary

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Reviewer List	Name
Finance	Karen Hamel
Regulatory	Gideon Katsh
Procurement	John Kavanaugh
Jurisdictional Delegates	Laurie Brown

5 *Appendices*

5.1 *Project Cost Breakdown*

Project Cost Breakdown		
Cost Category	**Company Name ($ Amount)**	**Description of Cost Category**
Growth – Gas System Reliability	Rhode Island ($1.88M)	Reliability
Total:	$1.88M	

5.2 *Other Appendices*

Appendix 1: 2012 -13 Reliability Projects

Project Year	Work Type	Town	Project Description	Length	Size	Material	MAOP	Cost Estimate	Reason for Project
2012	Flood Zone Remediation	Westerly	Relocate the 21 psig regulator from the Westerly Take Station to higher ground on High Rock Rd @ Canal St, which involves relaying 1,850' of 3" & 4" BS (21 psig) main with 4" plastic 75 psig (MAOP of 99 psig) main. Reconfigure the odorization operations	1,850	4	PL	21, 75, 99	$421,557	Allows uninterrupted district regulator operations during periods of severe flooding (620 customers)
2012	Carryover	Various	2011 Project Carryover Costs					$20,000	
2012	Flood Zone Remediation	Westerly	Relocate the two 60 psig regulators and one LP regulator on Canal St to higher ground 500' up Friendship St, which involves installing 2,000' of inlet/outlet main.	2,000	Varies	PL	99, 60, LP	$1,400,000	Project is necessary to maintain district regulator operations during periods of severe flooding (4,200 Customers)
2012	Engineering	Providence	Engineering study associated with BTU Stabilization equipment to compensate for LNG with a high BTU value or Wobbe index value.					$30,000	
2012	Engineering	varies	Engineering costs associated with 2013 projects					$17,000	Engineering design for 2013 projects

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Appendix 2: Outage Restoration Costs
Estimates for relighting customers and recovering from a system outage have been prepared to quantify the impact of outages related to insufficient system capacity during periods of peak demand and severe winter cold.

Actual relight costs have been captured from recent incidents to quantify company expenses related to restoring service. These were all related to outages that occurred for reasons other than insufficient system capacity and operations were conducted under benign weather conditions. It is likely that during severe winter weather, costs would increase.

Claims related to frozen buildings, burst pipes and equipment damage due to a lack of heat during severe cold weather were captured from the only incident in recent times the company experienced – e.g. the outage in Hull, Ma during the peak day of January 16th, 2004.

Relight Costs

Tiverton (2008): 900 customers out and relight costs of $299,692 for an average relight cost of $322.99 per customer.

Cutchogue (2003): 1,800 customers out and relight costs of $2,367,401 with an average relight cost of $1,315.22

Glen Cove (2008): 1,016 customers out and relight cots of $275,000 for an average relight cost of $270.67 per customer

Average cost to relight for combined instances above equals $792 per customer

Claims

Hull (2004): 297 customers affected with claims totaling $206,336 for an average claim of $694.73 per customer

Combined cost of relight and claims

The combined cost of relighting customers and resolving claims averages out to $1,486 per customer.

Recognizing the amount of variability in different incidents such as weather conditions, different types of neighborhoods, variable labor costs, economies of scale, etc., for purposes of evaluating the benefits of reinforcement projects, an average value of service restoration costs and claims of $1,000 per customer is used.

Appendix3: Complex Project Estimating Levels

Estimate Level	Definition	Performed By (as appropriate)	Cost Estimate Basis	Applicability
Level I • **Strategy** • **Analysis** • **Decision**	A strategy is developed to meet future system needs by the project sponsor. Analysis of alternatives ultimately leads to a decision to execute a project. The sponsor develops a scope document meeting their requirements and collaboratively seeks to satisfy the requirements of other stakeholders in the project. Project objectives are stated in the document and a preliminary investigation has shown that the project is feasible. The project objectives are well defined but key components of the design and construction are not clearly defined since no detailed design has been done. Stakeholders will include but are not be limited to Network Strategy, Project Management (PM Projects), Construction Instrumentation & Regulation and Field Operations.	Integrity, Reliability Planning, Sales, Production, PED, PM (for PM projects)	Conceptual Based on historical information such as unit cost or a similar project. Estimate accuracy +/- 50%.	Level I estimates may typically be found in 5 year plans
Level II • **30% Design**	A level II estimate meets the requirements of the stakeholders. Most permit requirements have been identified and costs associated with materials are being refined. Some but not all constructability issues have been identified. Test holes have been used, where necessary, to determine field conditions.	PE&D, CDC (Growth Projects), Construction, PM for PM Projects	Based on 30% Design Estimate accuracy +/- 25%.	Level II estimates may typically be available for projects occurring in 2 to 3 years.
Level III • **100% Design**	A level III estimate includes all materials, expected permit costs, and costs associated with field conditions. The job site specific conditions have been identified utilizing mapping, survey, and combined with the previously obtained test hole information. Permit applications for sanctioned projects are submitted for long lead permits. Requests for long lead permits for projects that do not require sanctioning will be submitted. Applications for easements/ right of ways are submitted.	PE&D, CDC (Growth Projects), Construction, PM for PM Projects	Based on 100% Design Estimate accuracy +/- 15%.	Level III estimates may typically be available for projects scheduled for construction in 1 to 2 years.
Level IV • **Projection to Build**	At this level Engineering is 100% complete. Resources have been identified to construct the project. Estimates/bids from in-house Construction, contractors and other in-house implementing groups based on identified/observed field conditions, permit stipulations, etc. are in hand. The costs of special items such as easements, permits, etc. are known. The compilation of these estimates/bids will become the basis for the Projected Spend for the project.	PM (when managed by PM), Process Owner, PE&D, I&R, Production and Construction	100% Design plus bids, permit fees Estimate accuracy +/- 10%.	Level IV (Includes proposed start date)

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5.3 Summary (if applicable)

5 Customer Outreach Plan (if applicable)

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Title:	Rhode Island 2012/2013 Planning Reliability Program	**Sanction Paper #:**	USSC-12-101C
Project #:	Various	**Sanction Type:**	Closure
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	3/30/2017
Author:	Eric Aprigliano/Adnan Malik	**Sponsor:**	John Stavrakas VP Gas Asset Management
Utility Service:	Gas	**Project Manager:**	Joseph Fortier, Jr.

1 Executive Summary

This paper is presented to close C029210, C033090, C2910, C33090, CON0036, CON036, CON038. The total spend was $1.882M. The sanctioned amount for this project was $1.889M.

The final spend amount is $1.882M broken down into:

1.866M Capex
0.000M Opex
0.016M Removal

2 Project Summary

This is the annual sanction closure of the Gas System Reliability Program for Rhode Island. Under this program, projects are completed which focus on improving overall system reliability for a potential of over 4,820 customers impacted if abnormal operating conditions (e.g., unexpected shutdown of a pipeline facility) were to occur. Overall the program was successful and no abnormal system issues arose over 2012-13.

3 Over / Under Expenditure Analysis

3.1 Summary Table

Actual Spending ($M)			
Project #	**Description**		**Total Spend**
Various (See Appendix)	Rhode Island 2012/2013 Planning Reliability Program	Capex	1.866
		Opex	0.000
		Removal	0.016
		Total	1.882
Total		Capex	1.866
		Opex	0.000
		Removal	0.016
		Total	1.882

Project Sanction Summary Table			
Project Sanction Approval ($M)			**Total Spend**
		Capex	1.880
		Opex	0.000
		Removal	0.000
		Total Cost	1.880
Sanction Variance ($M)			**Total Spend**
		Capex	0.014
		Opex	0.000
		Removal	(0.016)
		Total Variance	(0.002)

3.2 Analysis

The Rhode Island 2012/2013 Planning Reliability Program is within the tolerance level.

4 Improvements / Lessons Learned/Root Cause

- Improve development of estimating practices.
- Work with Finance and Resource Planning to create better financial metrics.
- Create Long Term resource requirements for future Capital planning.
- Identify carryover or deferred projects in a timely fashion.

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5 *Closeout Activities*

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	(•) Yes ( ) No
All relevant costs have been charged to project	(•) Yes ( ) No
All work orders and funding projects have been closed (1)	( ) Yes (•) No
All unused materials have been returned	(•) Yes ( ) No
All as-builts have been completed (2)	( ) Yes (•) No
All lessons learned have been entered appropriately into the lesson learned database (3)	( ) Yes (•) No

(1) All work orders and funding projects have been closed

Program/Blanket projects may contain work orders and or funding projects which have not yet been closed for reasons including but not limited to:

- the same work order(s) are used annually. They will remain open until Asset Management and/or Resource Planning have determined work orders are no longer needed .
- construction may cross multiple fiscal years
- the work order closing process is within the late charge waiting period
- other accounting processes or final system closing activities have not yet completed

The Program/Blanket projects are approved annually for the current year expected spend and remain open until Asset Management and/or Resource Planning have determined the project is no longer required.

(2) All as-builts have been completed

Program/Blanket projects may contain work orders for which no as-builts have yet been recorded for reasons including but not limited to:

- design and/or construction have not yet completed
- construction may cross multiple fiscal years
- work has completed recently and as-builts have not yet been processed into the system

- does not apply. Work order(s) are not linked to work management systems. (example: Meter Purchases, Meter Changes, AMR Installations Purchase Misc Capital Tools/Equipment, etc.)
- does not apply to Information systems projects.

(3) All lessons learned have been entered appropriately into the lesson learned database

Program/Blanket projects usually contain short cycle work which the Company has been performing over several fiscal years. No new Lessons Learned which have not already been identified and recorded within section 4.

6 Statements of Support

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planner	Pensabene, Patrick M.	Endorses relative to 5-year business plan or emergent work
Resource Planning	Falls, Jonathon	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Project Management	Fortier, Joseph Jr.	Endorses Resources, cost estimate, schedule
Gas Project Estimation	Paul, Art	Endorses Cost Estimate

6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Easterly, Patricia
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Currie, John

Procurement	Curran, Art
Control Center	Loiacono, Paul

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7 Decisions

I approve this paper.

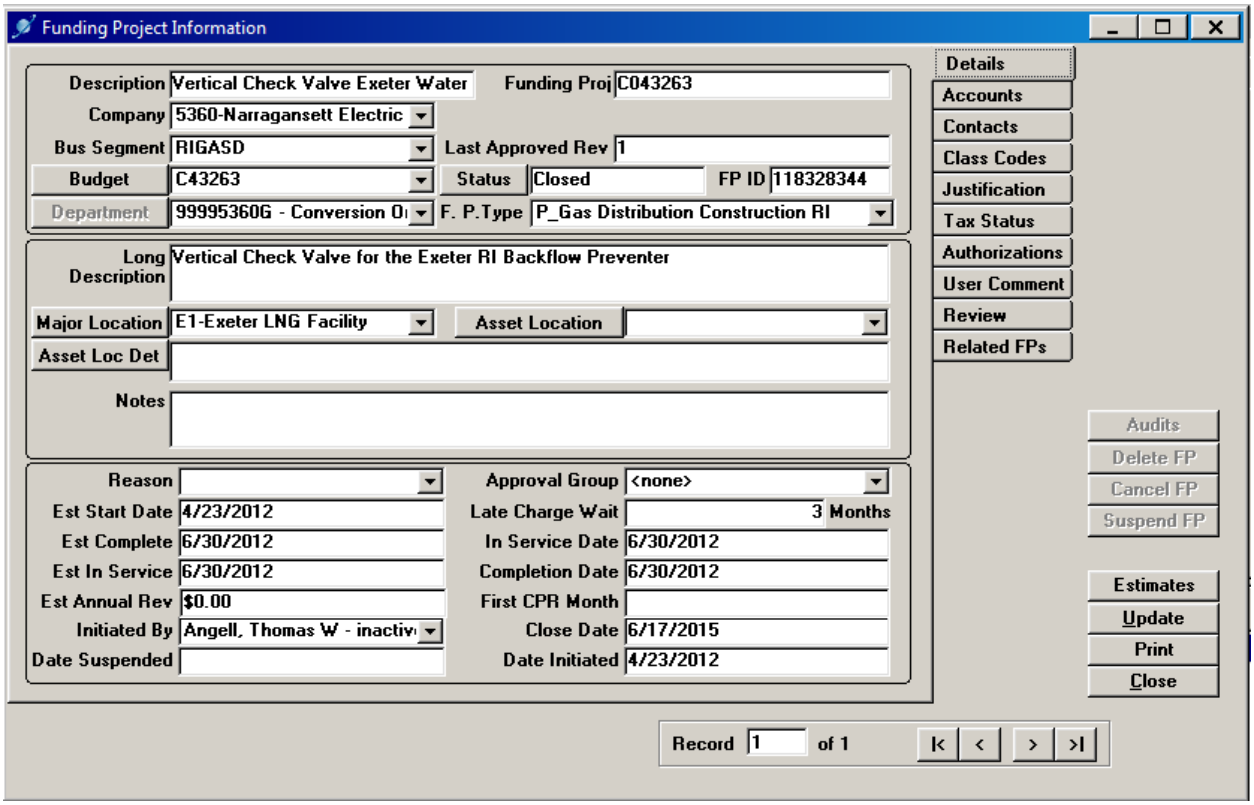
Signature Ross W. Turrini Date April 27, 2017

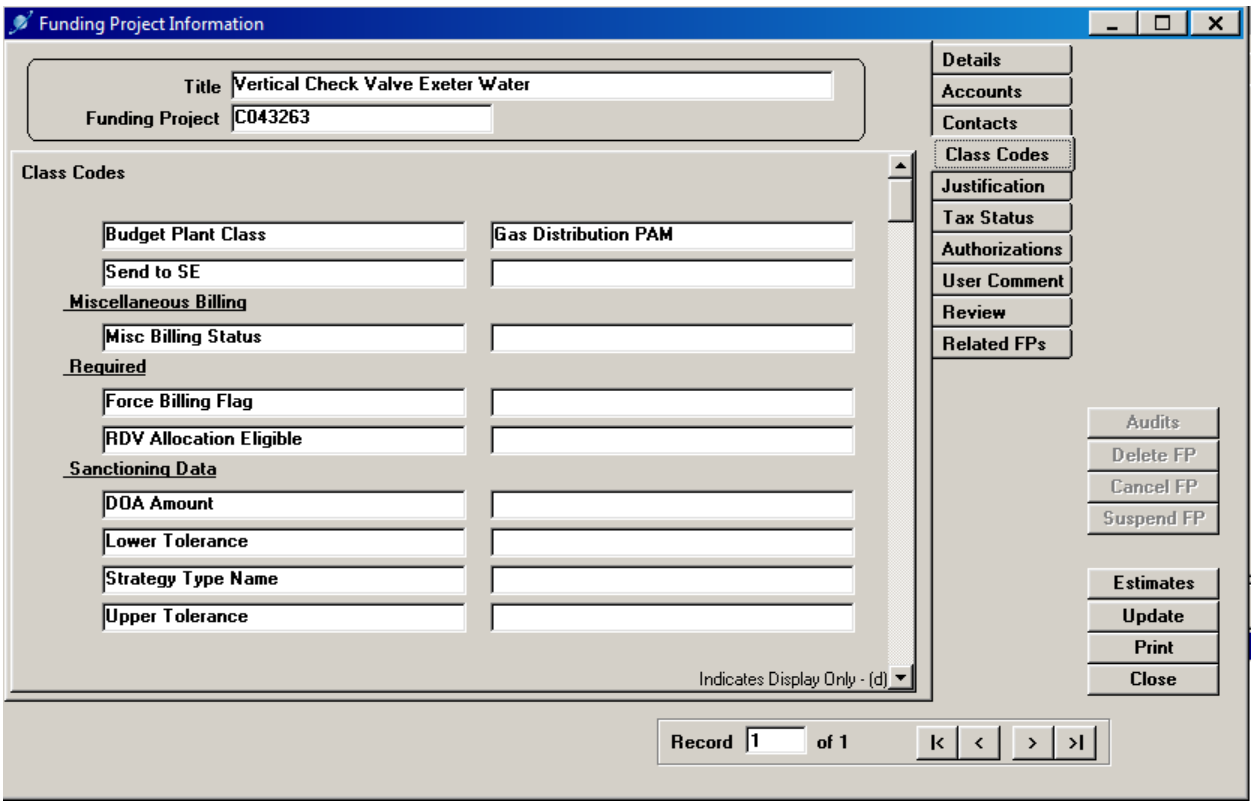
Executive Sponsor – Ross Turrini, Senior Vice President, Gas Process & Engineering and Chief Gas Engineer

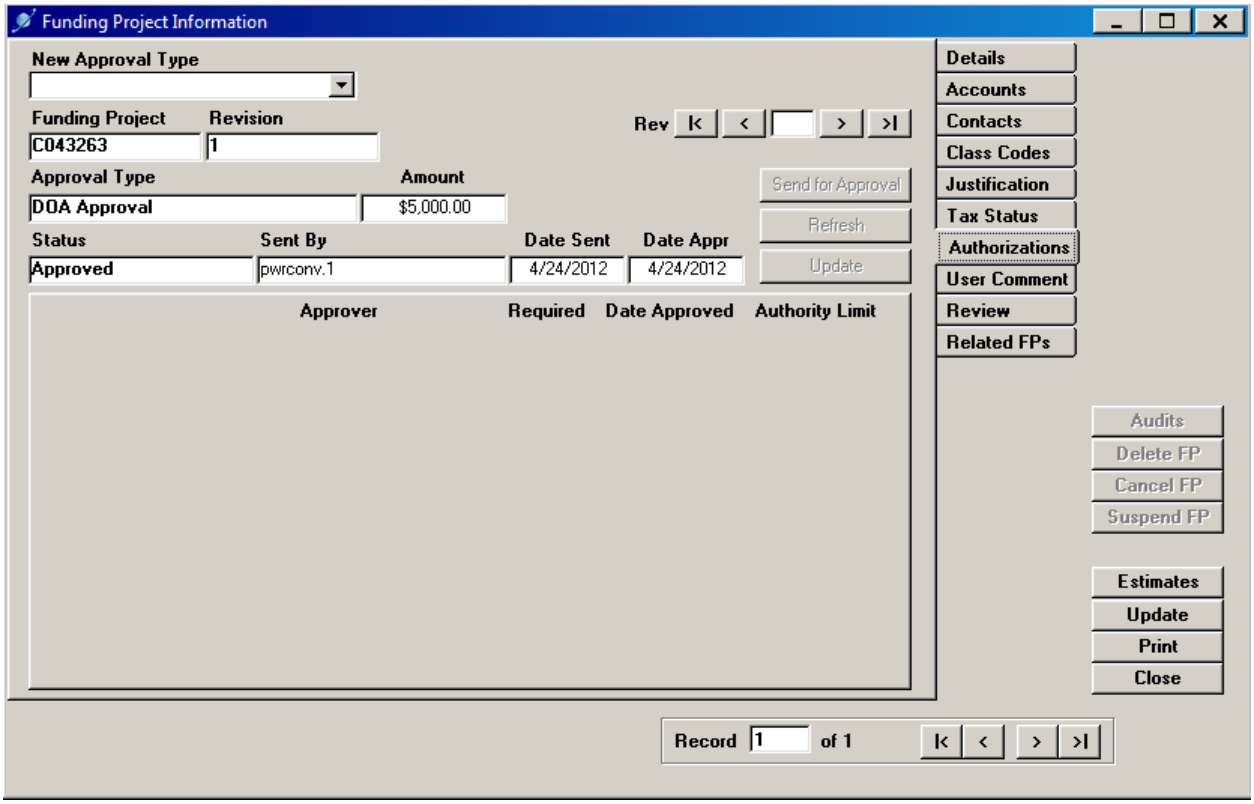
Appendix

Section #	Paper Name	Project	CAP	COR	Grand Total
USSC-12-100 Total			$ 242,410		$ 242,410
USSC-12-101	Rhode Island 2012/2013 Planning Reliability Program	C025210	$ 0		$ 0
		C033050	$ 2,739		$ 2,739
		C25210	$ 0		$ 0
		C33050	$ 17,595		$ 17,595
		CON0036	$ 1,376,037	$ 9,276	$ 1,385,313
		CON036	$ 463,745	$ 7,401	$ 471,146
		CON038	$ 5,491		$ 5,491
USSC-12-101 Total			$ 1,865,607	$ 16,678	$ 1,882,285

FY13 LNG Projects:



