



Risk Assessment and Mitigation Phase

(Chapter SCG-Risk-3-QWP) Incident Related to the Medium Pressure System (Excluding Dig-in) Workpapers

May 17, 2021

Overall Workpaper Description	This workpaper file explains the risk scoring and Risk Spend Efficiency (RSE) quantification. It contains necessary information and sources for calculating the risk score and RSE for respective mitigations and controls filed in the 2021 RAMP.
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"Master Inputs" Tab	This sheet contains the major MAVF inputs for risk scoring
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"RSE Summary" Tab	This sheet presents a summarized view of RSE scoring
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RSE Equation	$\text{Risk Reduction} = (\text{Pre} - \text{Mitigated LoRE} * \text{Pre} - \text{Mitigated CoRE}) - (\text{Post} - \text{Mitigated LoRE} * \text{Post} - \text{Mitigated CoRE})$
	$\text{Discounted Time} = 1 - \left(\frac{1}{\frac{(1 + \text{Benefit Discount Rate})^{\text{Benefits Lifetime}}}{\text{Benefit Discount Rate}}} \right)$
	$\text{RSE per \$M} = \frac{\text{Risk Reduction} * \text{Discounted Time}}{\text{Total Cost (\$M)}}$

Master Inputs

Discount Factors

Benefit Discount Factor 3.00%

MAVF Framework

	Range	Weight
Safety Index	20	60%
Reliability Index	1	23%
Financial Cost	500	15%
Stakeholder Satisfaction Index	100	2%

2021 RAMP
 SCG-RISK-3-QWP
 RSE Summary

ID	Mitigation Name	Lifetime Benefit	Total Cost (\$k)	% Change in LoRE	Pre-Mitigated LoRE	CoRE Safety
SCG-RISK-3-A02	ALTERNATIVE - Post-Training Follow-up Field Evaluation	5.0	\$1,075	0.02%	544.99	3.86
SCG-RISK-3-A01	ALTERNATIVE - Technical Refresher Training	5.0	\$1,750	0.02%	544.99	3.86
SCG-RISK-3-C10	Bridge & Span Inspections & Maint (Pipeline Monitoring and Inspection)	1.0	\$76	0.01%	544.99	3.86
SCG-RISK-3-C16	Capital CP 10 Service Replacement	10.0	\$40,200	0.30%	544.99	3.86
SCG-RISK-3-C14	Cathodic Protection – Install/Replace Impressed Current Systems	20.0	\$20,347	1.25%	544.99	3.86
SCG-RISK-3-C03	Cathodic Protection- 100mV Requalification	10.0	\$3,648	0.71%	544.99	3.86
SCG-RISK-3-C01	Cathodic Protection Base Activities	1.0	\$11,936	13.78%	544.99	3.86
SCG-RISK-3-C02	Cathodic Protection- CP10 Activities	10.0	\$3,180	1.40%	544.99	3.86
SCG-RISK-3-C20	DIMP: Distribution Riser Inspection Project (DRIP)	67.0	\$73,509	1.77%	544.99	3.86
SCG-RISK-3-C21-T2	DIMP: DREAMS- Bare Steel Replacement Program (BSRP)	68.0	\$281,718	0.28%	544.99	3.86
SCG-RISK-3-C21-T1	DIMP: DREAMS- Vintage Integrity Plastic Plan (VIPP)	68.0	\$657,339	0.86%	544.99	3.86
SCG-RISK-3-C22	DIMP: Gas Infrastructure Protection Project (GIPP)- Medium Pressure and High pressure	40.0	\$85,024	26.47%	544.99	3.86
SCG-RISK-3-C23	DIMP: Sewer Lateral Inspection Project (SLIP)	67.0	\$73,509	0.89%	544.99	3.86
SCG-RISK-3-C07	EPM Replacements & Installs	10.0	\$1,462	0.59%	544.99	3.86

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 SCG-RISK-3-QWP
 RSE Summary

