

Combining Green and Sustainable Remediation Evaluations with Cost/Risk Analysis as Effective Communication Tools to Drive Cleanup Decisions

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Overview

- Purpose
- Site Background
- Remedial Alternatives
- Cost Risk Analysis
- Green and Sustainable Remediation Assessment
- Conclusions

Santa Susana Field Laboratory – Area IV



Santa Susana Field Laboratory – Area IV Site Background

- 290 acres, including 90 acres in which the Energy Technology Engineering Center (ETEC) once operated.
- Site Operation and Impact
- Previous Cleanups
- Remaining Cleanup

Remedial Alternatives

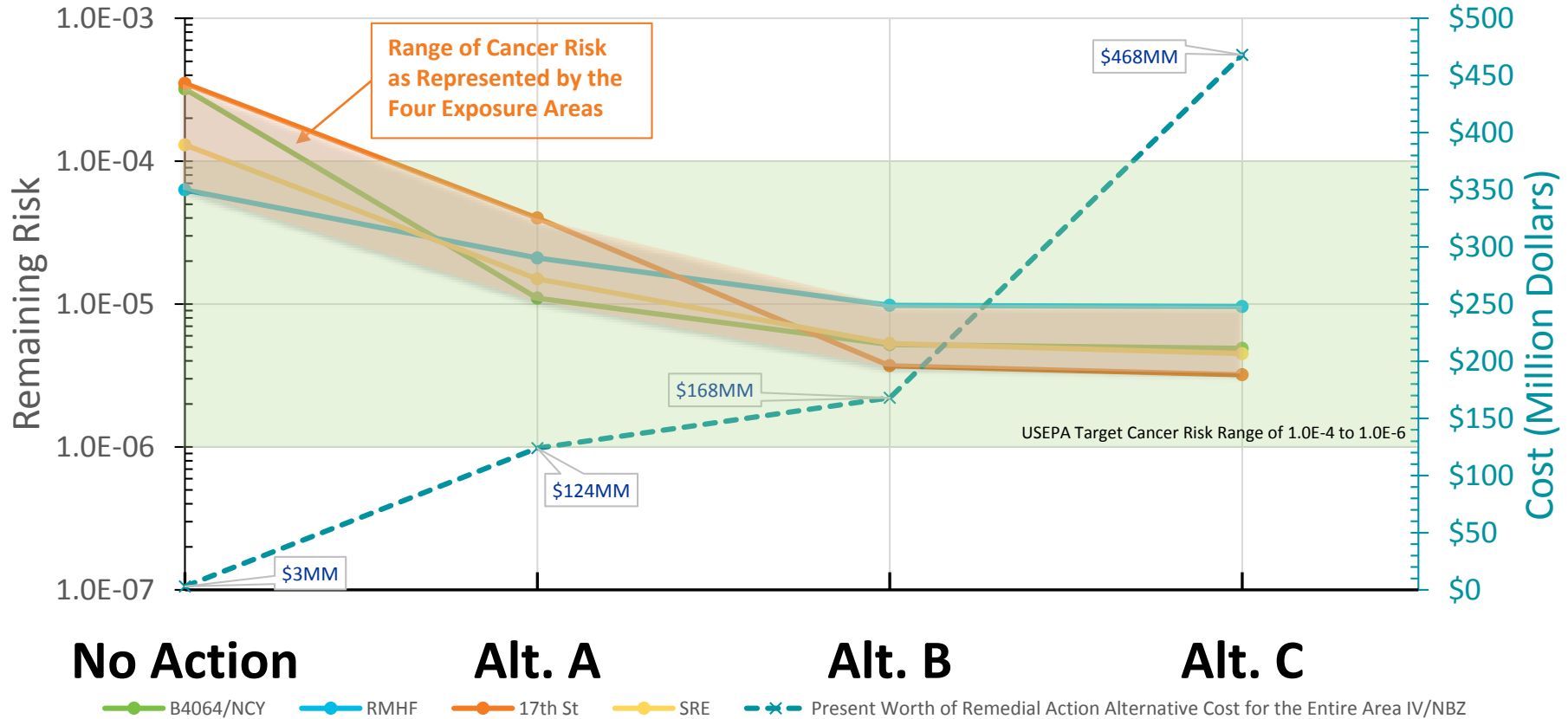
- Three Cleanup Alternatives were Identified for Soil (all involve excavation):