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C043263
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Update
Status
Sent By
Date Sent
Date Appr
Approved
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4/24/2012
4/24/2012
Approver
Required
Date Approved
Authority Limit
Details
Accounts
Contacts
Class Codes
Justification
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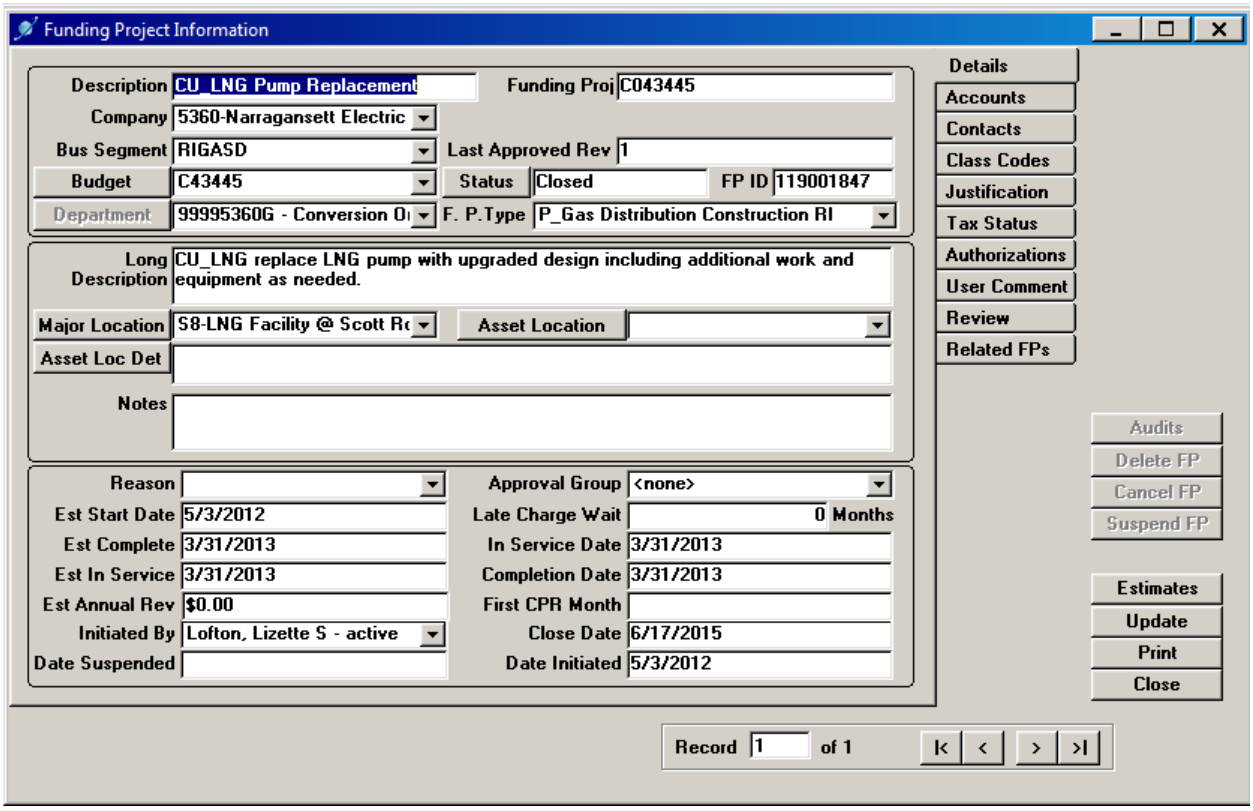
of 1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Funding Proj
C043445
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5360-Narragansett Electric
Bus Segment
RIGASD
Last Approved Rev
1
Budget
C43445
Status
Closed
FP ID
119001847
Department
99995360G - Conversion O
F. P.Type
P_Gas Distribution Construction RI
Long Description
CU_LNG replace LNG pump with upgraded design including additional work and equipment as needed.
Major Location
S8-LNG Facility @ Scott R
Asset Location
Asset Loc Det
Notes
Reason
Approval Group
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Late Charge Wait
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Months
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In Service Date
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Completion Date
3/31/2013
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$0.00
First CPR Month
Initiated By
Lofton, Lizette S - active
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6/17/2015
Date Suspended
Date Initiated
5/3/2012
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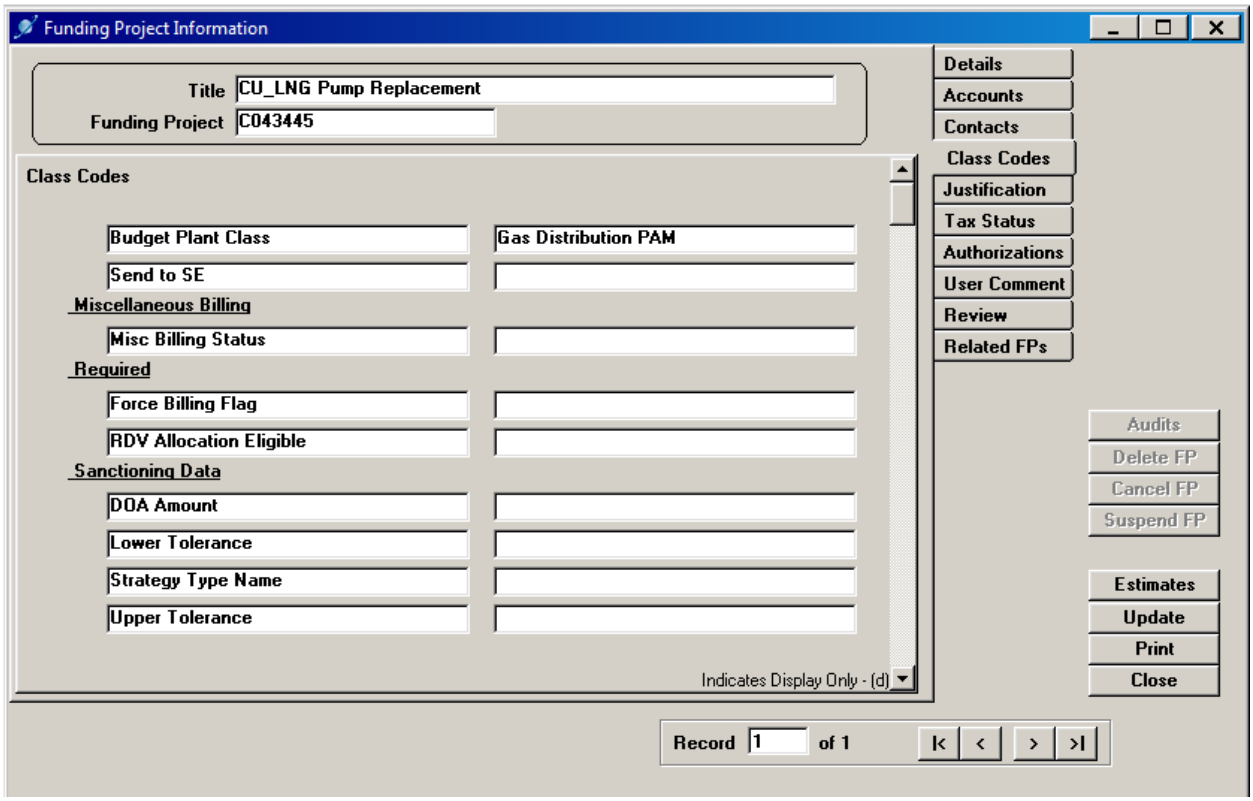
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Miscellaneous Billing
Misc Billing Status
Required
Force Billing Flag
RDV Allocation Eligible
Sanctioning Data
DOA Amount
Lower Tolerance
Strategy Type Name
Upper Tolerance
Indicates Display Only - (d)
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Contacts
Class Codes
Justification
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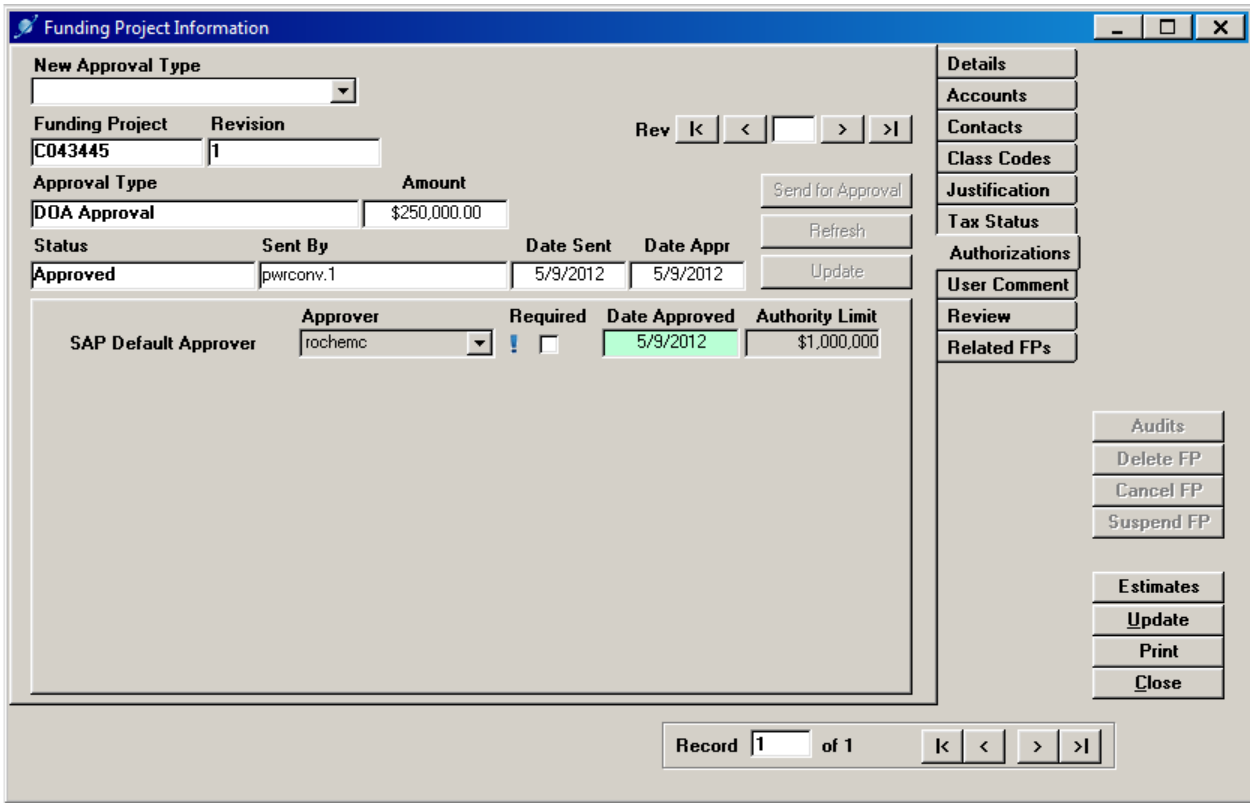
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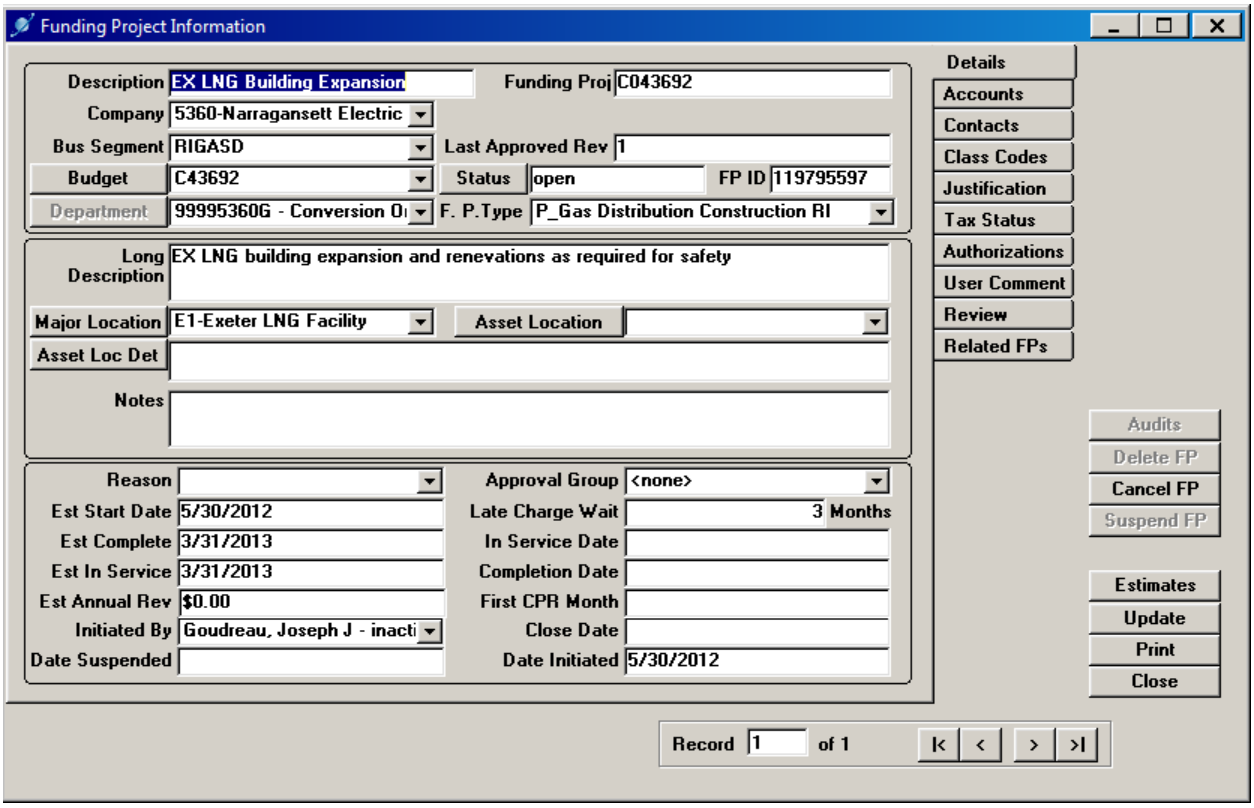
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Funding Proj C043692
Company 5360-Narragansett Electric
Bus Segment RIGASD
Last Approved Rev 1
Budget C43692
Status open
FP ID 119795597
Department 99995360G - Conversion O
F. P.Type P_Gas Distribution Construction RI
Long Description EX LNG building expansion and renevations as required for safety
Major Location E1-Exeter LNG Facility
Asset Location
Asset Loc Det
Notes
Reason
Approval Group <none>
Est Start Date 5/30/2012
Late Charge Wait 3 Months
Est Complete 3/31/2013
In Service Date
Est In Service 3/31/2013
Completion Date
Est Annual Rev $0.00
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Initiated By Goudreau, Joseph J - inacti
Close Date
Date Suspended
Date Initiated 5/30/2012
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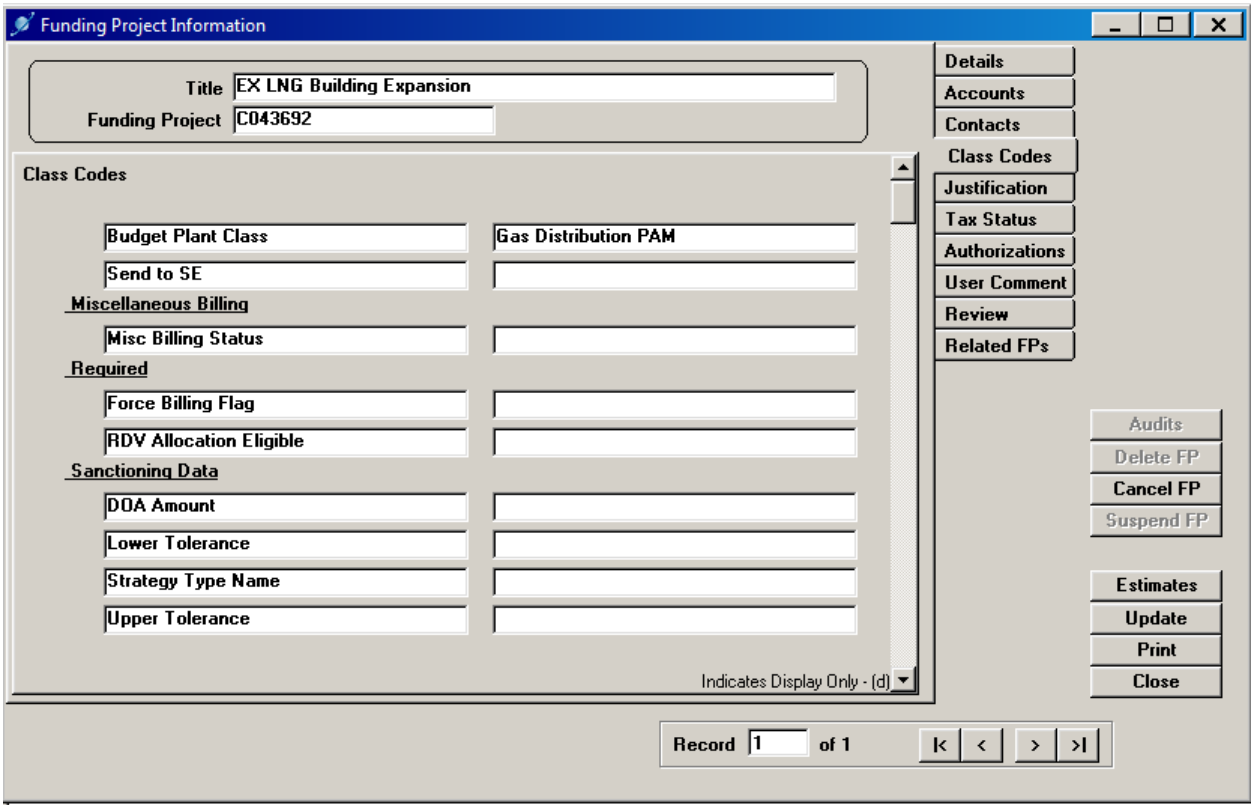
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Funding Project C043692
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Send to SE
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Misc Billing Status
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RDV Allocation Eligible
Sanctioning Data
DOA Amount
Lower Tolerance
Strategy Type Name
Upper Tolerance
Indicates Display Only - (d)
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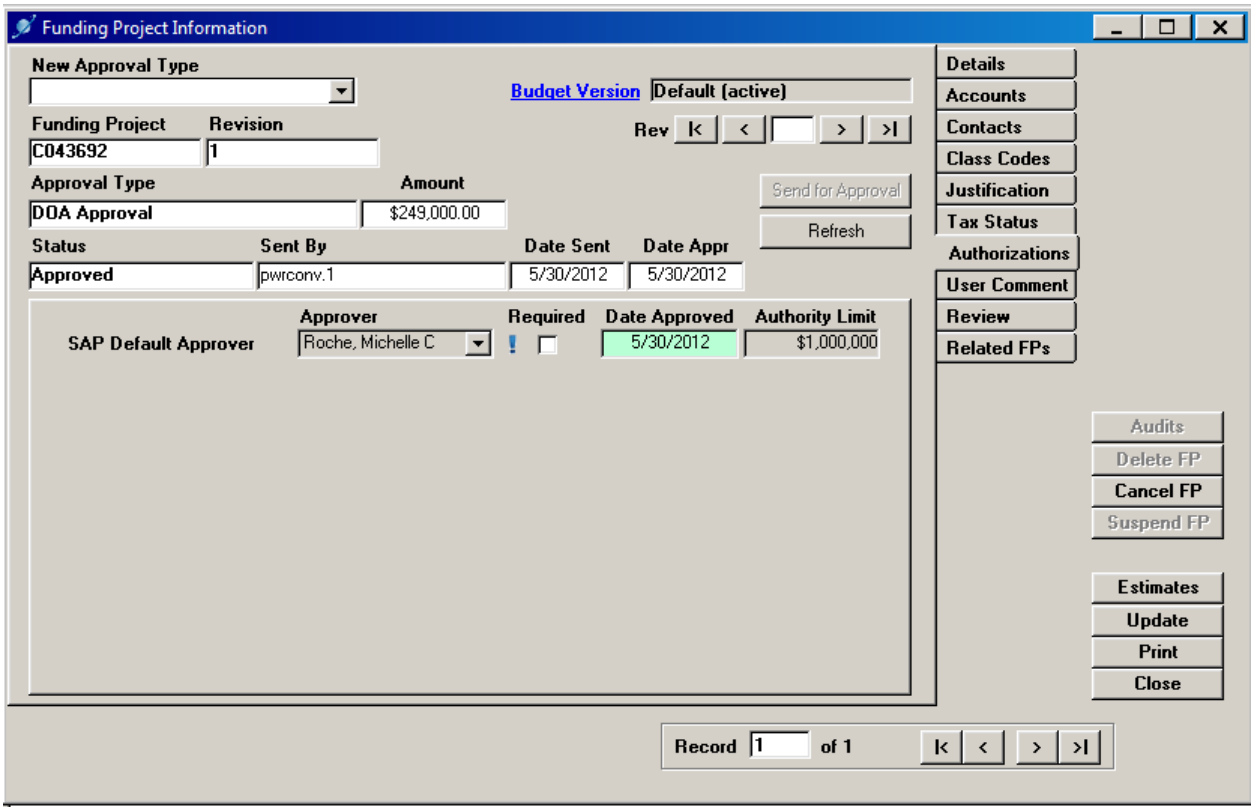
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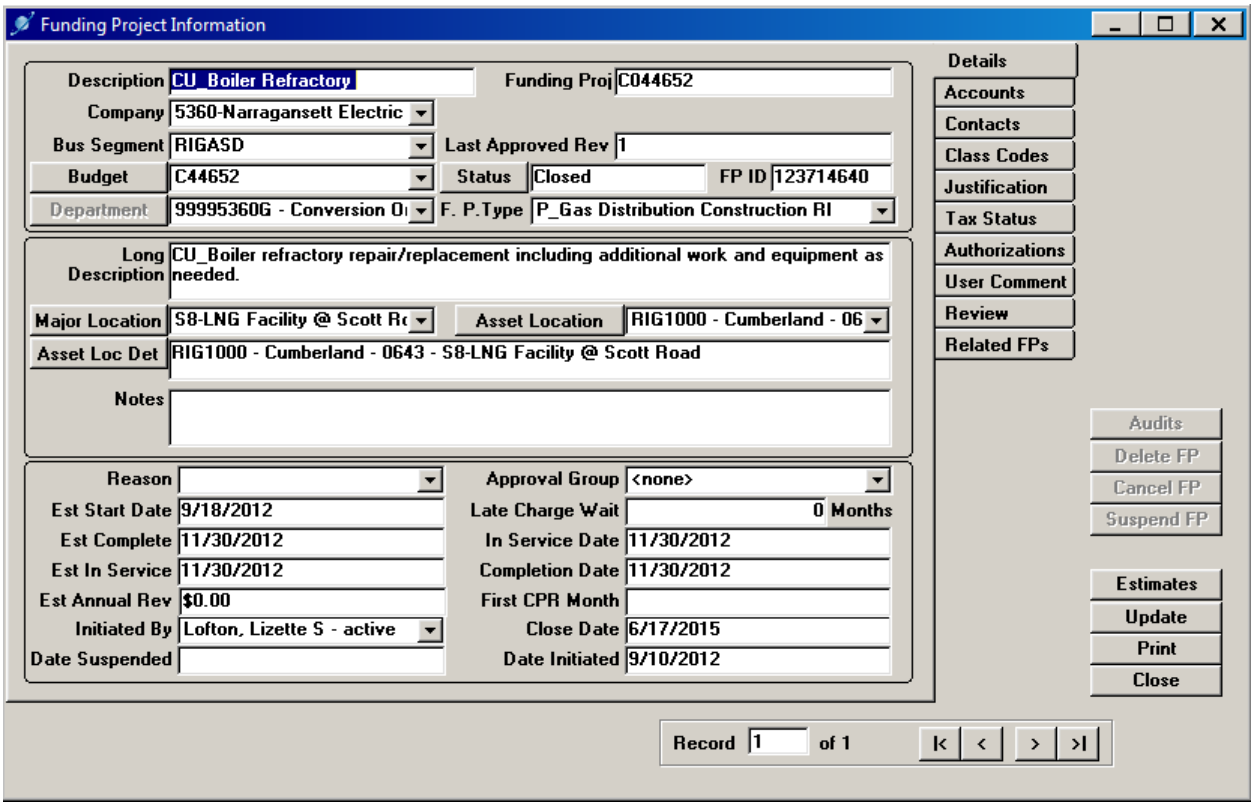
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Funding Proj C044652
Company 5360-Narragansett Electric
Bus Segment RIGASD
Last Approved Rev 1
Budget C44652
Status Closed
FP ID 123714640
Department 99995360G - Conversion O
F. P.Type P_Gas Distribution Construction RI
Long Description CU_Boiler refractory repair/replacement including additional work and equipment as needed.
Major Location S8-LNG Facility @ Scott R
Asset Location RIG1000 - Cumberland - 06
Asset Loc Det RIG1000 - Cumberland - 0643 - S8-LNG Facility @ Scott Road
Notes
Reason
Approval Group <none>
Est Start Date 9/18/2012
Late Charge Wait 0 Months
Est Complete 11/30/2012
In Service Date 11/30/2012
Est In Service 11/30/2012
Completion Date 11/30/2012
Est Annual Rev $0.00
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Initiated By Lofton, Lizette S - active