ID	Mitigation Name	Lifetime Benefit	Total Cost (\$k)	% Change in LoRE	Pre-Mitigated LoRE	CoRE Safety
SCG-RISK-3-C25	Field Employee Skills Training	5.0	\$30,843	0.09%	544.99	3.86
SCG-RISK-3-C08/C17	Leak Survey and Main & Service Leak Repair	3.4	\$66,507	15.81%	544.99	3.86
SCG-RISK-3-C19	Main Replacements- Leakage, Abnormal Op. Conditions, CP Related	68.0	\$72,450	0.03%	544.99	3.86
SCG-RISK-3-C04	Meter and Regulator (M&R) Station Maintenance + Electronic Pressure Monitor (EPM) Maintenance	1.0	\$3,571	11.07%	544.99	3.86
SCG-RISK-3-C06	Meter Set Assembly (MSA) Inspection and Maintenance	10.0	\$16,180	4.98%	544.99	3.86
SCG-RISK-3-C30	MSA Inspection Program	3.0	\$66,519	9.14%	544.99	3.86
SCG-RISK-3-C09	Pipeline Patrol (Pipeline Monitoring and Inspection)	1.0	\$94	0.07%	544.99	3.86
SCG-RISK-3-C28	Quality Assurance Program	5.0	\$4,060	0.22%	544.99	3.86
SCG-RISK-3-C05	Regulator Station Replacements/Installs	47.0	\$9,450	0.06%	544.99	3.86
SCG-RISK-3-C18	Residential Meter Protection	40.0	\$27,308	3.51%	544.99	3.86
SCG-RISK-3-C32	Safety Related Field Orders	1.0	\$298,774	30.07%	544.99	3.86
SCG-RISK-3-C11	Unstable Earth Inspection & Maint (Pipeline Monitoring and Inspection)*	0.5	\$4	0.02%	544.99	3.86
SCG-RISK-3-C12	Valve Inspections and Maintenance	1.0	\$1,252	2.68%	544.99	3.86
SCG-RISK-3-C13	Valve Installs and Replacements	47.0	\$2,709	0.01%	544.99	3.86

* Mitigation has adjustment in "% Change in LoRE" field to account for variance in RSE calculation.

2021 RAMP
 SCG-RISK-3-QWP
 RSE Summary

ID	Mitigation Name	CoRE Financial	CoRE Reliability	CoRE Stakeholder Satisfaction	CoRE	Post-Mitigated LoRE
SCG-RISK-3-A02	ALTERNATIVE - Post-Training Follow-up Field Evaluation	0.26	0.50	1.01	5.63	544.91
SCG-RISK-3-A01	ALTERNATIVE - Technical Refresher Training	0.26	0.50	1.01	5.63	544.90
SCG-RISK-3-C10	Bridge & Span Inspections & Maint (Pipeline Monitoring and Inspection)	0.26	0.50	1.01	5.63	544.92
SCG-RISK-3-C16	Capital CP 10 Service Replacement	0.26	0.50	1.01	5.63	543.37
SCG-RISK-3-C14	Cathodic Protection – Install/Replace Impressed Current Systems	0.26	0.50	1.01	5.63	538.18
SCG-RISK-3-C03	Cathodic Protection- 100mV Requalification	0.26	0.50	1.01	5.63	541.14
SCG-RISK-3-C01	Cathodic Protection Base Activities	0.26	0.50	1.01	5.63	469.89
SCG-RISK-3-C02	Cathodic Protection- CP10 Activities	0.26	0.50	1.01	5.63	537.37
SCG-RISK-3-C20	DIMP: Distribution Riser Inspection Project (DRIP)	0.26	0.50	1.01	5.63	535.37
SCG-RISK-3-C21-T2	DIMP: DREAMS- Bare Steel Replacement Program (BSRP)	0.26	0.50	1.01	5.63	543.46
SCG-RISK-3-C21-T1	DIMP: DREAMS- Vintage Integrity Plastic Plan (VI PP)	0.26	0.50	1.01	5.63	540.31
SCG-RISK-3-C22	DIMP: Gas Infrastructure Protection Project (GI PP)- Medium Pressure and High pressure	0.26	0.50	1.01	5.63	400.74
SCG-RISK-3-C23	DIMP: Sewer Lateral Inspection Project (SLIP)	0.26	0.50	1.01	5.63	540.15
SCG-RISK-3-C07	EPM Replacements & Installs	0.26	0.50	1.01	5.63	541.75

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 SCG-RISK-3-QWP
 RSE Summary

ID	Mitigation Name	CoRE Financial	CoRE Reliability	CoRE Stakeholder Satisfaction	CoRE	Post-Mitigated LoRE
SCG-RISK-3-C25	Field Employee Skills Training	0.26	0.50	1.01	5.63	544.52
SCG-RISK-3-C08/C17	Leak Survey and Main & Service Leak Repair	0.26	0.50	1.01	5.63	458.81
SCG-RISK-3-C19	Main Replacements- Leakage, Abnormal Op. Conditions, CP Related	0.26	0.50	1.01	5.63	544.86
SCG-RISK-3-C04	Meter and Regulator (M&R) Station Maintenance + Electronic Pressure Monitor (EPM) Maintenance	0.26	0.50	1.01	5.63	484.64
SCG-RISK-3-C06	Meter Set Assembly (MSA) Inspection and Maintenance	0.26	0.50	1.01	5.63	517.83
SCG-RISK-3-C30	MSA Inspection Program	0.26	0.50	1.01	5.63	495.20
SCG-RISK-3-C09	Pipeline Patrol (Pipeline Monitoring and Inspection)	0.26	0.50	1.01	5.63	544.63
SCG-RISK-3-C28	Quality Assurance Program	0.26	0.50	1.01	5.63	543.79
SCG-RISK-3-C05	Regulator Station Replacements/Installs	0.26	0.50	1.01	5.63	544.68
SCG-RISK-3-C18	Residential Meter Protection	0.26	0.50	1.01	5.63	525.84
SCG-RISK-3-C32	Safety Related Field Orders	0.26	0.50	1.01	5.63	381.09
SCG-RISK-3-C11	Unstable Earth Inspection & Maint (Pipeline Monitoring and Inspection)*	0.26	0.50	1.01	5.63	544.88
SCG-RISK-3-C12	Valve Inspections and Maintenance	0.26	0.50	1.01	5.63	530.37
SCG-RISK-3-C13	Valve Installs and Replacements	0.26	0.50	1.01	5.63	544.93