Remedial Alternative	Excavation Volume	Construction Time Frame
No Action	0 CY	NA
A Risk Assessment-based Cleanup	148,000 CY	2-3 Years
B Cleanup to Risk-based Cleanup Levels	192,000 CY	2-3 Years
C Cleanup to Background (per AOC)	933,000 CY	10 Years

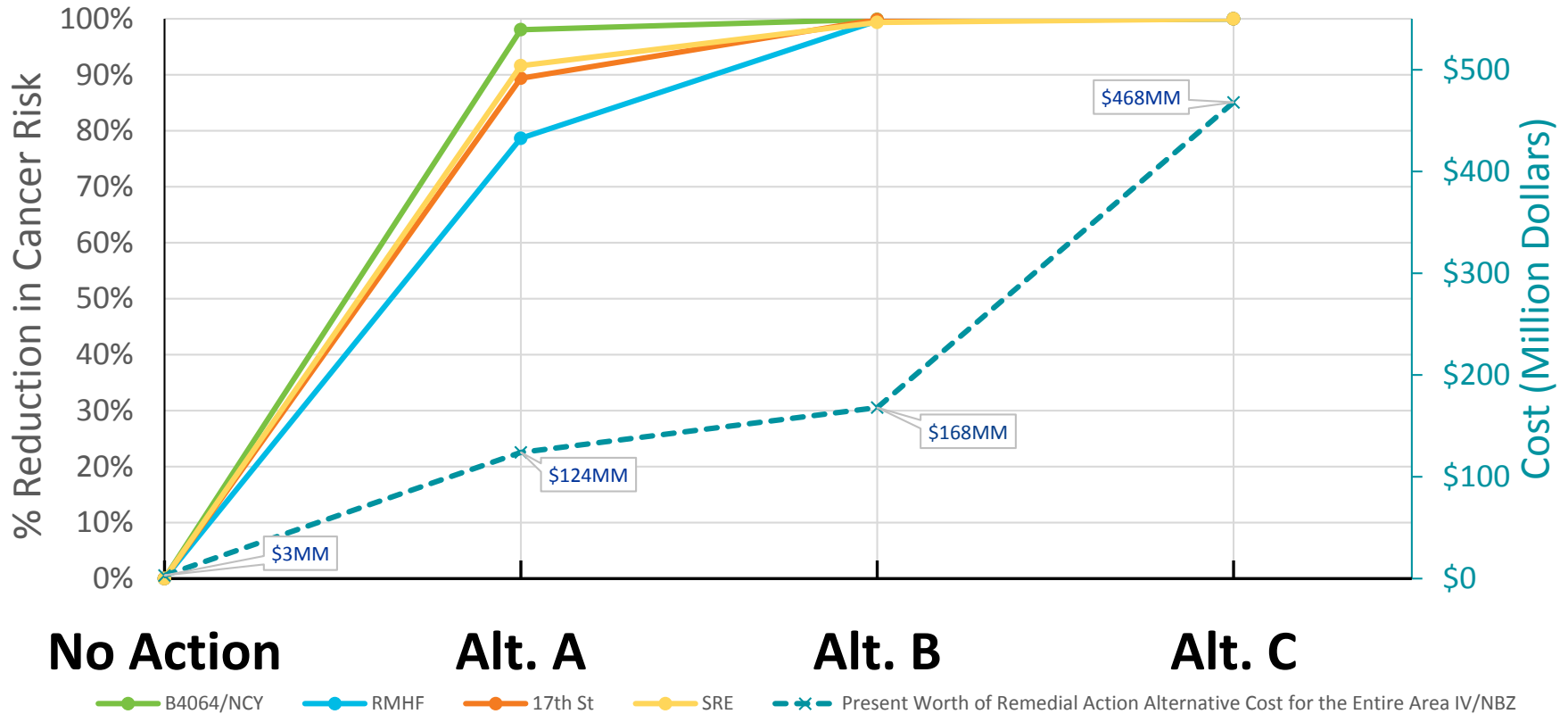
Cost Risk Analysis

- Four historical operation areas within Area IV were selected for risk analysis
 - Cancer Risk
 - Non-cancer Risk
- Cost estimates per DOE cost estimating guidance