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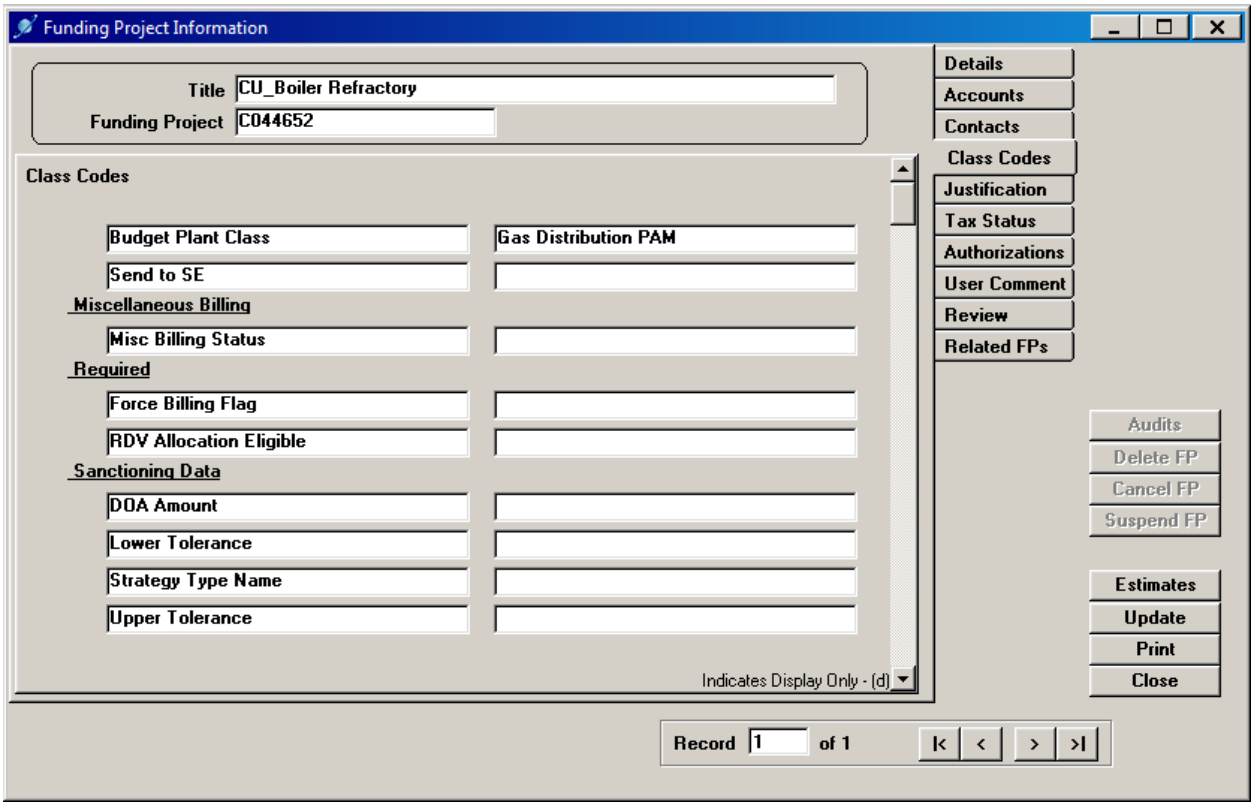
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Funding Project C044652
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Send to SE
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Misc Billing Status
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Force Billing Flag
RDV Allocation Eligible
Sanctioning Data
DOA Amount
Lower Tolerance
Strategy Type Name
Upper Tolerance
Indicates Display Only - (d)
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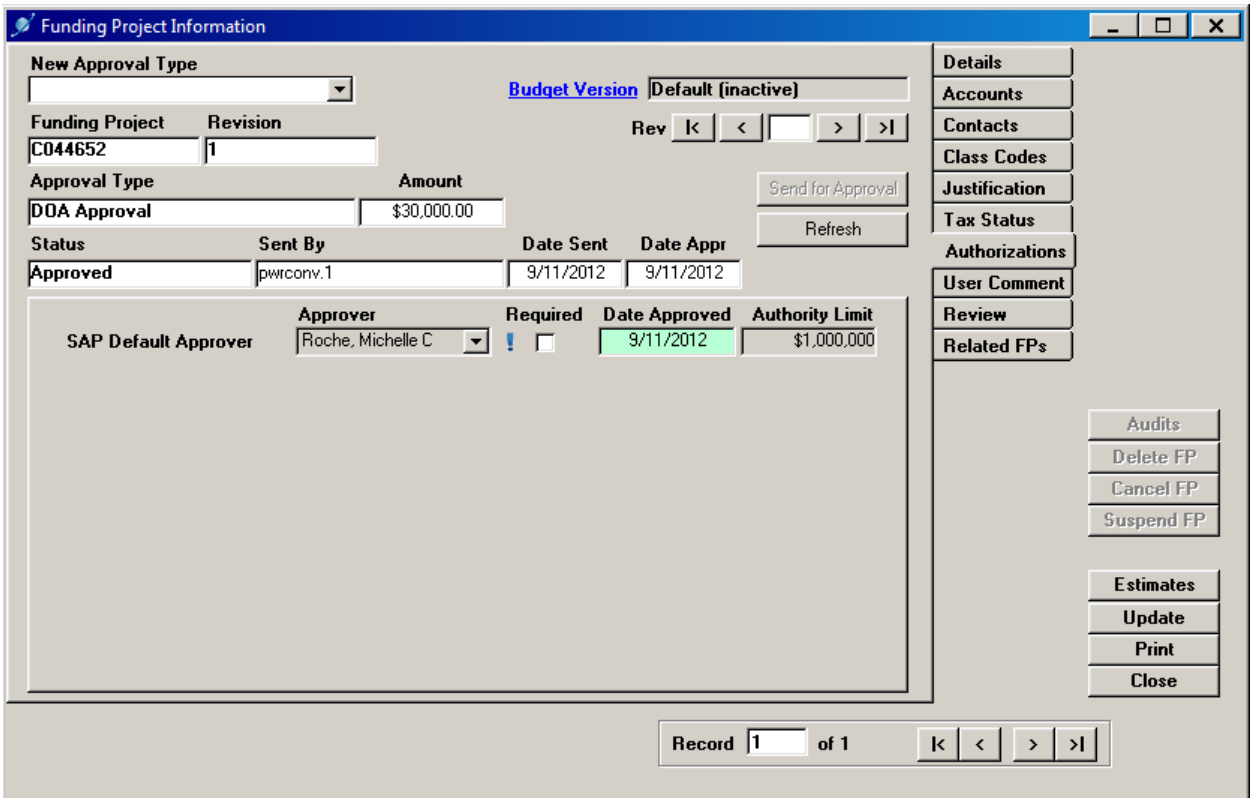
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Date Sent
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Roche, Michelle C
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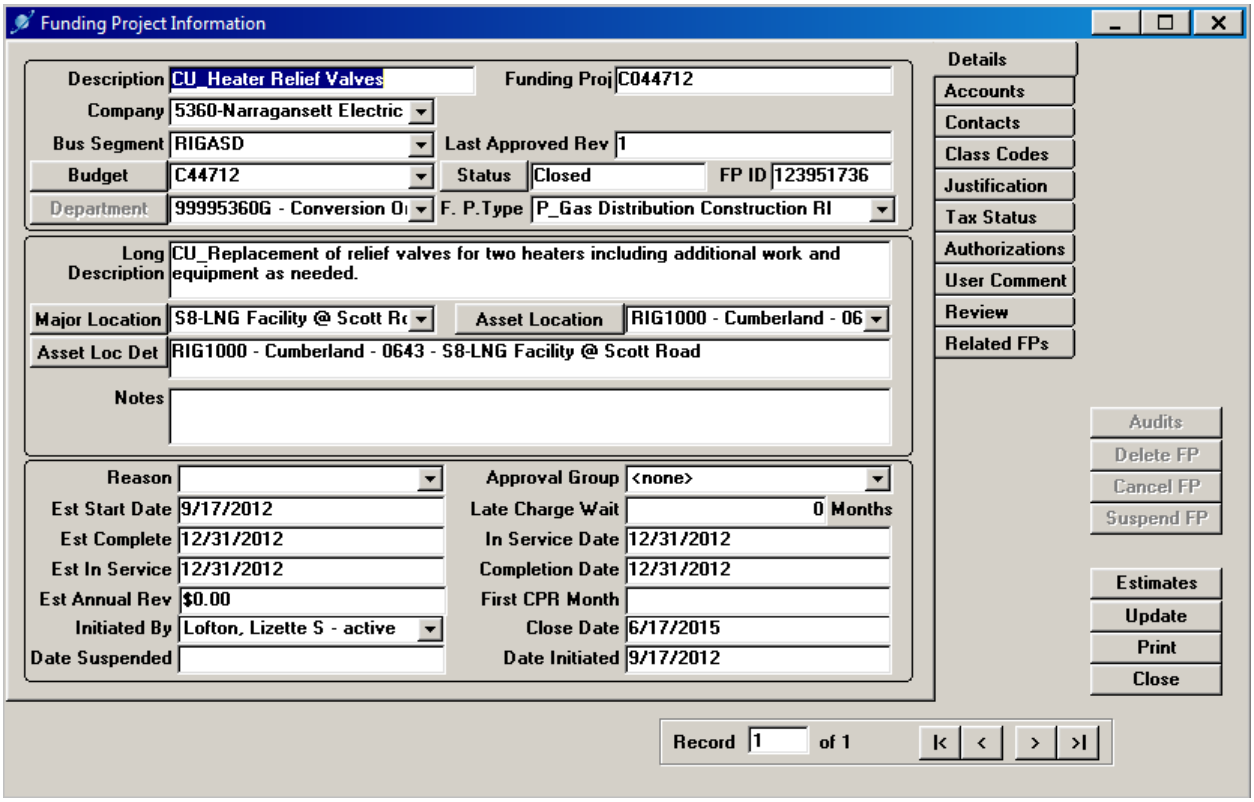
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Description CU_Heater Relief Valves
Funding Proj C044712
Company 5360-Narragansett Electric
Bus Segment RIGASD
Last Approved Rev 1
Budget C44712
Status Closed
FP ID 123951736
Department 99995360G - Conversion O
F. P.Type P_Gas Distribution Construction RI
Long Description CU_Replacement of relief valves for two heaters including additional work and equipment as needed.
Major Location S8-LNG Facility @ Scott R
Asset Location RIG1000 - Cumberland - 06
Asset Loc Det RIG1000 - Cumberland - 0643 - S8-LNG Facility @ Scott Road
Notes
Reason
Approval Group <none>
Est Start Date 9/17/2012
Late Charge Wait 0 Months
Est Complete 12/31/2012
In Service Date 12/31/2012
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Completion Date 12/31/2012
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First CPR Month
Initiated By Lofton, Lizette S - active
Close Date 6/17/2015
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Date Initiated 9/17/2012
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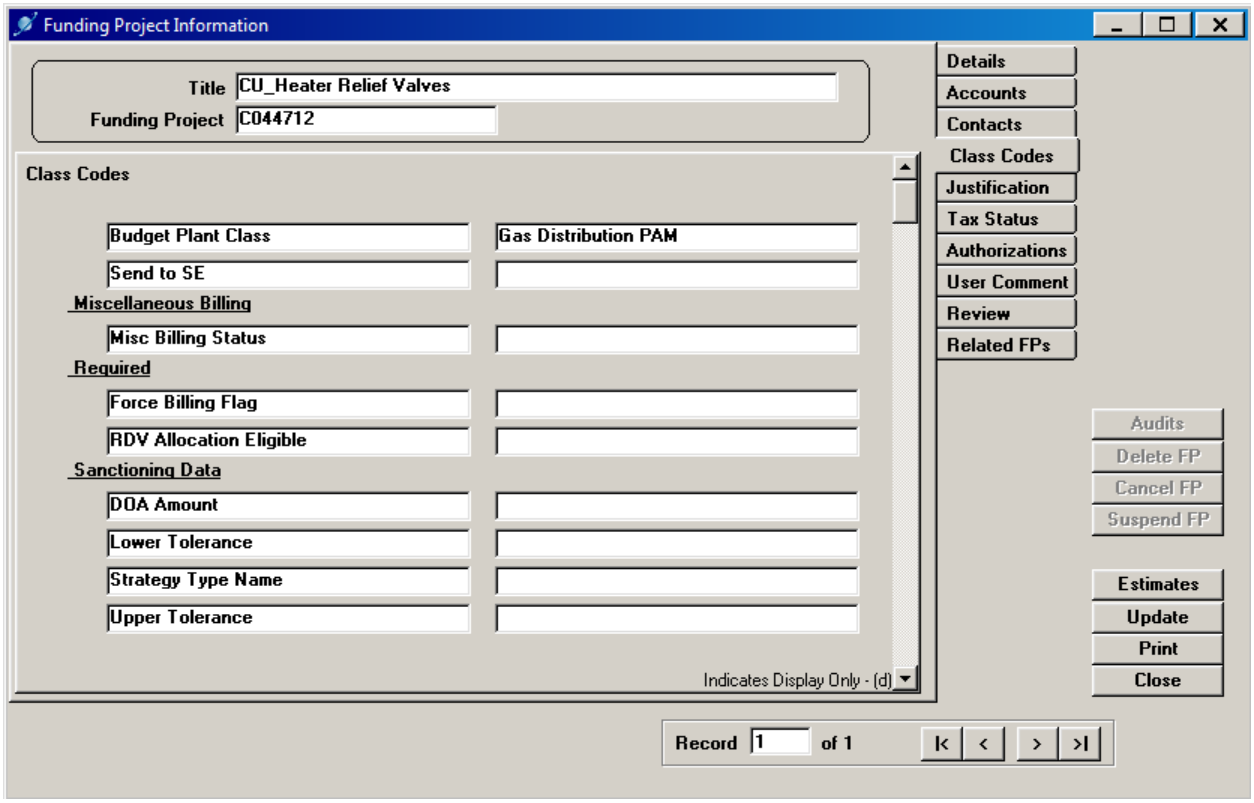
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Title CU_Heater Relief Valves
Funding Project C044712
Class Codes
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Send to SE
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Misc Billing Status
Required
Force Billing Flag
RDV Allocation Eligible
Sanctioning Data
DOA Amount
Lower Tolerance
Strategy Type Name
Upper Tolerance
Indicates Display Only - (d)
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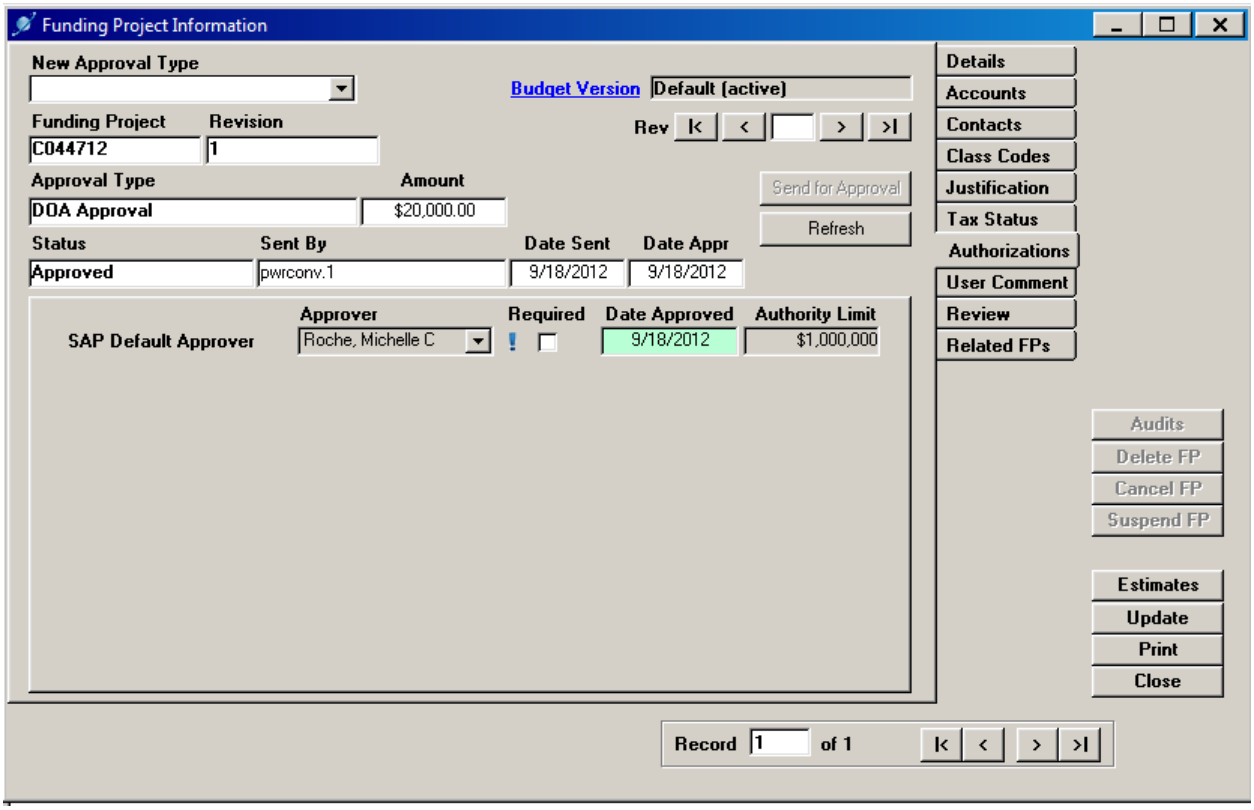
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Roche, Michelle C
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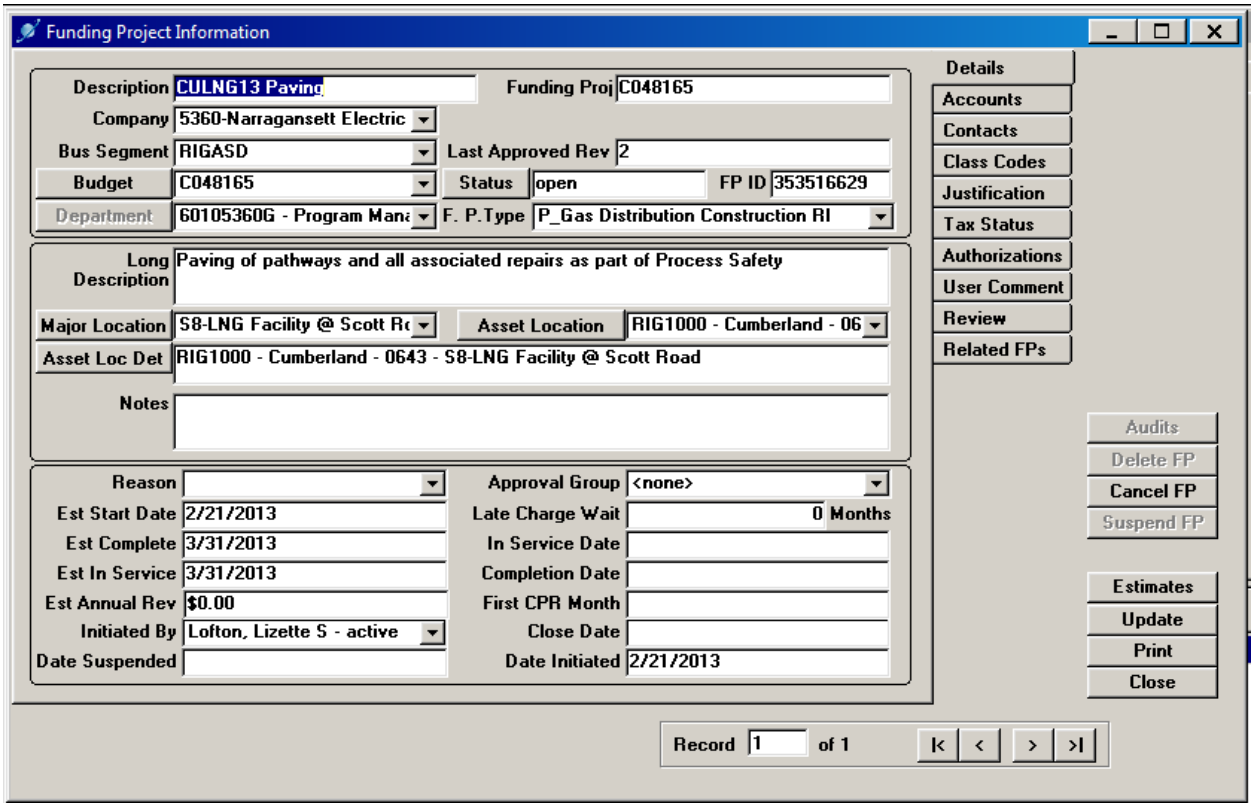
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Description CULNG13 Paving
Funding Proj C048165
Company 5360-Narragansett Electric
Bus Segment RIGASD
Last Approved Rev 2
Budget C048165
Status open
FP ID 353516629
Department 601053606 - Program Mana
F. P.Type P_Gas Distribution Construction RI
Long Description Paving of pathways and all associated repairs as part of Process Safety
Major Location S8-LNG Facility @ Scott Rc
Asset Location RIG1000 - Cumberland - 06
Asset Loc Det RIG1000 - Cumberland - 0643 - S8-LNG Facility @ Scott Road
Notes
Reason
Approval Group <none>
Est Start Date 2/21/2013
Late Charge Wait 0 Months
Est Complete 3/31/2013
In Service Date
Est In Service 3/31/2013
Completion Date
Est Annual Rev $0.00
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Initiated By Lofton, Lizette S - active
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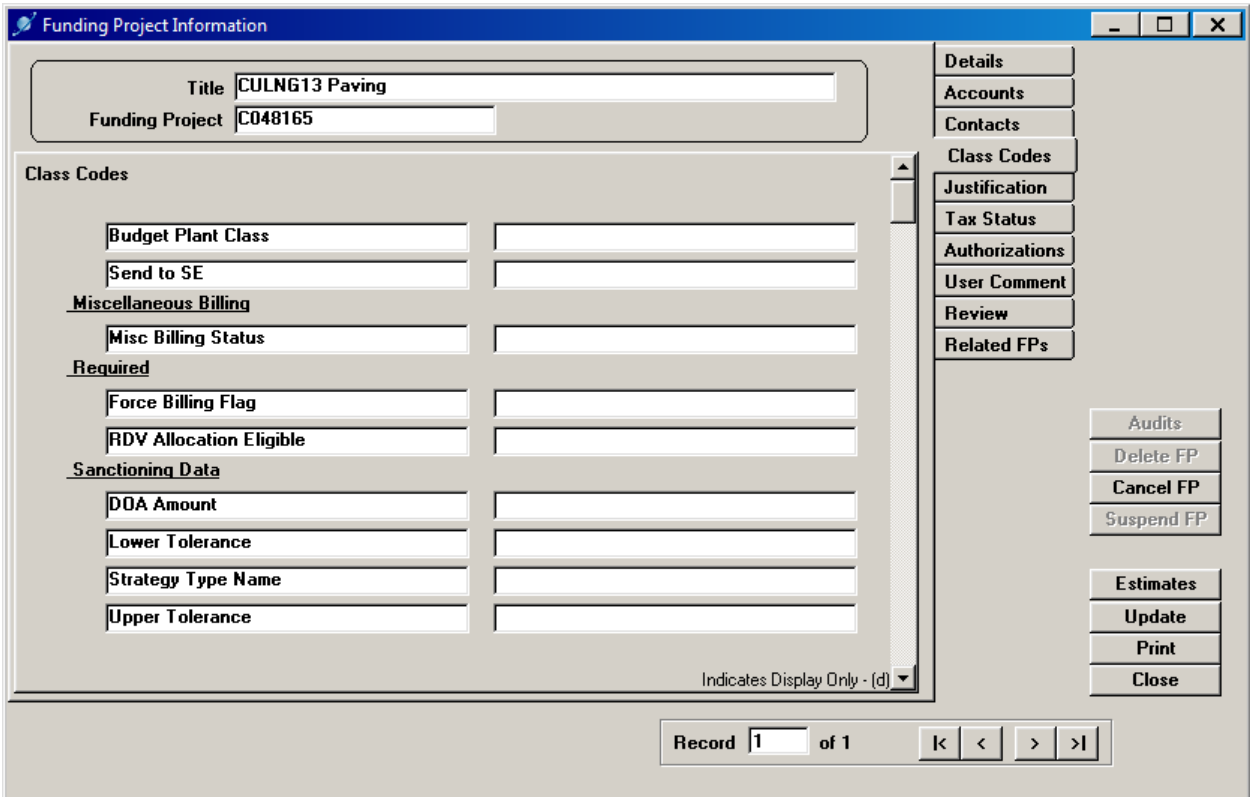
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Funding Project C048165
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Sanctioning Data
DOA Amount
Lower Tolerance
Strategy Type Name
Upper Tolerance
Indicates Display Only - (d)
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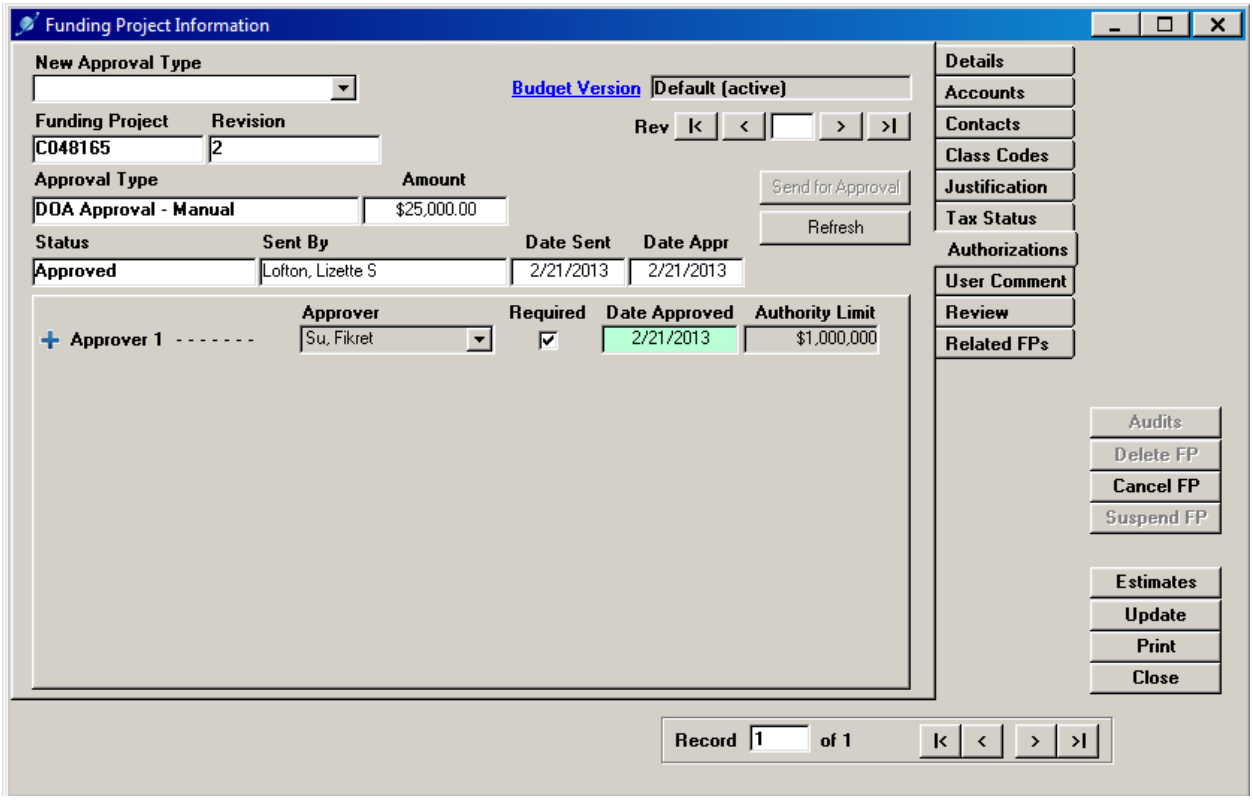
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2/21/2013
2/21/2013
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Date Approved
Authority Limit
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Su, Fikret
2/21/2013
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Contacts
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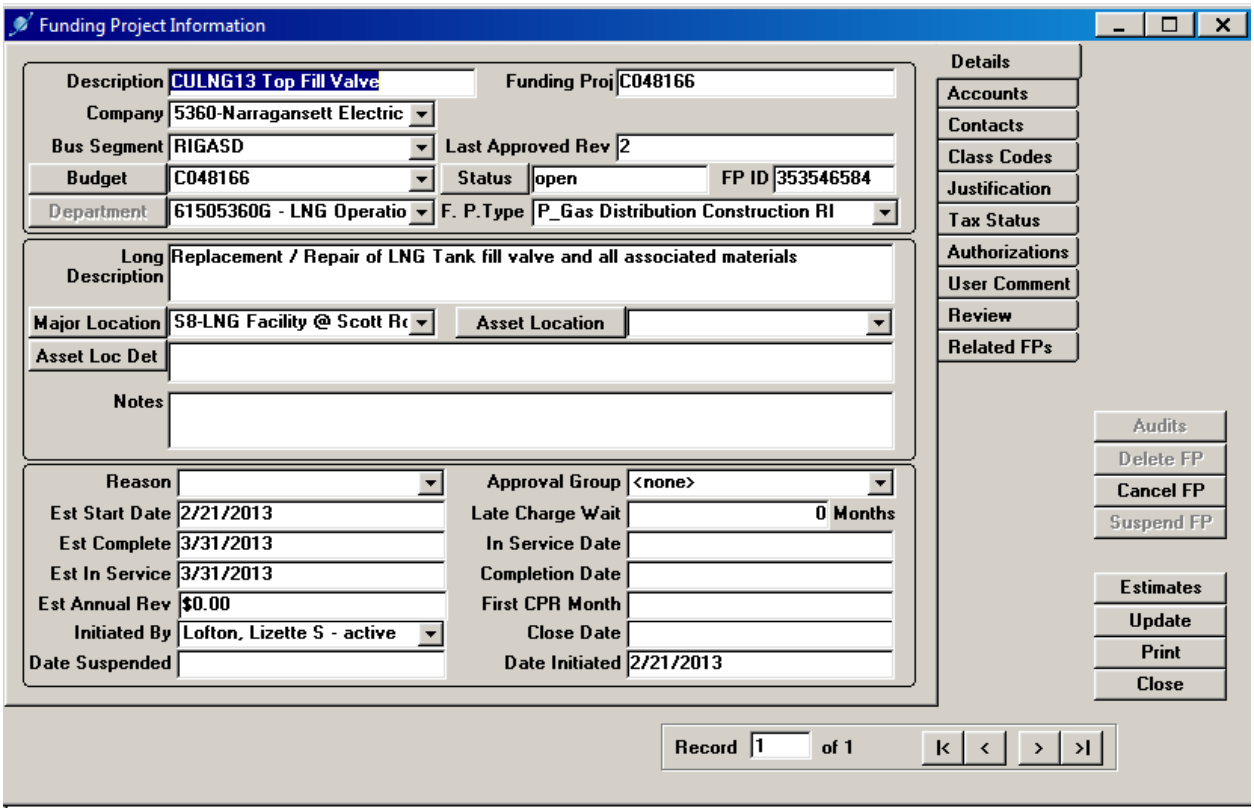
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Funding Proj C048166