* Mitigation has adjustment in "% Change in LoRE" field to account for v:

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 SCG-RISK-3-QWP
 RSE Summary

ID	Mitigation Name	Risk Reduction	Discounted Time	RSE per \$Million	Data Sources
SCG-RISK-3-A02	ALTERNATIVE - Post-Training Follow-up Field Evaluation	0.49	4.58	2.08	> Ten years of historical PHMSA incidents > Company training forecast data > SME input
SCG-RISK-3-A01	ALTERNATIVE - Technical Refresher Training	0.50	4.58	1.32	> Ten years of historical PHMSA incidents > Company training forecast data > SME input
SCG-RISK-3-C10	Bridge & Span Inspections & Maint (Pipeline Monitoring and Inspection)	0.40	0.97	5.16	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C16	Capital CP 10 Service Replacement	9.13	8.53	1.94	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C14	Cathodic Protection – Install/Replace Impressed Current Systems	38.39	14.88	28.07	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input > Accounting average service life figures
SCG-RISK-3-C03	Cathodic Protection- 100mV Requalification	21.72	8.53	50.79	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C01	Cathodic Protection Base Activities	423.21	0.97	34.42	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C02	Cathodic Protection- CP10 Activities	42.95	8.53	115.20	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C20	DIMP: Distribution Riser Inspection Project (DRIP)	54.20	28.73	21.19	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input > Accounting average service life figures
SCG-RISK-3-C21-T2	DIMP: DREAMS- Bare Steel Replacement Program (BSRP)	8.61	28.87	0.88	> Ten years of historical PHMSA incidents > Company operational forecast data > Company historical leak data > SME input > Accounting average service life figures
SCG-RISK-3-C21-T1	DIMP: DREAMS- Vintage Integrity Plastic Plan (VIIP)	26.39	28.87	1.16	> Ten years of historical PHMSA incidents > Company operational forecast data > Company historical leak data > SME input > Accounting average service life figures
SCG-RISK-3-C22	DIMP: Gas Infrastructure Protection Project (GIIP)- Medium Pressure and High pressure	812.82	23.11	220.97	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input > Accounting average service life figures
SCG-RISK-3-C23	DIMP: Sewer Lateral Inspection Project (SLIP)	27.27	28.73	10.66	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input > Accounting average service life figures
SCG-RISK-3-C07	EPM Replacements & Installs	18.27	8.53	106.60	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input

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 RSE Summary

ID	Mitigation Name	Risk Reduction	Discounted Time	RSE per \$Million	Data Sources
SCG-RISK-3-C25	Field Employee Skills Training	2.68	4.58	0.40	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input > Company historical QA training data
SCG-RISK-3-C08/C17	Leak Survey and Main & Service Leak Repair	485.64	3.18	23.22	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C19	Main Replacements- Leakage, Abnormal Op. Conditions, CP Related	0.77	28.87	0.31	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input > Accounting average service life figures
SCG-RISK-3-C04	Meter and Regulator (M&R) Station Maintenance + Electronic Pressure Monitor (EPM) Maintenance	340.10	0.97	92.47	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C06	Meter Set Assembly (MSA) Inspection and Maintenance	153.04	8.53	80.69	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C30	MSA Inspection Program	280.58	2.83	11.93	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C09	Pipeline Patrol (Pipeline Monitoring and Inspection)	2.06	0.97	21.27	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C28	Quality Assurance Program	6.77	4.58	7.63	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C05	Regulator Station Replacements/Installs	1.77	25.02	4.69	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input > Accounting average service life figures
SCG-RISK-3-C18	Residential Meter Protection	107.94	23.11	91.37	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input > Accounting average service life figures
SCG-RISK-3-C32	Safety Related Field Orders	923.58	0.97	3.00	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C11	Unstable Earth Inspection & Maint (Pipeline Monitoring and Inspection)*	0.75	0.49	104.57	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C12	Valve Inspections and Maintenance	82.41	0.97	63.91	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input
SCG-RISK-3-C13	Valve Installs and Replacements	0.37	25.02	3.38	> Ten years of historical PHMSA incidents > Company operational forecast data > SME input > Accounting average service life figures

* Mitigation has adjustment in "% Change in LoRE" field to account for v