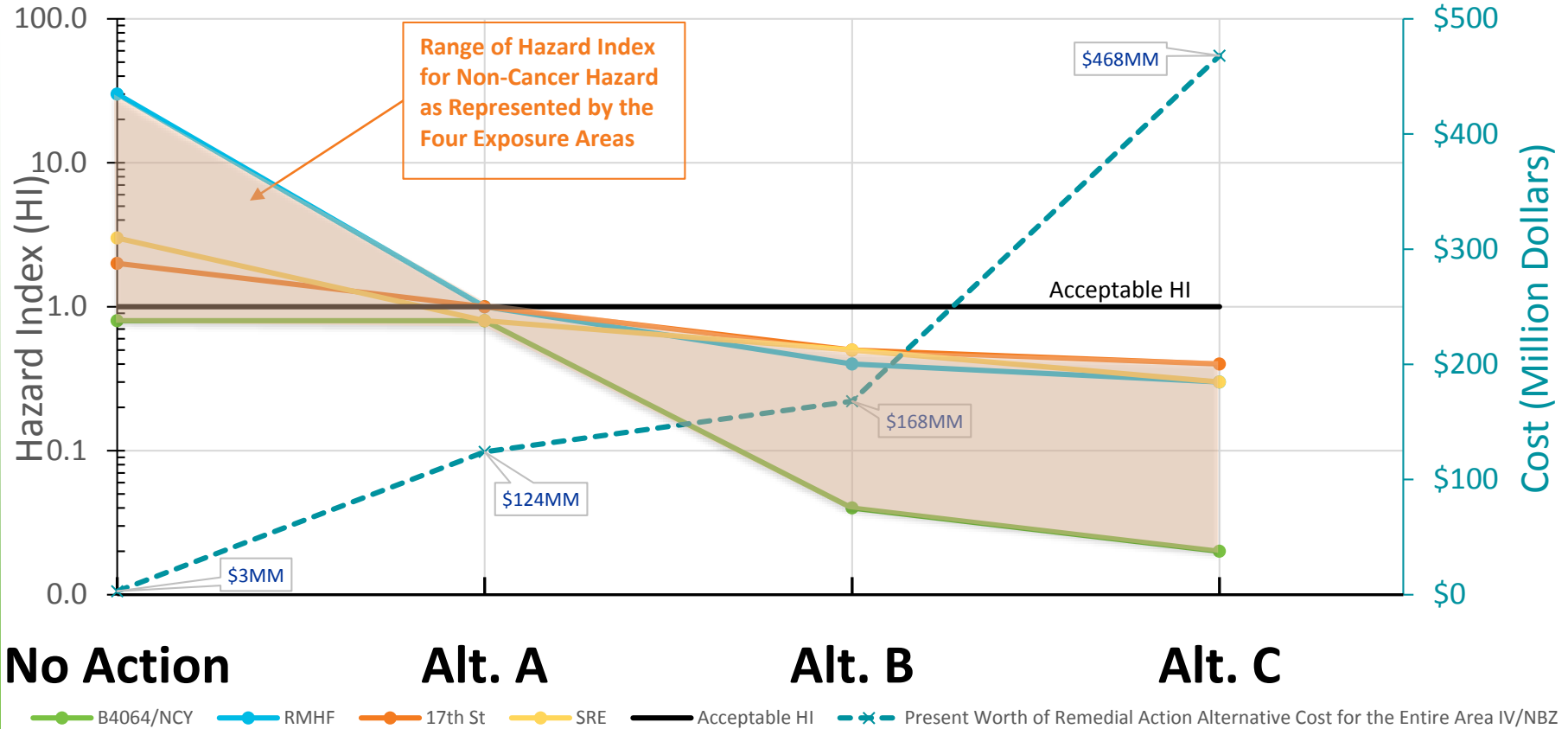
Cost Risk Analysis – Cancer Risk