Company 5360-Narragansett Electric
Bus Segment RIGASD
Last Approved Rev 2
Budget C048166
Status open
FP ID 353546584
Department 61505360G - LNG Operatio
F. P.Type P_Gas Distribution Construction RI
Long Description Replacement / Repair of LNG Tank fill valve and all associated materials
Major Location S8-LNG Facility @ Scott Rc
Asset Location
Asset Loc Det
Notes
Reason
Approval Group <none>
Est Start Date 2/21/2013
Late Charge Wait 0 Months
Est Complete 3/31/2013
In Service Date
Est In Service 3/31/2013
Completion Date
Est Annual Rev $0.00
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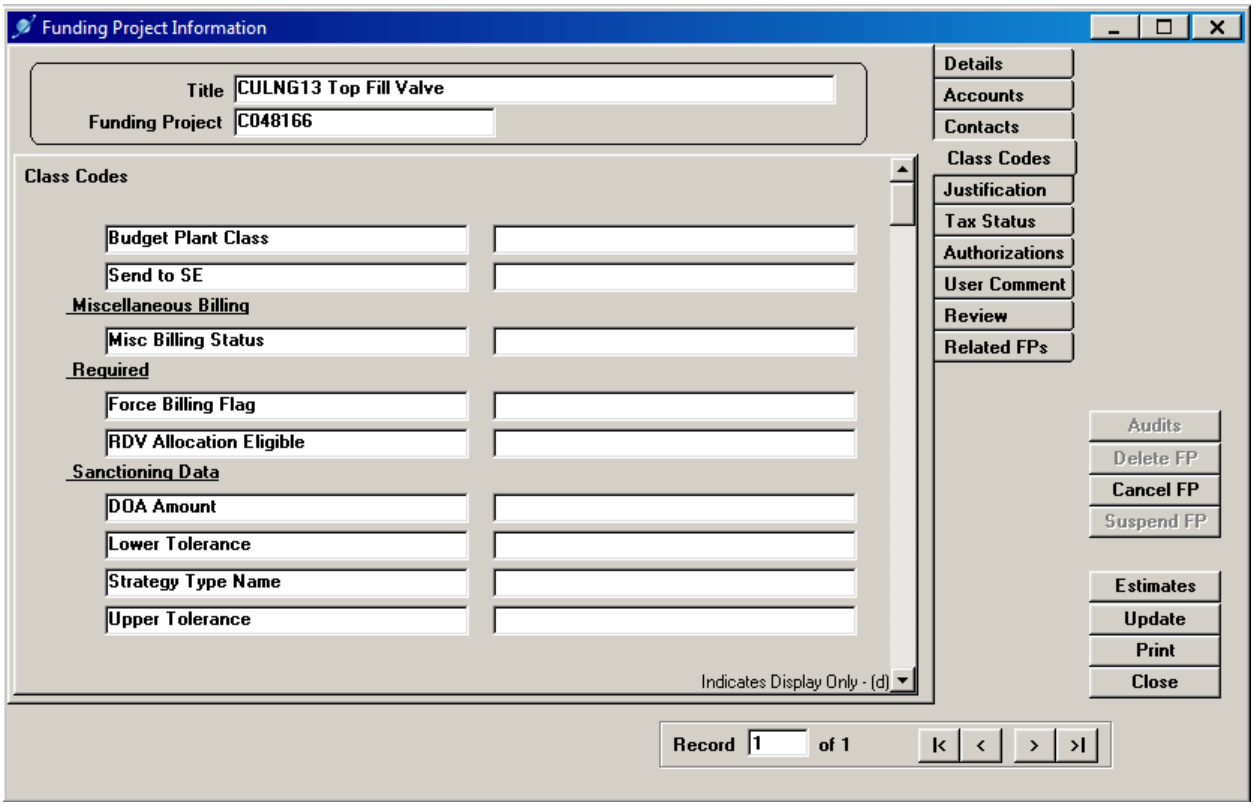
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Funding Project C048166
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Misc Billing Status
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Force Billing Flag
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Sanctioning Data
DOA Amount
Lower Tolerance
Strategy Type Name
Upper Tolerance
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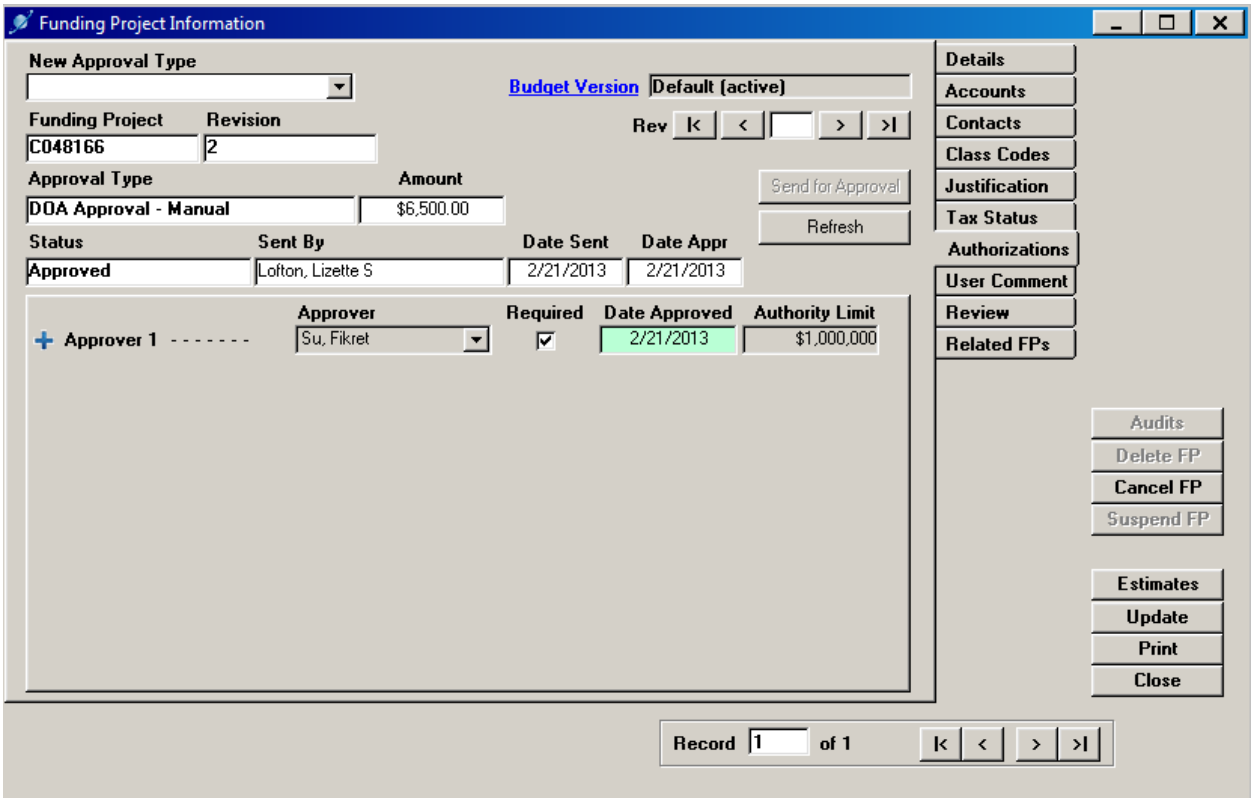
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2/21/2013
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2/21/2013
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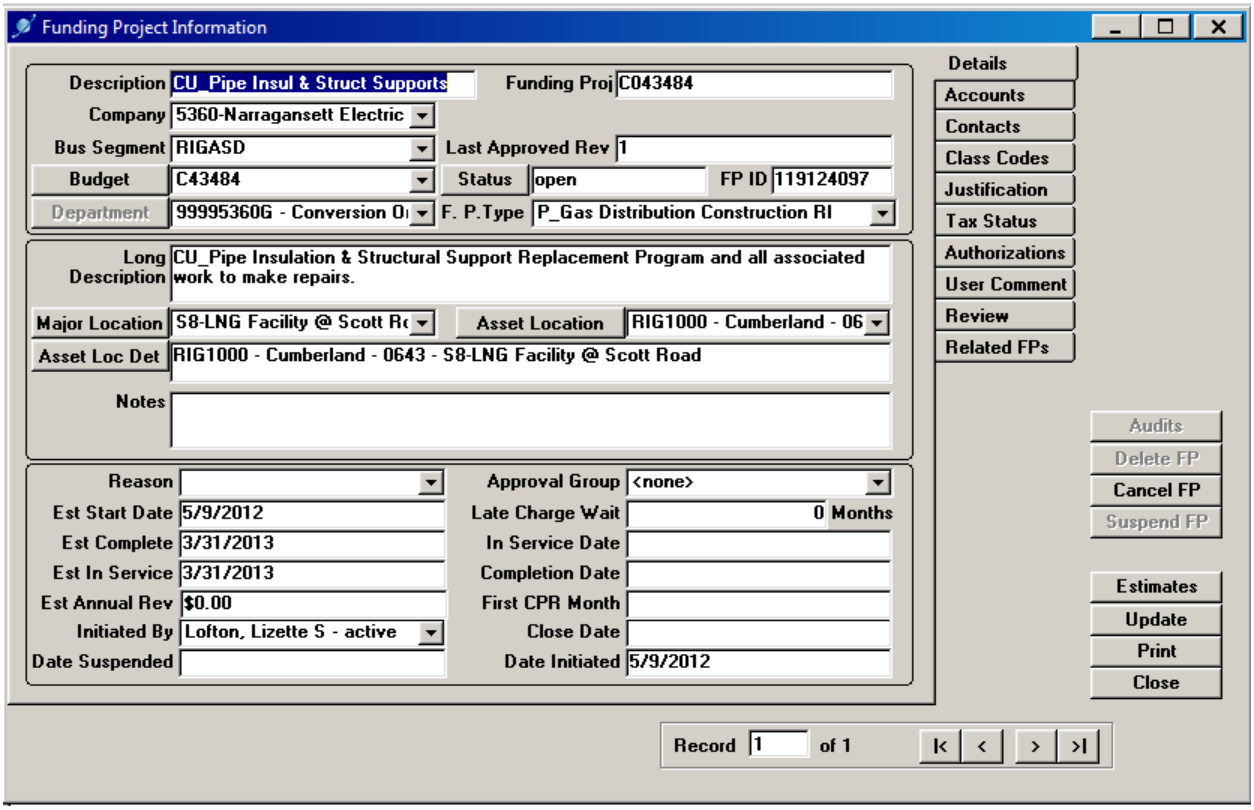
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Funding Proj C043484
Company 5360-Narragansett Electric
Bus Segment RIGASD
Last Approved Rev 1
Budget C43484
Status open
FP ID 119124097
Department 99995360G - Conversion O
F. P.Type P_Gas Distribution Construction RI
Long Description CU_Pipe Insulation & Structural Support Replacement Program and all associated work to make repairs.
Major Location S8-LNG Facility @ Scott R
Asset Location RIG1000 - Cumberland - 06
Asset Loc Det RIG1000 - Cumberland - 0643 - S8-LNG Facility @ Scott Road
Notes
Reason
Approval Group <none>
Est Start Date 5/9/2012
Late Charge Wait 0 Months
Est Complete 3/31/2013
In Service Date
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Date Initiated 5/9/2012
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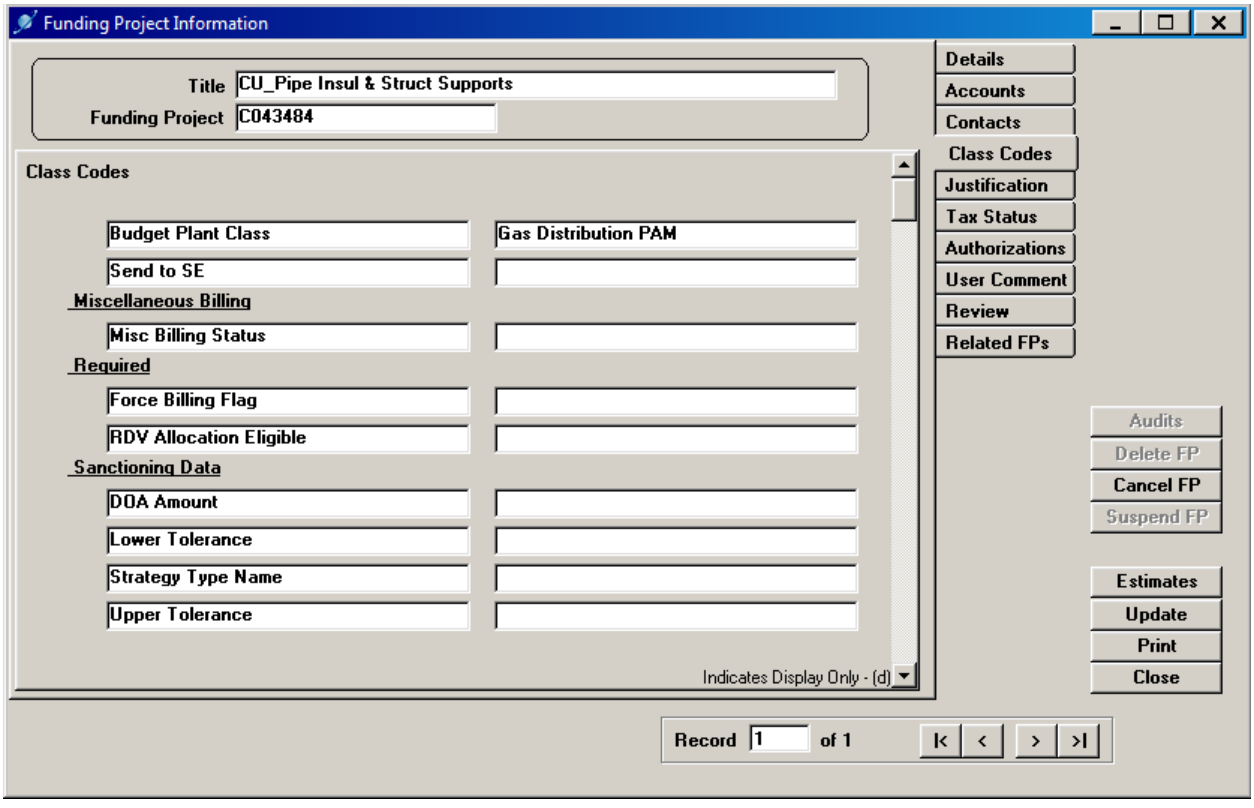
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Title CU_Pipe Insul & Struct Supports
Funding Project C043484
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Gas Distribution PAM
Send to SE
Miscellaneous Billing
Misc Billing Status
Required
Force Billing Flag
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Sanctioning Data
DOA Amount
Lower Tolerance
Strategy Type Name
Upper Tolerance
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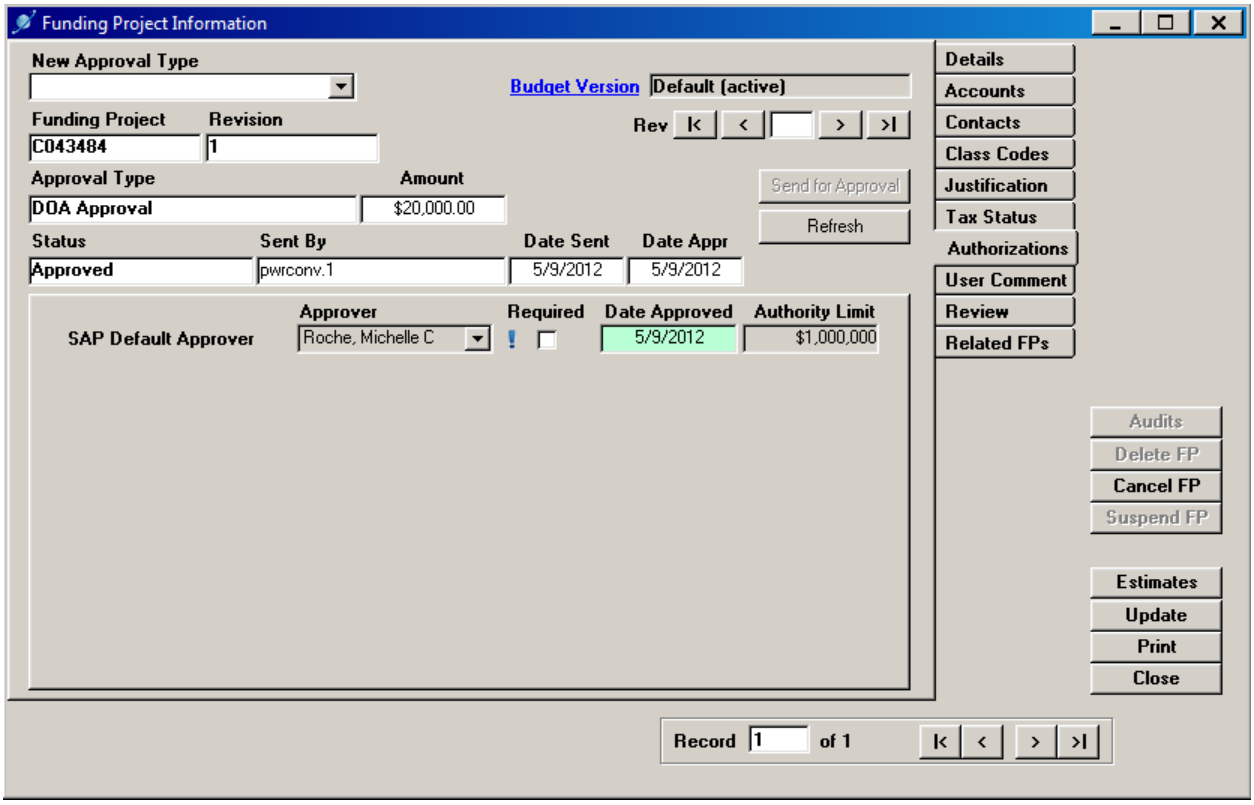
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Roche, Michelle C
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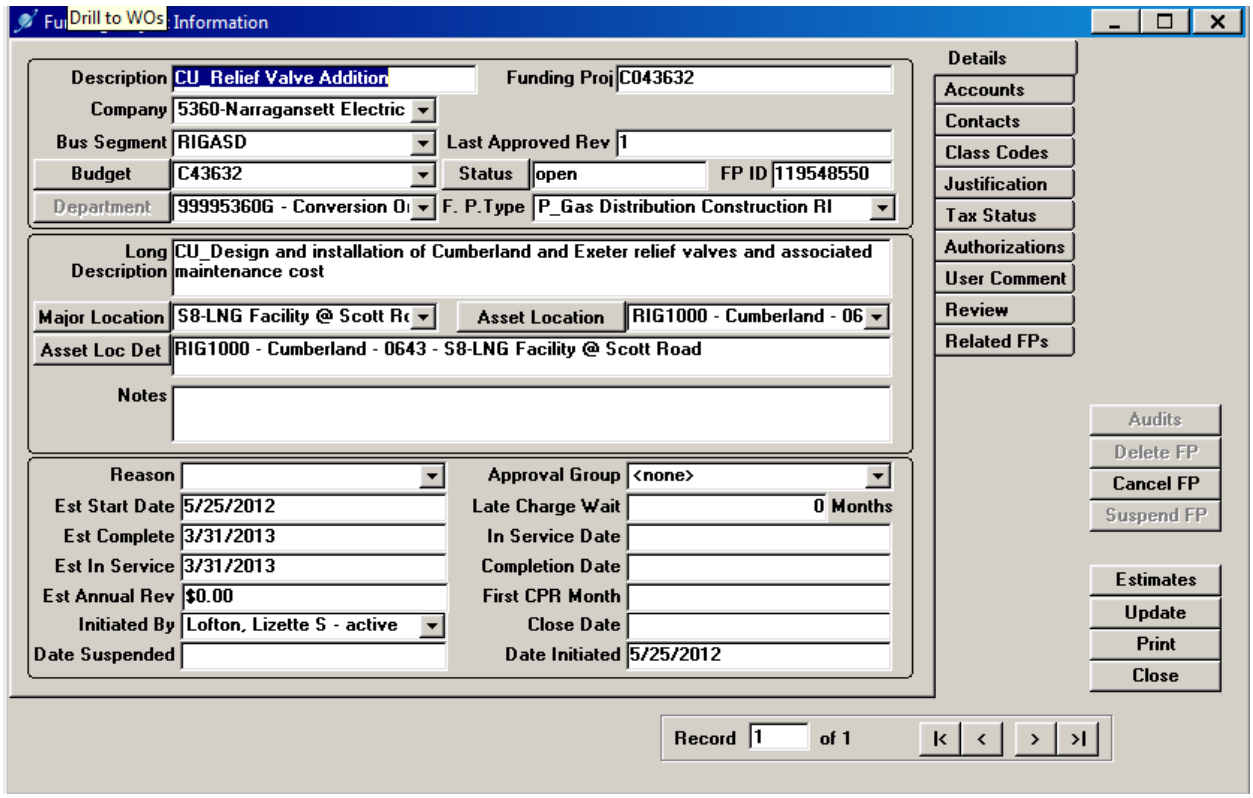
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CU_Relief Valve Addition
Funding Proj
C043632
Company
5360-Narragansett Electric
Bus Segment
RIGASD
Last Approved Rev
1
Budget
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Status
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FP ID
119548550
Department
99995360G - Conversion O
F. P.Type
P_Gas Distribution Construction RI
Long Description
CU_Design and installation of Cumberland and Exeter relief valves and associated maintenance cost
Major Location
S8-LNG Facility @ Scott Rc
Asset Location
RIG1000 - Cumberland - 06
Asset Loc Det
RIG1000 - Cumberland - 0643 - S8-LNG Facility @ Scott Road
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Approval Group
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Late Charge Wait
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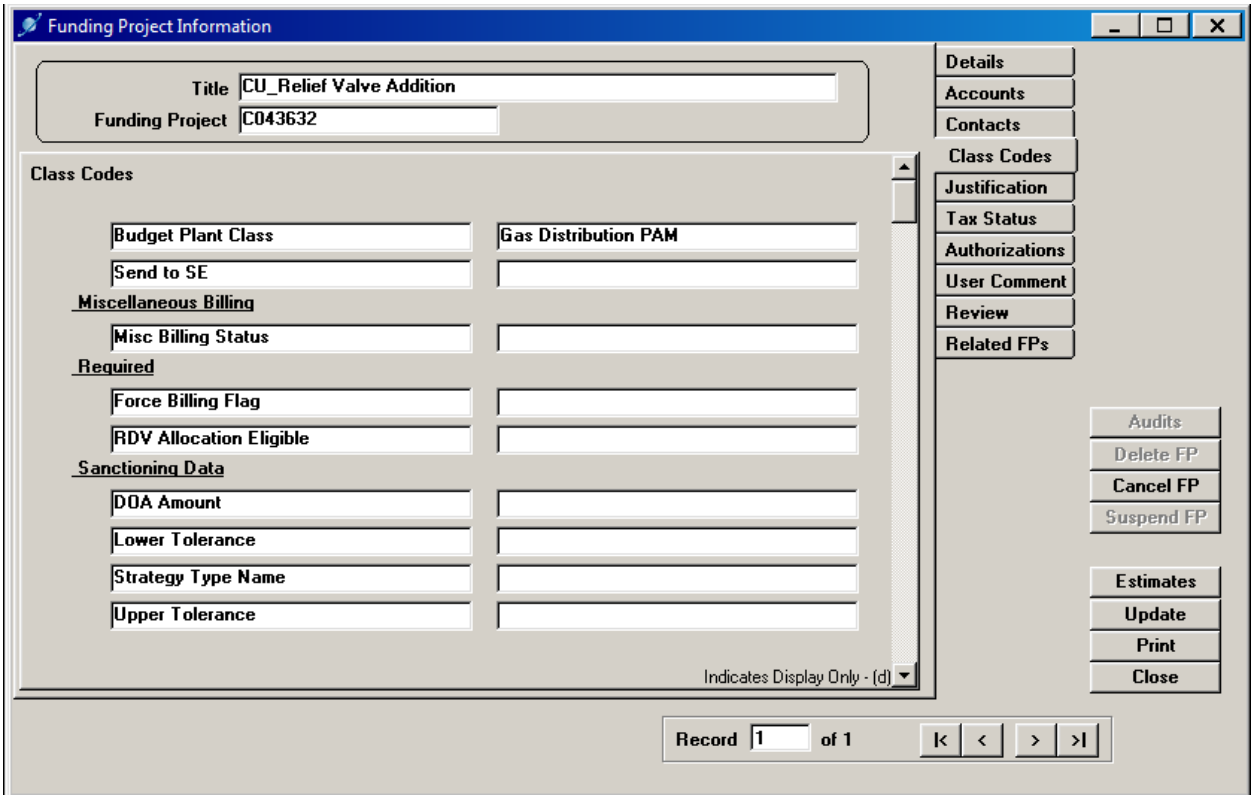
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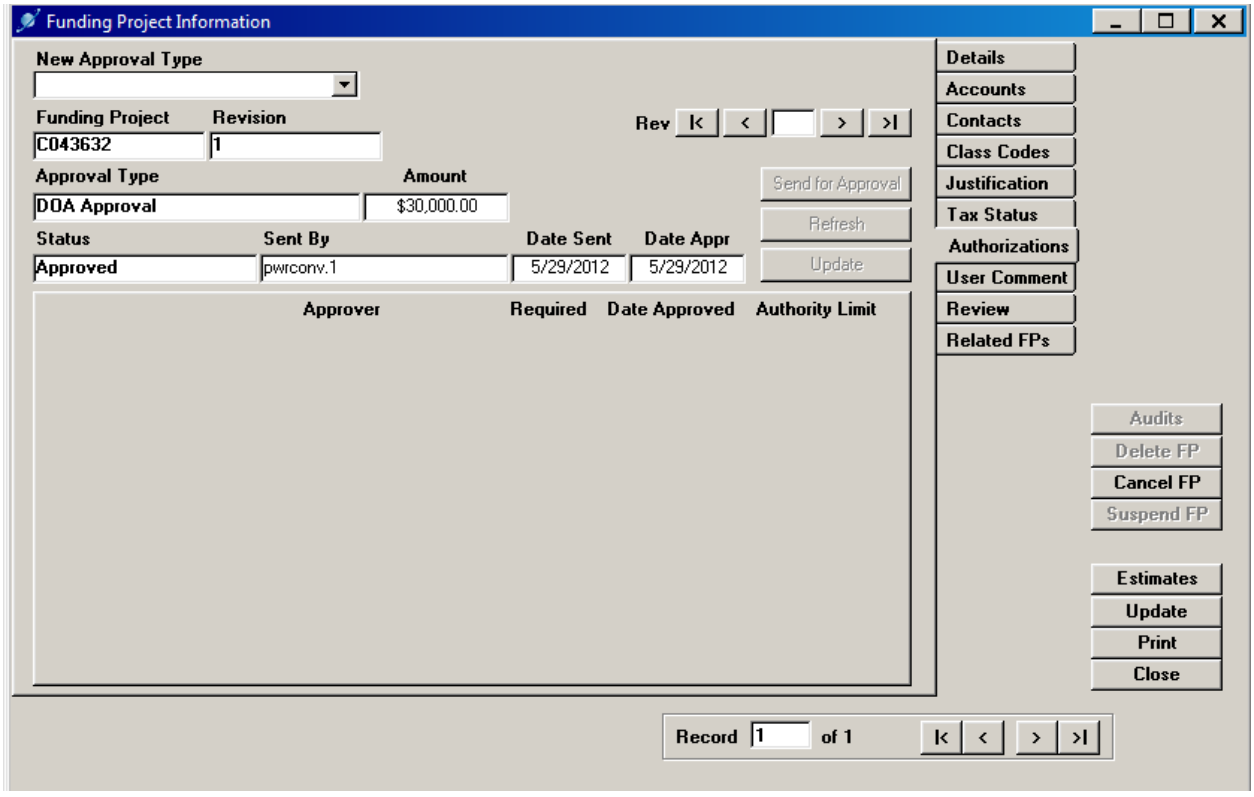
CU_Relief Valve Addition
Funding Project
C043632
Class Codes
Budget Plant Class
Gas Distribution PAM
Send to SE
Miscellaneous Billing
Misc Billing Status
Required
Force Billing Flag
RDV Allocation Eligible
Sanctioning Data
DOA Amount
Lower Tolerance
Strategy Type Name
Upper Tolerance
Indicates Display Only - (d)
Details
Accounts
Contacts
Class Codes
Justification
Tax Status
Authorizations
User Comment
Review
Related FPs
Audits
Delete FP
Cancel FP
Suspend FP
Estimates
Update
Print
Close
Record
1
of 1


Funding Project Information
New Approval Type
Funding Project
Revision
C043632
1
Rev
Approval Type
Amount
DOA Approval
$30,000.00
Send for Approval
Refresh
Update
Status
Sent By
Date Sent
Date Appr
Approved
pwrconv.1
5/29/2012
5/29/2012
Approver
Required
Date Approved
Authority Limit
Details
Accounts
Contacts
Class Codes
Justification
Tax Status
Authorizations
User Comment
Review
Related FPs
Audits
Delete FP
Cancel FP
Suspend FP
Estimates
Update
Print
Close
Record
1
of 1

US Sanction Paper

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Title:	**Proactive Pressure Regulator Station Management Program**	**Sanction Paper #:**	**USSC-12-155**
Project #:	**CON038**	**Sanction Type:**	**Sanction**
Operating Company:	**The Narragansett Electric Company**	**Date of Request:**	**April 25,2012**
Author:	**Stephen Greco - Pressure Regulation Engineering**	**Sponsor:**	**Tim Small – Gas System Engineering**
Utility Service:	**Gas**		

1 Executive Summary

1.1 Sanctioning Summary:

This paper requests sanction of The Narragansett Electric Company Proactive Pressure Regulator Station Management Program in the amount $1.72M and a tolerance of +/- *10%*.