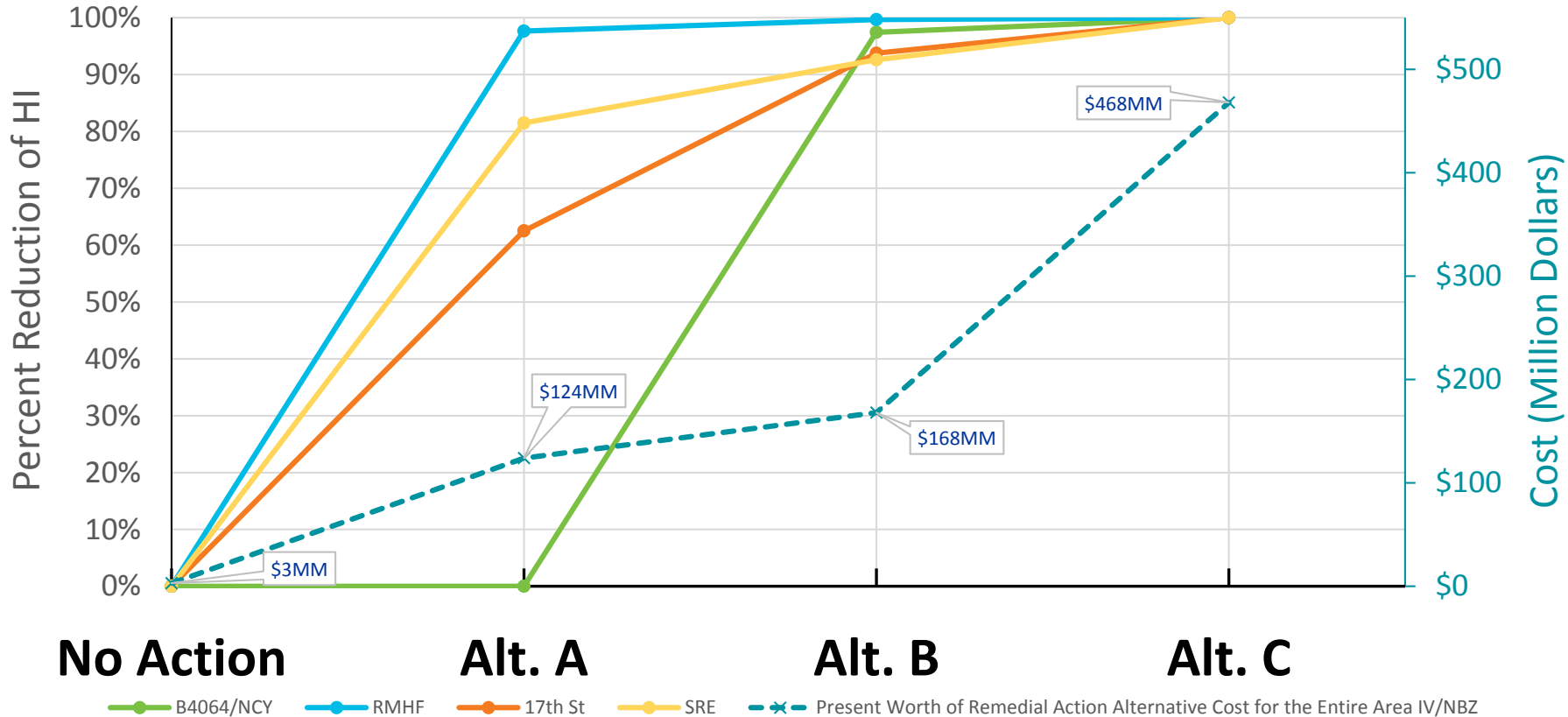
Cost Risk Analysis – Cancer Risk Reduction