This sanction amount is $1.72M broken down into:

$1.68 Capex
$0 Opex
$0.04 Removal

1.2 Brief Description:

The pressure regulating facilities have been designed to reliably control system pressures and maintain continuity of supply during normal and critical gas demand periods.

Using data from the annual performance testing (PT), cathodic protection (CP) testing, risk assessments and on-site inspections; technical assessments were made for each pressure regulating station taking into account: pipe and equipment condition, operating pressure, regulator performance, and corrosion data. This information combined with the potential customer impact resulting from a station outage was used to prioritize and schedule projects within the capital improvement plan.

1.3 Summary of Projects:

Project Number	Project Title	Estimate Amount ($)
CON038	**Proactive Pressure Regulator Station Management Program**	**1.72**
	Total	**$1.72M**

US Sanction Paper

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1.4 Associated Projects: Proactive Pressure Regulator Station, Sanction Paper

Project Number	Project Title	Company	Estimate Amount ($)

1.5 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type
N/A				

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
May, 2013	Closure

1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
☐ Mandatory ☒ Policy-Driven ☐ Justified NPV	National Grid Policy PL-020020 "Design of Gas Regulator Stations" National Grid Technical Instruction TI-020021 "Design of Gas Regulator Stations"

1.8 Asset Management Risk Score

Asset Management Risk Score: 36

Regulator Stations: Varies dependent on station (Integrity, Safety & Reliability)

Primary Risk Score Driver: (Policy Driven Projects Only)

☐ Reliability ☐ Environment ☒ Health & Safety

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1.9 Complexity Level: (if applicable)

☐ High Complexity ☐ Medium Complexity ☐ Low Complexity

Complexity Score: N/A

1.10 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
FY2013-FY2017 Gas Capital Plan	☒ Yes ☐ No	☐ Over ☐ Under	

1.11 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

1.12 Current Planning Horizon:

Includes: Pressure Regulating Facilities

Company Name	Current planning horizon							
$M	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 +	*Total*
Proposed Capex Investment		1.680						1.680
Proposed Opex Investment								0.000
Proposed Removal Investment		0.040						0.040
CIAC / Reimbursement								0.000
Total	$0.000	$1.720	$0.000	$0.000	$0.000	$0.000	$0.000	$1.720

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1.13 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☒ Internal	☐ Contractor	
Construction/Implementation Resources to be provided	☒ Internal	☒ Contractor	
Resource Delivery			
Availability of internal resources to deliver project:	☐ Red	☐ Amber	☒ Green
Availability of external resources to deliver project:	☐ Red	☐ Amber	☒ Green
Operational Impact			
Outage impact on network system:	☐ Red	☒ Amber	☐ Green
Procurement impact on network system:	☐ Red	☒ Amber	☐ Green

1.14 Key Issues (include mitigation of Red or Amber Resources):

Proactive Pressure Regulator Station Management Program

1	The Pipeline and Hazardous Materials Safety Administration (PHMSA) published the final rule establishing integrity management requirements for gas distribution pipeline systems on December 4, 2009 (74 FR 63906), otherwise known as Distribution Integrity Management Plan (DIMP). Based on these requirements National Grid utilizes a risk model to evaluate and risk rank the Take and Regulating Stations across the service territory. The risk score is used to prioritize work performed as part of the annual proactive pressure regulator station management program.
2	This program will greatly reduce the risk of complete failure of the stations by addressing those stations which are susceptible to a single incident capable of causing an over pressurization of the system.
3	Planned replacements will eliminate stations that do not meet current company standards for design (i.e. over pressure protection) as well as regulatory requirements from the system. By lowering the risk we will improve public safety and enhance the integrity of the system.
4	A single event at any vault could jeopardize the customers downstream. The program addresses corrosion issues, structural vault problems, obsolete pressure control valves, inadequate by-pass designs, accessibility and maintainability. Automation is handled within a separate System Automation Program. National Grid's work order programs are integrated and coordinated to ensure that all work is planned and performed concurrently.
5	Each project is reviewed for current and future flow capacity as well as the technical and regulatory requirements for good design.

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1.15 Key Milestones:

Milestone	Target Date: (Month/Year)
Approval	April, 2012
Delivery of Materials	May, 2012
Construction Start	May, 2012
Construction Complete	November, 2012
Project Closure	May, 2013

1.16 Climate Change:

Proactive pressure regulator station Management Program

Are financial incentives (e.g. carbon credits) available?		☐ Yes	☒ No
Contribution to National Grid's 2050 80% emissions reduction target:	☐ Neutral	☒ Positive	☐ Negative
Impact on adaptability of network for future climate change:	☒ Neutral	☐ Positive	☐ Negative

1.17 List References:

1	National Grid Policy PL-020020 "Design of Gas Regulator Stations"
2	National Grid Technical Instruction TI-020021 "Design of Gas Regulator Stations"
3	DRAFT – Gas Distribution Integrity Management Plan, July 11, 2011

2 Recommendations:

The **Sanctioning Authority**, i.e., USSC is invited to:

(a) APPROVE the investment of $1.72M and a tolerance of +/- 10 %

(b) NOTE that Stephen Greco is the Project Manager and has the approved financial delegation to undertake the activities in (a).

Signature..... Date..... 5/24/2012

Tim Small

VP Gas Systems Engineering

US Sanction Paper

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I hereby approve the recommendations made in this paper.

Signature..... Date 6/1/12

Christopher E. Root,
Senior Vice President Network Strategy

3 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on April 25, 2012.

Signature..... Date 6/12/12.

Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee

US Sanction Paper

4 *Sanction Paper Detail*

Title:	**Proactive Pressure Regulator Station Management Program**	**Sanction Paper #:**	**USSC-12-155**
Project #:	**CON038**	**Date of Request:**	**April 25,2012**
Company Name:	**THE NARRAGANSETT ELECTRIC COMPANY**	**Sponsor:**	**Tim Small – Gas System Engineering**
		Author:	**Walter Werther & Steve Greco Pressure Regulation Engineering**

4.1 Background

Proactive Pressure Regulator Station Management Program

The pressure regulating facilities have been designed to reliably control system pressures and maintain continuity of supply during normal and critical gas demand periods. Pressure regulation stations have been designed for specific flows and pressures. Accepted engineering guidelines provide for design, planning, operation and maintenance of these gas distribution facilities. Applicable state and federal codes are followed to help ensure safe and continuous supply of natural gas to National Grid customers and the community we serve. Standards for the design of pressure regulating facilities have varied widely over time. Assessing these stations in light of current standards and best practices is critical to determining which stations need to be addressed first in order of risk.

Pressure Regulating Engineering working in conjunction with the Instrumentation and Regulation Team recently compiled and published a comprehensive five (5) year capital improvement plan for the pressure regulating facilities, which includes associated equipment such as control lines, blow-off's and oil seals. The plan was developed utilizing a risk model to evaluate and risk rank the one hundred ninety-nine (199) pressure regulating stations, which includes take stations and high and low pressure regulator stations across the Narragansett Electric Company service territory. Five (5) stations were selected for capital improvements based on risk scoring. The plan addresses the safety and reliability aspects of each station (including over pressure protection). Using data from the annual performance testing (PT), cathodic protection (CP) testing and on-site inspections, technical assessments were made for each station taking into account pipe and equipment condition, regulator performance, and corrosion data. This information combined with the potential customer impact resulting from a station outage was used to prioritize and schedule projects within the capital improvement plan.

Regulator stations with corrosion issues, structural vault problems, obsolete pressure control valves, inadequate by-pass designs, accessibility and maintainability problems as well as inadequate separation between pressure control and overpressure protection devices were identified for replacement. Ongoing engineering evaluations will continue in conjunction with annual required PT performed by I&R to formulate updated annual and five (5) year improvement plans. The work can be categorized into two (2) basic types:

Full replacement – the entire station is replaced from the station inlet to the outlet. This is done for reasons of:

- Severe corrosion; usually occurs where no CP was installed [i.e. Pre-DOT pipe, pre 1971]
- It is not cost effective to fix or modify
- Under capacity – the station is too small and would require new vaults, new piping with larger valves and regulators as identified by Gas System Planning.
- Structural problems with vaults, coupled with flooding and traffic problems that need to be addressed.

When these situations occur, it is usually more cost effective to perform a full replacement.

Station Rebuild – the station can be rebuilt and brought to current standards. This may require the following:

- Control line rework or replacement
- Minor work to ensure adequate sustained CP readings
- New regulators or replacement of "soft goods"
- New sleeves, ladders, vault covers, and pipe stubs
- Recoating of all exposed piping with epoxy

Station rebuilds can extend the life of an existing station by 20 years or more and are very cost effective. They usually cost less than 30% of a full replacement.

The FY 2012-13 plan for the Narragansett Electric Company proactive pressure regulator program and special projects are listed in Appendix I.

4.2 Drivers

The key drivers for the replacement of pressure regulator stations that do not meet current standards of reliability, safety and performance include the following:

- Stations which were initially designed with the over pressure protection safety device installed within the same box or vault as the primary pressure control valve. This does not meet current code requirements and presents the risk that a single event impacting the vault could compromise both the control and safety devices resulting in a system over pressure event.

- Stations that contain a design which places the over pressure protection device in an inaccessible location presenting health and safety issues for maintenance.
- Addressing regulating stations with corrosion issues (including control lines), structural vault problems, obsolete pressure control valves, inadequate by-pass designs, accessibility and maintainability

4.3 Project Description

These projects include the design, procurement, construction, testing and completion of capital additions as indicated in Appendix I. These projects are designed to improve the system reliability for our customers by: pressure regulating station upgrades and replacements (removing obsolete equipment), control line replacement, odorizer replacement, oil seal replacement, and installing over pressurization protection. The work plan is developed using data from annual performance tests, cathodic protection tests, and on site inspections. National Grid uses the risk ranking of its equipment for identifying and prioritizing the jobs included in the work plan. This method ensures that National Grid targets the areas of highest risk with the resources available. The plan is reviewed annually and revised as necessary.

4.4 Benefits Summary

Integrity – This work will improved safety and reliability of the gas system. This work will improve the safety of the gas system by minimizing the risk of regulating station failure and subsequent outages, damages and /or incidents.

Reliability – This work will enhance reliability to all downstream customers by retiring facilities that do not meet today's standards for code compliance, safety, performance and condition and insuring that downstream pipe imperfections and anomalies are maintained as stable threats by eliminating increased cold temperature stresses.

Regulatory – Improve relations, demonstrate our resolve to find and fix problems before they present themselves as potential incidents, it shows our due diligence and supports our position as a Premier Operator for ongoing and regulatory support.

4.5 Business Issues

This project is an annual capital improvement program that will require sanctioning on an annual basis. This sanctioning document addresses the FY 2012-2013 projects which have been included in the annual budget plan.

US Sanction Paper

4.6 Options Analysis

Proactive pressure regulator station Management Program

Recommended Option:

Install work:

This option provides the greatest benefit because it reduces the risk of over-pressurizing the system, improves the operation and performance of these stations, improves the maintainability of these stations and reduces the potential for customer outages.

Alternative 1:

Maintain existing Stations (Do Nothing):

The consequences of not completing the work will result in increased risks associated with potential failure of existing noncompliant stations and downstream piping. It would reduce the integrity of the system and potentially result in significant customer outages.

4.7 Safety, Environmental and Project Planning Issues

Regulator Station Management Program

Some building permits are required. Obtaining permits for these stations are sometimes problematic which can cause delays in starting construction. In some cases, station construction could be delayed and stations scheduled for construction the following year are advanced into the current fiscal year utilizing the Investment Planning process.

4.8 Execution Risk Appraisal

No.	Status (Active, Dormant,	Category	Detailed Description of Risk / Opportunity	Cause/Trigger	Prob	Impact		Score		Strategy
1	Active	Permitting	Municipal/State Permitting Delays	Permitting Process	3	3	3	9	9	Mitigate
2	Active	Construction	resources, will need contractor support to complete work plan	Limited company resources	3	3	4	9	12	Mitigate

4.9 Permitting

Permit Name	Probability Required (Certain/ Likely/ Unlikely)	Duration	Status (Complete/ In Progress Not Applied For)	Estimated Completion Date
DOT Road Permits	Likely	1-2 months	In progress	On going
Building Permits	Certain	2-3 months	Not Applied For	May, 2012

4.10 Investment Recovery

4.10.1 Investment Recovery and Regulatory Implications

This project enables the company to comply with the established policy and will reduce the need for increased regulatory oversight with regard to operation, maintenance and risk of these critical facilities. This capital investment plan support current rate strategy for recovery of capital investment.

4.10.2 Customer Impact

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately $0.336 million. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

Every effort is made to minimize customer impact during construction of these projects. Traffic control plans are put in place to maintain traffic and maintain access to homes and businesses. Permit stipulations typically limit work hours when necessary to accommodate rush hour traffic and/or residential communities. Minimal customer impact is expected during these construction projects. New technologies are utilized where ever possible to minimize customer impacts such as utilization of the draw down compressor to minimize venting to atmosphere, etc.

4.10.3 CIAC / Reimbursement N/A

$M	CIAC/Reimbursement							
	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 17/18	*Total*
CIAC / Reimbursement								

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4.11 Financial Impact to National Grid

4.11.1 Cost Summary Table

			Current Planning Horizon									
Project Description	Project Estimate level	$M	Prior YR Spending	YR 1 12/13	YR 2	13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR7+	Total
Description												0.000
Pressure Regulator		Capex		1.680								1.680
		Opex										0.000
		Removal		0.040								0.040
		Total	0.000	1.720	0.000		0.000	0.000	0.000	0.000	0.000	1.720
Description												
		Capex										0.000
		Capex										0.000
		Opex										0.000
		Removal										0.000
		Total	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000
ed Sanction												
		Capex	0.000	1.680	0.000		0.000	0.000	0.000	0.000	0.000	1.680
		Opex	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000
		Removal	0.000	0.040	0.000		0.000	0.000	0.000	0.000	0.000	0.040
		Total	0.000	1.720	0.000		0.000	0.000	0.000	0.000	0.000	1.720
			$0.000	$1.720	$0.000		$0.000	$0.000	$0.000	$0.000	$0.000	$1.720

Total Project Current Year and Future Years Cost = $1.720 M

4.11.2 Project Budget Summary Table

Project Budget Summary Table

Project Costs per Business Plan		Prior Year Spending*	YR 1 12/13	YR 2 13/14	YR 3	14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR 7	Total
	Capex	0.000	1.680	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	Opex	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.040	0.000	0.000		0.000	0.000	0.000	0.000	0.040
	Total Cost in B Plan	0.000	1.720	0.000	0.000		0.000	0.000	0.000	0.000	$1.720

*P/Y Actuals

Variance		Prior Year Spending	YR 1 12/13	YR 2 13/14	YR 3	14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR 7	Total
	Capex	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	Opex	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	Removal	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	Total Variance	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	$0.000

4.11.3 Cost Assumptions

Cost estimates are a combination of high level and detailed depending on their design status. Cost estimates were based on the following assumptions:

a) Environmental concerns are limited to current practices for mitigation of known conditions such as operating in wetland areas, asbestos removal and noise abatement etc.
b) Road opening permits are approved without new or unprecedented additional requirements.

4.11.4 Net Present Value / Cost Benefit Analysis

Not Applicable

4.11.5 Additional Impacts

None

4.12 Statements of Support

4.12.1 Supporters

Role	Name	Responsibilities
Sponsor		Endorses the project aligns with jurisdictional objectives
Instrumentation and Regulation	Dave Zielinski	
Investment Planning	Michelle Roche	
Resource Planning	James Patterson jr.	

4.12.2 Reviewers

Reads paper for content / language. Recommends edits if necessary

Reviewer List	Name
Finance	Karen Hamel
Regulatory	Peter Zschokke
Procurement	John Kavanaugh
Jurisdictional Delegates	Laurie Brown

5 *Appendices*

Appendix 1 Work Plan for FY 2012/2013

Station ID	Scope of Work	Estimated Cost
Pawtucket, Lawn Ave @Lonsdale (RIS-C041)	Regulator Abandonment	$40,000
Pawtucket, Tidewater (RIS-039)	Install Building	$380,000
Warren, Warren/Bristol - Brown St (RIS-W010)	Overhaul Brown St Reg Station	$400,000
East Providence, Dey St (RIS-311)	Install Relief Valve	$50,000
East Providence, Holder 20 - First @ Mauran (RIS-002 RIS-003)	Install new pre-fabs	$850,000
	TOTAL	**$1,720,000**

Appendix 2 Tidewater Building Damage

US Sanction Paper

5.1 Project Cost Breakdown

Project Cost Breakdown		
Cost Category	**Company Name ($ Amount)**	**Description of Cost Category**
Total:		

5.2 Other Appendices

5.3 NPV Summary (if applicable)

5.4 Customer Outreach Plan (if applicable)

USSC Closure Paper

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Title:	FY13 Proactive Pressure Regulator Station Management Program	**Sanction Paper #:**	USSC-12-155C
Project #:	CON038	**Sanction Type:**	Closure
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	3/30/2017
Author:	Steve Greco/Stephen Soroka	**Sponsor:**	John Stavrakas, VP Gas Asset Management
Utility Service:	Gas	**Project Manager:**	Joseph Fortier, Jr.

1 *Executive Summary*

This paper is presented to close CON038. The total spend was $1.836M. The sanctioned amount for this project was $1.720M.

The final spend amount is $1.836M broken down into:
$1.695M Capex
$0.141M Removal

2 *Project Summary*

The pressure regulating facilities have been designed to reliably control system pressures and maintain continuity of supply during normal and critical gas demand periods.

Using data from the annual performance testing (PT), cathodic protection (CP) testing, risk assessments and on-site inspections; technical assessments were made for each pressure regulating station taking into account: pipe and equipment condition, operating pressure, regulator performance, and corrosion data. This information combined with the potential customer impact resulting from a station outage was used to prioritize and schedule projects within the capital improvement plan.

USSC Closure Paper

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3 Over / Under Expenditure Analysis

3.1 Summary Table

Actual Spending ($M)			
Project #	Description		Total Spend
Various-See Appendix	Various - See Appendix	Capex	1.695
		Opex	0.000
		Removal	0.141
		Total	1.836
Total		Capex	1.695
		Opex	0.000
		Removal	0.141
		Total	1.836

Project Sanction Summary Table			
Project Sanction Approval ($M)			Total Spend
		Capex	1.720
		Opex	0.000
		Removal	0.000
		Total Cost	1.720
Sanction Variance ($M)			Total Spend
		Capex	0.025
		Opex	0.000
		Removal	(0.141)
		Total Variance	(0.116)

3.2 Analysis

The Proactive Pressure Regulator Station Management Program is 7% over plan which is within the tolerance level.

4 Improvements / Lessons Learned/Root Cause

- Improve development of estimating practices.
- Work with Finance and Resource Planning to create better financial metrics.
- Create Long Term resource requirements for future Capital planning.
- Identify carryover or deferred projects in a timely fashion.

5 *Closeout Activities*

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	(•) Yes ( ) No
All relevant costs have been charged to project	(•) Yes ( ) No
All work orders and funding projects have been closed (1)	( ) Yes (•) No
All unused materials have been returned	(•) Yes ( ) No
All as-builts have been completed (2)	( ) Yes (•) No
All lessons learned have been entered appropriately into the lesson learned database (3)	( ) Yes (•) No

(1) All work orders and funding projects have been closed
Program/Blanket projects may contain work orders and or funding projects which have not yet been closed for reasons including but not limited to:

- the same work order(s) are used annually. They will remain open until Asset Management and/or Resource Planning have determined work orders are no longer needed .
- construction may cross multiple fiscal years
- the work order closing process is within the late charge waiting period
- other accounting processes or final system closing activities have not yet completed

The Program/Blanket projects are approved annually for the current year expected spend and remain open until Asset Management and/or Resource Planning have determined the project is no longer required.

(2) All as-builts have been completed

Program/Blanket projects may contain work orders for which no as-builts have yet been recorded for reasons including but not limited to:

- design and/or construction have not yet completed
- construction may cross multiple fiscal years
- work has completed recently and as-builts have not yet been processed into the system
- does not apply. Work order(s) are not linked to work management systems. (example: Meter Purchases, Meter Changes, AMR Installations Purchase Misc Capital Tools/Equipment, etc.)
- does not apply to Information systems projects.

(3) All lessons learned have been entered appropriately into the lesson learned database

Program/Blanket projects usually contain short cycle work which the Company has been performing over several fiscal years. No new Lessons Learned which have not already been identified and recorded within section 4.

6 *Statements of Support*

6.1 *Supporters*

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planner	Pensabene, Patrick M.	Endorses relative to 5-year business plan or emergent work
Resource Planning	Falls, Jonathon	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Project Management	Fortier, Joseph Jr.	Endorses Resources, cost estimate, schedule
Gas Project Estimation	Paul, Art	Endorses Cost Estimate

6.2 *Reviewers*

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Easterly, Patricia
Regulatory	Zschokke, Peter

USSC Closure Paper

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Jurisdictional Delegate	Currie, John
Procurement	Curran, Art
Control Center	Loiacono, Paul

USSC Closure Paper

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7 ***Decisions***

I approve this paper.

Signature Ross W. Turrini Date April 27, 2017

Executive Sponsor – Ross Turrini, Senior Vice President, Gas Process & Engineering and Chief Gas Engineer

USSC Closure Paper

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APPENDIX

Project	Cost Category CAP	COR	Grand Total
	$ 2,073,772	**$ 612,323**	**$ 2,686,094**
C039268	$ 102,550	$ 65,440	$ 167,990
C39268	$ 501,815	$ 2,989	$ 504,804
CON036	$ 332,632	$ 33,410	$ 366,042
CON038	$ 628,013	$ 17,023	$ 645,036
CRIC402	$ 129,838	$ 21,925	$ 151,763
	$ 1,694,849	**$ 140,786**	**$ 1,835,635**

US Sanction Paper

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Title:	**System Automation & Control**	**Sanction Paper #:**	**USSC-12-061**
Project #:	**C39264**	**Sanction Type:**	**Sanction**
Operating Company:	**The Narragansett Electric Company**	**Date of Request:**	**February 22, 2012**
Author:	**Walter Werther & Steve Greco Pressure Regulation Engineering**	**Sponsor:**	**Tim Small – Gas System Engineering**
Utility Service:	**Gas**		

1 Executive Summary

1.1 Sanctioning Summary:

The Narragansett Electric Company System Automation program requests sanctioning in the amount of $1.4M and a tolerance of +/- 10% to install system automation equipment over the next year. The primary purpose of this program is to increase the level of system automation by monitoring and controlling gas pressure, temperature and flow rates at National Grid's regulator stations.

This sanction amount is $1.4M broken down into:
$.1.4M Capex
$0.030 Opex
$0 Removal

1.2 Brief Description:

This project will install Remote Terminal Units (RTU's) at four (4) gate stations and forty-six (46) regulator stations located throughout the Narragansett Electric Company Service territory. RTU's are installed locally at the sites and provide temperature, pressure, and flow data to the Gas Control Rooms. In some cases the RTU's will also monitor other station sensors such as gas detectors and intrusion alarms. The RTU's will allow Gas Control to remotely adjust the pressure set point at the regulator stations based on the data provided by the RTU. Data will be transmitted primarily via cellular technology. Since the level of existing automation in the Narragansett Electric Company territory is relatively low, most of the costs of the projects listed below in the summary table are associated with the new RTU installations. Gas odorizer telemetry will provide Gas Control with monitoring and remote dosing control.

1.3 Summary of Projects:

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The Narragansett Electric Company System Automation **Fiscal Year 2012-13**			
Description	**Number**	**Ave Cost**	**Total Cost**
New RTU Installation w/Controller	33	$40,000	$1,320,000
Odorant RTU	1	$39,000	$39,000
RTU Replacements	16	$3,750	$60,000
Total	**50**		**$1,419,000**

1.4 Associated Projects:

Project Number	Project Title	Company	Estimate Amount ($)

1.5 Prior Sanctioning History (including relevant approved Strategies):

Date	Governance Body	Sanctioned Amount	Paper Title	Sanction Type

1.6 Next Planned Sanction Review:

Date (Month/Year)	Purpose of Sanction Review
May, 2013	Closure

1.7 Category:

Category	Reference to Mandate, Policy, or NPV Assumptions
☐ Mandatory ☒ Policy-Driven ☐ Justified NPV	National Grid Policy PL 030002 – SCADA Instrument & Control requires that new telemetry points are approved by Gas Control in accordance with the U.S. Department of Transportation - Pipeline and Hazardous Materials Safety Administration (PHMSA) Control Room Management standards (49CFR 192.631.

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1.8 Asset Management Risk Score

Asset Management Risk Score: 35

Primary Risk Score Driver: (Policy Driven Projects Only)

☐ Reliability ☐ Environment ☒ Health & Safety

1.9 Complexity Level: (if applicable)

☐ High Complexity ☐ Medium Complexity ☐ Low Complexity

Complexity Score: N/A

1.10 Business Plan:

Business Plan Name & Period	Project included in approved Business Plan?	Over / Under Business Plan	Project Cost relative to approved Business Plan ($)
System Automation Program FY 12 - 13	☐ Yes ☐ No	☐ Over ☐ Under	

1.11 If cost > approved Business Plan how will this be funded?

Re-allocation of funds within the portfolio will be managed by Resource Planning to meet jurisdictional budgetary, statutory and regulatory requirements.

1.12 Current Planning Horizon:

Company Name	Current planning horizon								
$M	Prior YR'S	Yr 1 12/13	Yr 2 13/14	Yr 3 14/15	Yr 4 15/16	Yr 5 16/17	Yr 6 17/18	Yr 7+	*Total*
Proposed Capex Investment		1.419							1.419
Proposed Opex Investment		0.030							0.030
Proposed Removal Investment									0.000
CIAC / Reimbursement									0.000
Total	$0.000	$1.449	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$1.449

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1.13 Resources:

Resource Sourcing			
Engineering & Design Resources to be provided	☒ Internal		☒ Contractor
Construction/Implementation Resources to be provided	☒ Internal		☒ Contractor
Resource Delivery			
Availability of internal resources to deliver project:	☐ Red	☐ Amber	☒ Green
Availability of external resources to deliver project:	☐ Red	☐ Amber	☒ Green
Operational Impact			
Outage impact on network system:	☐ Red	☐ Amber	☒ Green
Procurement impact on network system:	☐ Red	☐ Amber	☒ Green

1.14 Key Issues (include mitigation of Red or Amber Resources):

1	There are one hundred ninety-nine (199) pressure regulating stations in the Narragansett Electric Company service area. Currently, the system in the Narragansett Electric Company has a limited amount of system automation – 19% (or 38) of the pressures regulating stations are equipped with automation, which allows the regulator to be controlled remotely from the GSO control room, while 81% (161) of the system can not be controlled remotely from the GSO control room.
2	Due to the increased scrutiny place on system automation in the aftermath of the San Bruno Pipeline incident, it is anticipated that Federal Regulations will require additional levels of system automation on both transmission and distribution systems. Increasing the level of automation at pressure regulating stations will enhance the ability of the Gas Control to pinpoint problems and take corrective action.
3	Recent changes in Federal Regulations for Control Room Management focus on increasing system awareness and providing proactive response to abnormal operating conditions. This program supports compliance with these regulations.
4	This program supports the standardization of telemetry across National Grid's gas transmission and distribution system.
5	Enhanced calibration of network models from automation and telemetry data improves the accuracy of network analysis and enhances the ability to forecast future capital reinforcements, which leads to more efficient capital expenditure. National Grid's 2011-2012 US GDx Winter Operations Report summarizes areas within the system that where pressure problems could be encountered. (See page 158 of Reference #3)

6	Telemetry at each pressure regulating station will allow GSO to react to system problems immediately and crews can be dispatched to a specific problem area thus improving the response time. Telemetry will also eliminate the need to chart recorders.

1.15 Key Milestones:

Milestone	**Target Date: (Month/Year)**
Develop regional detail project list	February 2012
Identify I&R Resources	March/April 2012
Issue Bid Specification for standard telemetry cabinets	March, 2012
Order Equipment	April, 2012
Execute Work plan	April – March 2013

1.16 Climate Change:

Are financial incentives (e.g. carbon credits) available?		☐ Yes	☒ No
Contribution to National Grid's 2050 80% emissions reduction target:	☐ Neutral	☒ Positive	☐ Negative
Impact on adaptability of network for future climate change:	☐ Neutral	☒ Positive	☐ Negative

1.17 List References:

1	PL 030002 – SCADA Instrument & Control
2	PHMSA Proposed rule 49 CFR Part 192.631 Pipeline Safety: Control Room Management/ Human Factors
3	National Grid 2011-2011 US GDx Winter Operations Performance Report

2 Recommendations:

The **Sanctioning Authority** i.e., USSC, is invited to:

(a) APPROVE the investment of $1.4M and a tolerance of +/- 10 %

(b) NOTE that Stephen Greco is the Project Manager and has the approved financial delegation.

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Signature..... Date.....3/22/2012
Tim Small
VP Gas Systems Engineering

I hereby approve the recommendations made in this paper.

Signature..... Date.....4/2/12
Christopher E. Root,
Senior Vice President Network Strategy

3 Decisions

The US Sanctioning Committee (USSC) approved this paper at a USSC meeting held on February 22, 2012.

Signature.....Date.....4/6/12
Lee S. Eckert
US Chief Financial Officer
Chairman, US Sanctioning Committee

4 Sanction Paper Detail

Title:	System Automation & Control	**Sanction Paper #:**	USSC-12-061
Project #:	C39264	**Date of Request:**	February 22, 2012
Company Name:	THE NARRAGANSETT ELECTRIC COMPANY	**Sponsor:**	Tim Small – Gas System Engineering
		Author:	Walter Werther & Steve Greco

4.1 Background

The Need for System Automation in light of recent DOT Regulations

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The Narragansett Electric Company service territory currently has one hundred ninety-nine (199) pressure regulator stations, which includes take stations, and high and low pressure regulator stations. Of these stations, sixty-five (65) stations are currently equipped with telemetry and connected to the SCADA system of which thirty-eight (38 or 19% of the system) are equipped with automation which allows for control of the regulator form the GSO control room. Currently there are one hundred thirty-four (134) stations without telemetry. Data from these 134 stations is recorded on paper chart recorders and retrieved manually, and these stations account for 67% of this system. There are sixteen (16) stations currently connected to the SCADA system requiring updated telemetry equipment.

In the past, system low points were monitored using traditional forms of telemetry. These points were representative of several critical pressure regulating facilities as they were located between sites at critical system nodes. These monitoring points provide pressure data and in the event of a system pressure drop will alarm in the Gas Control Center; however, the source of any system problem is difficult to determine since one point may be driven by several regulating facilities. In order to determine the exact cause of a system problem, crews must be dispatched to several locations in order to determine where the actual problem is. This process is inefficient, and not responsive to system operating requirements as crew's travel from location to location checking equipment and looking for problems.

Another inefficient method employed to determine system problems is waiting for customers to call in and report problems. Obviously this is not a proactive approach to running the gas system and this often leads to further confusion. System pressure problems may not be understood or realized until a large number of customer calls are received from a geographic area. This process wastes valuable time that could be invested in solving the problem had the stations feeding the area been automated. Customer satisfaction drops as time elapses trying to determine that a pressure regulating facility is not working properly.

National Grid is planning on adding automation to the Narragansett Electric Company service territory, with the goal to automate all critical sites within the service territory in the next five (5) years. This will require the installation of approximately thirty-three (33) new RTU's and the upgrade of another sixteen (16) sites with new equipment in FY 2012-13.

On September 17, 2010, PHMSA published a Notice of Proposed Rulemaking (NPRM) proposing to expedite the program implementation deadline for 49CFR192.631. The expedited deadline was August 1, 2011. As a result of this landmark regulatory change, National Grid has undertaken numerous programs aimed at improving the reliability of the gas system. These include enhanced control room equipment, improved operator training, alarm management, and fatigue management programs for the control room operators.

The primary objective of this new regulation is to make operators such as National Grid more aware of system conditions and therefore proactively respond to system changes and abnormal conditions. The new code specifically states that "Pipeline controllers must have adequate and up to date information about the conditions and operating status of the equipment they monitor and control if they are to succeed in maintaining pipeline safety".

All of the activities within the gas control room at National Grid are centered around the SCADA system (Supervisory Control and Data Acquisition) which receives its input from field installed RTU's (Remote Terminal Units). This system records and displays operational information about the pipeline system, such as temperatures, pressures, flow rates and valve positions. National Grid's SCADA system also remotely controls some of this equipment and/or requires its controllers to dispatch personnel to the field to operate its equipment.

In order to more effectively operate the gas system, National Grid must have accurate and timely information regarding the status of the gas system. Specifically National Grid will need additional data on system pressures, flow rates and gas temperatures as well as the operating status of regulator stations. Without timely and accurate information system operators cannot make informed decisions to control pipeline operations nor can they promptly identify abnormal operating conditions and take corrective actions to prevent the escalation of a larger problem or incident. The proposed rule requires that National Grid develop processes to provide that system operators receive timely and necessary information to operate there system in a safe and reliable manner.

4.2 Drivers

Proactive Gas System Control and Alarm Monitoring:
Historically National Grid responded to system upsets based on trouble calls from its customers and to a lesser degree from the review of field charts. Since most of the field charts are collected and reviewed on a monthly basis, National Grid first indication of an abnormal condition is a call from a customer generally indicating poor pressure or a lack of service. Through the use of real time field telemetry National Grid would be in a position to recognize and respond to abnormal operating conditions before the customer would notice the problem. Knowledge of the problem as it relates to system operations would also mitigate the need to dispatch a first responder thereby increasing National Grids efficiently in responding and resolving system problems.

Regulator Control and Leak Reduction:

The gas system in the Narragansett Electric Company is prone to leak activity due to material composition and environmental factors. Low pressure gas systems have shown that leak activity is directly related to the system operating pressure and a reduction in the operating pressure would have a corresponding reduction in leak activity. One of the benefits of adding telemetry on the gas regulation stations will allow operators to remotely manage system pressures to match system load requirements. National Grid must design and set its gas system to meet the maximum gas load requirements during the winter period. However on most winter days, design conditions are not met and gas system pressures could be remotely re-set to a lower pressure set point without any reduction in service to our customers.

Process Safety- System Operating Procedure:
As a result of the Lexington Incident in 2005, National Grid instituted a process safety policy change that required all field and construction activity to be cleared and approved by Gas System Control. These system clearances are called System Operating Procedures or SOP's. SOP's are required by all work activity that could impact or change the movement or flow of natural gas to our customers. These procedures are to be implemented for any construction or maintenance requiring the shutdown or interruption of the gas transmission or distribution system as well as all gas main tie-ins and main extensions. Typically this requires that field personnel obtain pressure readings. The installation of system telemetry will allow Gas System Control to have more information with respect to actual operating condition at system low points and regulator stations and therefore be better informed and able to respond to abnormal operating conditions.

4.3 Project Description

The System Automation & Control Program provides for the installation of RTU devices. These are will be installed in weatherproof outdoor cabinets at thirty-three (33) new sites. As stated above the program will also provide replacement RTU's for sixteen (16) sites and equipment upgrades to an additional site. The equipment will be purchased and pre-fabricated from vendors specializing in construction and testing for this specialized equipment. A mix of in-house and contractor crews will install the equipment.

4.4 Benefits Summary

- Real time data and alarms promotes faster response to system problems and avoids loss of customers
- System alarm points set around critical operating parameters at key sites allows Gas Control to focus on important issues as they arise
- More effective monitoring of ongoing SOP's is possible using telemetry data to confirm that valves are closed and pressures are reduced before work commences.

- Less reliance on antiquated paper chart recorders saves times, eliminates "chart runs", and frees up resources to perform other activities
- Enhances system modeling using actual real time data promotes more effective capital planning.
- Allows Gas Control to increase or reduce pressure remotely when system requirements so dictate.
- Allows I&R to troubleshoot site specific problems using historical data from SCADA and allows the I&R team to pinpoint pressure problems.
- Provides a platform for future automation programs such as remote Cathodic Protection monitoring.

4.5 Business Issues

- Execution of a program of this magnitude requires pre-fabrication of RTU cabinets at remote locations. This requires accurate planning and scheduling in order to efficiently utilize the capital allocated to the program.
- Field installation of RTU's at this level will require additional resources to supplement internal crews.
- Programming the RTU's will require the support of the SCADA Support Group
- Global procurement of this quantity of equipment should help reduce costs
- Adding approximately thirty-three (33) points to the SCADA system per year will create challenges as Gas Control Operators have an increasing level of equipment to monitor.

4.6 Options Analysis

Recommended Option:

Company objective is to standardize operations, maintain custody check metering and increase control and monitoring at city gate stations and regulator stations. Delivering the project supports The Narragansett Electric Company rate case. Project delivery also serves to increase operational understanding of the system to identify abnormal operating conditions and taking a proactive approach to alarm management in support of new DOT PHMSA requirements. The program also adopts a best practice with respect to check metering and leak management.

Alternative 1:

Defer Project: The company objective is to standardize operations, maintain custody check metering and increase levels of automation, monitoring, and control at city gate stations and pressure regulator stations. Deferring this program does not meet long term objective to actively manage system pressures and leak activity. Not having the capability to monitor system pressure in real time increases risk.

Alternative 2:

Do Nothing: The company objective is to standardize operations, maintain custody check metering and increase control and monitoring at city gate stations and regulator stations. Doing nothing does not meet the long term company objective to actively manage system pressures and leak activity. Also this alternative will leave approximately 67% of this region without the ability to remotely manage SOP's.

4.7 Safety, Environmental and Project Planning Issues

Increasing the level of system monitoring enhances safety by allowing Gas Control to monitor the system in real-time. Alarms are generated when pressures fall outside pre-established ranges calling the Operator's attention to the problem.

System Automation allows the Gas Control personnel to selectively monitor and control system pressures which can reduce leakage, thus reducing greenhouse gas emissions.

4.8 Execution Risk Appraisal

Category	Detailed Description of Risk / Opportunity	Cause/Trigger	Probability	Impact		Score		Strategy	RiskOwner	Comments/Actions
				Cost	Schedule	Cost	Schedule			
Contracting and Procurement	High volume of work will require additional contractor support	Increased volume of work	4	3	3	12	12	Accept	I & R	Contractors are available
						-	-			
						-	-			

4.9 Permitting – no special permits are required for this program

Permit Name	Probability Required (Certain/ Likely/	Duration	Status (Complete/ In Progress Not Applied	Estimated Completion Date

	Unlikely)		**For)**	

4.10 Investment Recovery

4.10.1 Investment Recovery and Regulatory Implications

Investment recovery is included in existing business, and investment plans. This program is policy driven and will increase the overall reliability and integrity of the gas system.