Cost Risk Analysis – Non-Cancer Risk



Cost Risk Analysis – Non-Cancer Risk Reduction



Green and Sustainable Remediation Assessment

- Environmental footprint analysis
 - SiteWise™ tool
- Global monetized impacts
 - Social cost of environmental metrics
- Community impact analysis
 - Qualitative evaluation of potential short- and long-term impacts



Environmental Footprint Analysis

<u>Remedial Alternatives</u>	GHG Emissions	Total NO _x Emissions	Total SO _x Emissions	Total PM ₁₀ Emissions	Total energy Used	Water Consumption	Landfill Space	Topsoil Consumption
	ton	ton	ton	ton	MMBTU	gallons	tons	cubic yards

Quantitative Sustainability Metrics Results:

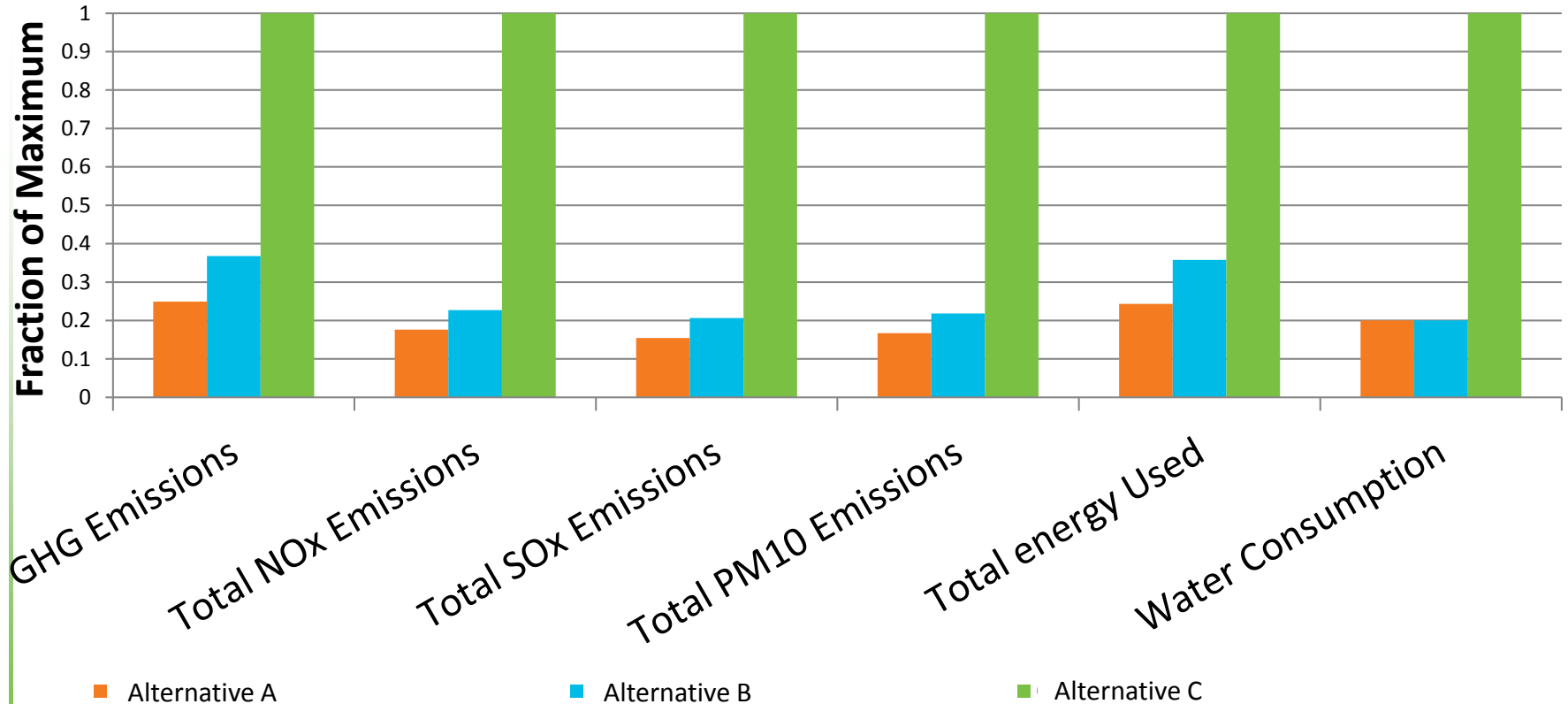
ALTERNATIVE A	24,000	38	10	45	320,000	8,000,000	218,000	110,000
ALTERNATIVE B	35,000	50	14	60	480,000	8,000,000	288,000	140,000
ALTERNATIVE C	96,000	220	66	270	1,300,000	40,000,000	1,410,000	700,000