The system automation program supports the PHMSA requirement that "each operator must provide its controllers with the information, tools, processes and procedures necessary for the controllers to carry out the roles and responsibilities the operator has defined."

4.10.2 Customer Impact – No negative customer impact

Customer impact would be positive as this program reduces the risk of major outages by providing real-time data to Gas Control, helping the Operators to find problems at the earliest stages and allowing them to adjust system pressures to compensate for other problems as they arise.

This project results in an indicative first full year revenue requirement when the asset is placed in service equal to approximately $0.280 million. This is indicative only. The actual revenue requirement will differ, depending upon the timing of the next rate case and/or the timing of the next filing in which the project is included in rate base.

4.10.3 CIAC / Reimbursement – N/A

	CIAC/Reimbursement							
$M	**Prior YR'S**	**Yr 1 12/13**	**Yr 2 13/14**	**Yr 3 14/15**	**Yr 4 15/16**	**Yr 5 16/17**	**Yr 6 17/18**	***Total***
CIAC / Reimbursement								

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4.11 Financial Impact to National Grid

4.11.1 Cost Summary Table

				Current Planning Horizon								
Project#	Project Description	Project Estimatlevel	$M	Prior YR Spending	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR7+	Total
Project #	Program	1	Capex		1.419							1.419
	SystemAutomation		Opex		0.030							0.030
			Removal									0.000
			Total	0.000	1.449	0.000	0.000	0.000	0.000	0.000	0.000	1.449
Project#	Description											
			Capex									0.000
			Opex									0.000
			Removal									0.000
			Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Proposed Sanction												
			Capex	0.000	1.419	0.000	0.000	0.000	0.000	0.000	0.000	1.419
			Opex	0.000	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.030
			Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Total	0.000	1.449	0.000	0.000	0.000	0.000	0.000	0.000	1.449
				$0.000	$1.449	$0.000	$0.000	$0.000	$0.000	$0.000	$0.000	$1.449

Total ProjectCurentYear and Fute Yeas Cost = $1.449M

Project Budget Summary Table

Project Costs per Business Plan		Prior Year Spending*	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR 7	Total
	Capex	0.000	1.419	0.000	0.000	0.000	0.000	0.000	0.000	1.419
	Opex	0.000	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.030
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total Cost in B Plan	0.000	1.449	0.000	0.000	0.000	0.000	0.000	0.000	$1.449
	* P/Y Actuals									

Variance		Prior Year Spending	YR 1 12/13	YR 2 13/14	YR 3 14/15	YR 4 15/16	YR 5 16/17	YR 6 17/18	YR 7	Total
	Capex	0.000	1.419	0.000	0.000	0.000	0.000	0.000	0.000	1.419
	Opex	0.000	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.030
	Removal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total Variance	0.000	1.449	0.000	0.000	0.000	0.000	0.000	0.000	$1.449

4.11.2 Cost Assumptions

The estimated costs for this program are based on estimates for RTU installations and RTU replacements for this region (see Appendices). It is assumed that the equipment

will be purchased from a system integrator who will provide pre-fabricated and tested RTU cabinets ready for field installation.

The total capital requirement for each year is based upon the number of each type of project to be executed in each fiscal year.

Each new RTU site requires either a lease line or a cellular connection. Typically a cellular connection is used and these costs are approximately $900 per year per line. These costs are incremental and are included in the annual O&M plan.

4.11.3 Net Present Value / Cost Benefit Analysis

Not financially driven.

4.11.4 Additional Impacts

None.

4.12 Statements of Support

4.12.1 Supporters

Role	Name	Responsibilities
Manager	Ray Morey	Investment Planning
Manager	Dave Zielinski	Instrumentation and Regulation
Manager	Stephen Greco	Pressure Regulation Engineering
Director	Dave Iseler	Project Engineering and Design

4.12.2 Reviewers

Reads paper for content / language. Recommends edits if necessary

Reviewer List	Name
Finance	Karen Hamel
Procurement	John Kavanaugh
Jurisdictional Delegates	Laurie Brown
Manager of CNI Support (SCADA)	Mike Benedicto

5 Appendices

Appendix 1 – Estimate for New RTU Installation

PROJECT COST ESTIMATE			
	Estimate Level	Level I	
Project Name:	New RTU Installation		
Work Order #:		Program ID:	System Automation
Region:	New England	Bid Area:	RI
City:	PROVIDENCE	Overhead Area:	Rhode Island
State:	RI	Date:(mm/dd/yyyy)	02/01/2012
Reimbursable MassDOT?	No	Estimated By:	Werther
		Project FY	FY1213
New Main (length/size/matl):			
Abandon Main (length/size/matl):			
Number of Services Involved:			
Scope of Work:			

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Install new RTU at pressure regulating facility		
National Grid Labor (Mgt.)		$0.00
National Grid Labor (Union)		$8,311.31
Contractor Labor		$2,300.00
Traffic Control		$0.00
Stock Materials		$0.00
Non-Stock Materials		$15,985.00
Other		$0.00
	Total Direct Cost	$26,596.31
Overheads		
Company Mgt. Labor (%)	59.76%	$0.00
Company Union Labor (%)	59.76%	$4,966.84
Transportation (%)	22.00%	$1,828.49
Contractor Labor (%)	0.00%	$0.00
Stock Material (%)	52.75%	$0.00
	Subtotal	$33,391.64
Capital Overhead (%)	20.26%	$6,765.15
	Subtotal	$40,156.79
AFUDC		$0.00
	Total Project Estimate	**$40,156.79**
Contingency (%)	15%	
Equivalent Overall OH (%)	51%	

Comments:

Ver. 11 - Upstate - Effective 05/01/2011

Appendix 2 – Install Odorizer RTU

PROJECT COST ESTIMATE

Estimate Level	Level I		
Project Name:	**New RTU Installation**		
Work Order #:		**Program ID:**	System Automation
Region:	New England	**Bid Area:**	RI
City:	PROVIDENCE	**Overhead Area:**	Rhode Island
State:	RI	**Date:**(mm/dd/yyyy)	02/01/2012
Reimbursable MassDOT?	No	**Estimated By:**	Werther
		Project FY	FY1213
New Main (length/size/matl):			
Abandon Main (length/size/matl):			
Number of Services Involved:			

Scope of Work:

Install new odorizer RTU at pressure regulating facility

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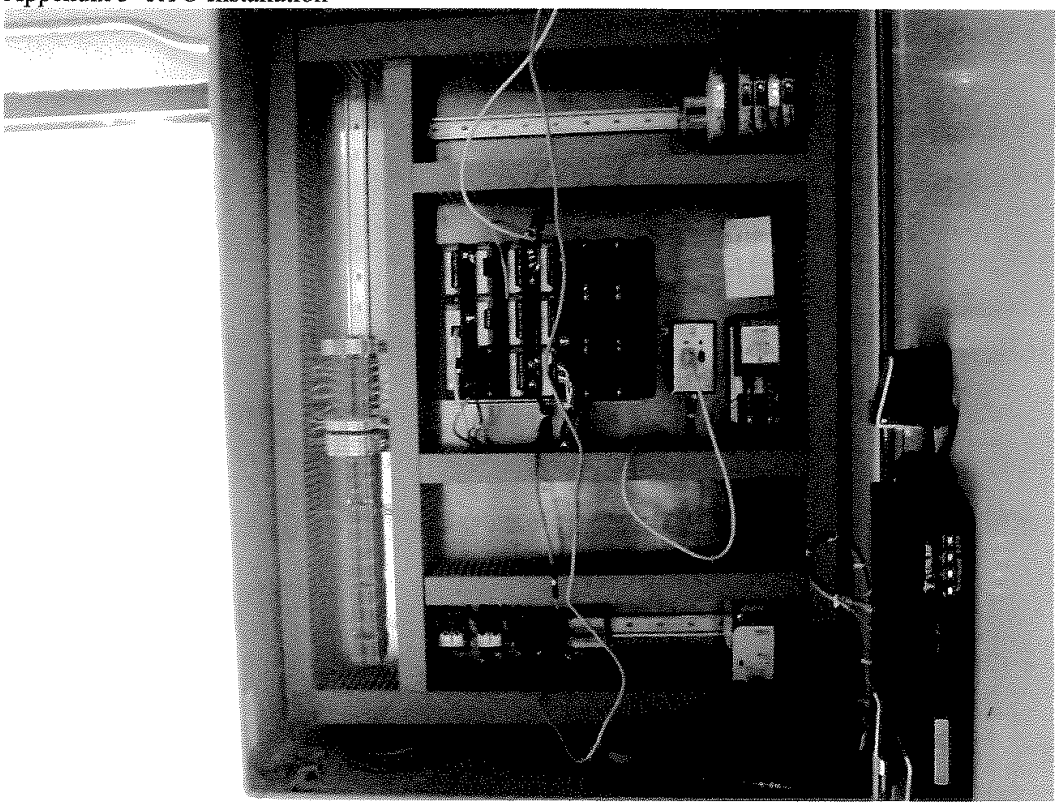
	National Grid Labor (Mgt.)		$0.00
	National Grid Labor (Union)		$8,311.31
	Contractor Labor		$2,875.00
	Traffic Control		$0.00
	Stock Materials		$0.00
	Non-Stock Materials		$14,605.00
	Other		$0.00
		Total Direct Cost	$25,791.31
	Overheads		
	Company Mgt. Labor (%)	59.76%	$0.00
	Company Union Labor (%)	59.76%	$4,966.84
	Transportation (%)	22.00%	$1,828.49
	Contractor Labor (%)	0.00%	$0.00
	Stock Material (%)	52.75%	$0.00
		Subtotal	$32,586.64
	Capital Overhead (%)	20.26%	$6,602.05
		Subtotal	$39,188.70
	AFUDC		$0.00
		Total Project Estimate	**$39,188.70**
	Contingency (%)	15%	
	Equivalent Overall OH (%)	52%	

Comments:

Ver. 11 - Upstate - Effective 05/01/2011

Appendix 3- RTU Installation



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Appendix 4

2012 - 2013 SYSTEM AUTOMATION

	CHI Group	CHI Description	City	Installation Type	Communications	Estimated Cost w/ Loading
1	RI North	New River	Lincoln	Traffic Box w/ Kixcell	Frame	$45,000
2	RI North	Bourdan Blvd	Woonsocket	Traffic Box w/ Kixcell	Frame	$45,000
3	RI North	Scenery Ave	Johnston	Traffic Box w/ Kixcell	Frame	$45,000
4	RI North	High St. SO	Central Falls	Traffic Box w/ Kixcell	Frame	$45,000
5	RI North	Smithfield Ave	Pawtucket	Traffic Box w/ Kixcell	Frame	$45,000
6	RI North	Ann & Hope	Cumberland	Traffic Box w/ Kixcell	Frame	$45,000
7	RI North	Cobble Hill	Lincoln	Traffic Box w/ Kixcell	Frame	$45,000
8	RI South	Pettis @ N. Main	Providence	Traffic Box w/ kixcell	Frame	$45,000
9	RI South	Wellington @ Thames	Newport	Accutech	CDMA	$25,000
10	RI South	Bliss Rd @ Broadway	Newport	Accutech	CDMA	$25,000
11	RI South	Waterman @ Pawtucket	E. Providence	Traffic box w/ Kixcell	Frame	$45,000
12	RI South	Roger Williams @ Whitaker	E. Providence	Traffic box w/ Kixcell	Frame	$45,000
13	RI South	Bullocks Point	Providence	Traffic box w/ Kixcell	Frame	$45,000
14	RI South	Park @ Station	Cranston	Traffic box w/ Kixcell	Frame	$45,000
15	RI South	New Depot @ Cranston	Cranston	Traffic box w/ Kixcell	Frame	$45,000
16	RI South	1584 Plainfield	Cranston	Traffic box w/ Kixcell	Frame	$45,000
17	RI South	Gibson Rd.	Bristol	Traffic box w/ Kixcell	Frame	$45,000
18	Rhode Island	Third St	Newport	Accutech	CDMA	$25,000
19	Rhode Island	Bridge St	Newport	Accutech	CDMA	$25,000
20	Rhode Island	Ledge Rd at Bellevue	Newport	Accutech	CDMA	$25,000
21	Rhode Island	First Beach	Newport	Accutech	CDMA	$25,000
22	Rhode Island	Harrison at Mountain View	Kingston	Accutech	CDMA	$25,000
23	Rhode Island	Dyer Ave @ Fountain St	Cranston	Accutech	CDMA	$25,000
24	Rhode Island	Dellwood Dr	Cranston	Accutech	CDMA	$25,000
25	Rhode Island	159 Old County Rd	Smithfield	Accutech	CDMA	$25,000
26	Rhode Island	Palmer Ave	Warwick	Accutech	CDMA	$25,000
27	Rhode Island	Ferncrest Ave	Johnston	Accutech	CDMA	$25,000
28	Rhode Island	Burriville Take Station	Burriville	RTU and temp	N/A	$50,000
29	Rhode Island	Tiverton Take Station	Tiverton	RTU and temp	N/A	$50,000
30	Rhode Island	Warren/Barrington Take Station	Warren	RTU and temp	N/A	$50,000
31	Rhode Island	Hoxie Regulator	Providence	Remote Control	Radio	$65,000
32	Rhode Island	Wompanoag Trail		Remote Control	Radio	$65,000
33	Rhode Island	Westerly Take Station	Westerly	Additional Telemetry	N/A	$65,000

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34	Rhode Island	Odorizer Telemetry Upgrades	Various	Install Modbus		$39,000
35	EXE	Cov 433 Hopkins Hill Rd (Center of NE)		Upgrade/Replace		$3,550
36		Cov Nooseneck Hill Rd (Rt 3)		Upgrade/Replace		$3,550
37		Nar 1039 Ocean Rd (Pt Judith)		Upgrade/Replace		$3,550
38		Nki 15 Belver Rd (Toray Plastics)		Upgrade/Replace		$5,565
39		Wgr 40 Technology Way (Amgen) Filter Diff Press		Upgrade/Replace		$4,160
40	Tiverton	RI Mid 16 Aquideck Ave @ Newman Rd		Upgrade/Replace		$3,155
41		Tiv Lawton Ave		Upgrade/Replace		$3,040
42		Por 95 Chases Rd		Upgrade/Replace		$3,040
43		RI Bri 1 Old Ferry Rd		Upgrade/Replace		$3,550
44		RI War 204 Metacom Ave		Upgrade/Replace		$3,040
45		RI Mid 177 Miantonomi Ave @ Boulevard St		Upgrade/Replace		$4,800
46		RI New 557 Thames St @Bayfront		Upgrade/Replace		$4,800
47		RI New Ocean Dr		Upgrade/Replace		$3,550
48	-	RI Mid 1 J H Dwyer Dr @ Greene Ln	-	Upgrade/Replace	-	~~$3,550~~
49		RI Bri 12 Gooding Ave		Upgrade/Replace		$3,550
50		RI Bri 72 Church St (Fire Station)		Upgrade/Replace		$3,550
						$1,419,000

5.1 Project Cost Breakdown

Project Cost Breakdown		
Cost Category	**Company Name ($ Amount)**	**Description of Cost Category**
Total:		

5.2 Other Appendices

5.3 NPV Summary (if applicable) – Not applicable

5.4 Customer Outreach Plan (if applicable) – Not required

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Title:	System Automation	**Sanction Paper #:**	USSC-12-061C
Project #:	C039264	**Sanction Type:**	Closure
Operating Company:	The Narragansett Electric Co.	**Date of Request:**	March 30, 2017
Author:	Walter Werther, Stephen Greco	**Sponsor:**	John Stavrakas, VP Gas Asset Management
Utility Service:	Gas	**Project Manager:**	John Barrett

1 Executive Summary

This paper is presented to close C039264. The total spend was $0.242M. The sanctioned amount for this project was $ 1.419M

The final spend amount is $0.242 broken down into:
$0.242M Capex
$0.000M Opex
$0.000M Removal

2 Project Summary

This project has installed Remote Terminal Units (RTU's) at four (4) gate stations and forty-six (46) regulator stations located throughout the Narragansett Electric Company Service territory. RTU's are installed locally at the sites and provide temperature, pressure, and flow data to the Gas Control Rooms. In some cases the RTU's will also monitor other station sensors such as gas detectors and intrusion alarms. The RTU's will allow Gas Control to remotely adjust the pressure set point at the regulator stations based on the data provided by the RTU. Data will be transmitted primarily via cellular technology. Since the level of existing automation in the Narragansett Electric Company territory is relatively low, most of the costs of the projects listed below in the summary table are associated with the new RTU installations. Gas odorizer telemetry will provide Gas Control with monitoring and remote dosing control.

3 *Over / Under Expenditure Analysis*

3.1 *Summary Table*

Actual Spending ($M)			
Project #	**Description**		**Total Spend**
C039264	System Automation	Capex	0.242
		Opex	0.000
		Removal	0.000
		Total	0.242
Total		Capex	0.242
		Opex	0.000
		Removal	0.000
		Total	0.242

Project Sanction Summary Table			
Project Sanction Approval ($M)			Total Spend
		Capex	1.419
		Opex	0.000
		Removal	0.000
		Total Cost	1.419
Sanction Variance ($M)			Total Spend
		Capex	1.177
		Opex	0.000
		Removal	0.000
		Total Variance	1.177

3.2 *Analysis*

The System Automation Blanketis 83% under plan. There are multiple contributing factors to the underruns. Resource limitations contributed to the under spend. In addition, cycle time of obtaining permits and long lead materials delayed work. There were challenges with estimates on larger projects within the blanket. Timing of restoration scheduling due to colder weather continues to effect progress of work.

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4 *Improvements / Lessons Learned/Root Cause*

- Improve development of estimating practices.
- Work with Finance and Resource Planning to create better financial metrics.
- Create Long Term resource requirements for future Capital planning.
- Identify carryover or deferred projects in a timely fashion.

5 *Closeout Activities*

The following closeout activities have been completed.

Activity	Completed
All work has been completed in accordance with all National Grid policies	(•) Yes ( ) No
All relevant costs have been charged to project	(•) Yes ( ) No
All work orders and funding projects have been closed (1)	( ) Yes (•) No
All unused materials have been returned	(•) Yes ( ) No
All as-builts have been completed (2)	( ) Yes (•) No
All lessons learned have been entered appropriately into the lesson learned database (3)	( ) Yes (•) No

(1) All work orders and funding projects have been closed
Program/Blanket projects may contain work orders and or funding projects which have not yet been closed for reasons including but not limited to:

- the same work order(s) are used annually. They will remain open until Asset Management and/or Resource Planning have determined work orders are no longer needed .
- construction may cross multiple fiscal years
- the work order closing process is within the late charge waiting period
- other accounting processes or final system closing activities have not yet completed

The Program/Blanket projects are approved annually for the current year expected spend and remain open until Asset Management and/or Resource Planning have determined the project is no longer required.

(2) All as-builts have been completed

Program/Blanket projects may contain work orders for which no as-builts have yet been recorded for reasons including but not limited to:

- design and/or construction have not yet completed
- construction may cross multiple fiscal years
- work has completed recently and as-builts have not yet been processed into the system
- does not apply. Work order(s) are not linked to work management systems. (example: Meter Purchases, Meter Changes, AMR Installations Purchase Misc Capital Tools/Equipment, etc.)
- does not apply to Information systems projects.

(3) All lessons learned have been entered appropriately into the lesson learned database

Program/Blanket projects usually contain short cycle work which the Company has been performing over several fiscal years. No new Lessons Learned which have not already been identified and recorded within section 4.

6 Statements of Support

6.1 Supporters

The supporters listed have aligned their part of the business to support the project.

Department	Individual	Responsibilities
Investment Planner	Pensabene, Patrick M.	Endorses relative to 5-year business plan or emergent work
Resource Planning	Falls, Jonathan	Endorses Resources, cost estimate, schedule, and Portfolio Alignment
Project Management	Fortier, Joseph Jr.	Endorses Resources, cost estimate, schedule
Gas Project Estimation	Paul, Art	Endorses Cost Estimate

6.2 Reviewers

The reviewers have provided feedback on the content/language of the paper.

Function	Individual
Finance	Collison, Mark
Regulatory	Zschokke, Peter
Jurisdictional Delegate	Currie, John
Procurement	Curran, Art
Control Center	Loiacono, Paul

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7 ***Decisions***

I approve this paper.

Signature Ross W. Turrini Date April 27, 2017

Executive Sponsor – Ross Turrini, Senior Vice President, Gas Process & Engineering and Chief Gas Engineer