Relative Impact:

ALTERNATIVE A	Low	Low	Low	Low	Low	Low	Low	Low
ALTERNATIVE B	Medium	Low	Low	Low	Medium	Low	Low	Low
ALTERNATIVE C	High	High	High	High	High	High	High	High

*Results from NAVFAC SiteWise™ footprint evaluation tool

Environmental Footprint – Relative Analysis



Social-economic Impact Analysis

Remedial Alternatives	GHG Emissions ²	Total NO _x Emissions	Total SO _x Emissions	Total PM ₁₀ Emissions	Total energy Used
	metric ton	metric ton	metric ton	metric ton	MMBTU

Environmental Impact Metrics under Each Alternative

ALTERNATIVE A	24,000	38	10	45	320,000
ALTERNATIVE B	35,000	50	14	60	480,000
ALTERNATIVE C	96,000	220	66	270	1,300,000

Unit Social Cost for Environmental Impact Metrics

Social Cost in 2016 US\$¹	\$ 183	\$ 329	\$ 1,278	\$ 224	\$ 14	Total Social Cost
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Social Cost of Environmental Impact Metrics for Each Alternative 2016 US\$

ALTERNATIVE A	\$ 4,392,000	\$ 12,502	\$ 12,780	\$ 10,080	\$ 4,480,000	\$8,907,000
ALTERNATIVE B	\$ 6,405,000	\$ 16,450	\$ 17,892	\$ 13,440	\$ 6,720,000	\$13,173,000
ALTERNATIVE C	\$ 17,568,000	\$ 72,380	\$ 84,348	\$ 60,480	\$ 18,200,000	\$35,985,000

Community Impact Analysis

		Alternative A	Alternative B	Alternative C
Short Term Impact	Traffic Congestion	Lowest	Intermediate	Highest
	Noise and Dust Generation	Lowest	Intermediate	Highest
Resources Lost	Water	Least	Intermediate	Most
	Clean Soil	Least	Intermediate	Most
	Landfill Space	Least	Intermediate	Most
Redevelopment Timeframe		2-3 Years	2-3 Years	10 Years

Overall Results

	Alternative A	Alternative B	Alternative C
Cost	\$124MM	\$168MM	\$468MM
Cancer Risk Reduction (all within EPA target risk range 10^{-4} to 10^{-6})	79% to 98%	>99%	100%
Hazard Index Reduction (all below HI of 1)	0% to 98%	93% to >99%	100%
Environmental Footprint	Smallest	Intermediate	Highest
Global Monetized Impacts	\$9MM	\$13MM	\$36MM
Community Short-Term Impact	Lowest	Intermediate	Highest
Resources Lost	Least	Intermediate	Most
Redevelopment Timeframe	2-3 Years	2-3 Years	10 Years

Conclusions

- Hybrid Risk/Cost Analysis and GSR Assessment
 - Transparent communication tool for stakeholder outreach
 - Reduce uncertainty in selecting a remedy



Credit

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Questions



Thanks for Attending!