Developing Greener Cleanup Metrics at US EPA

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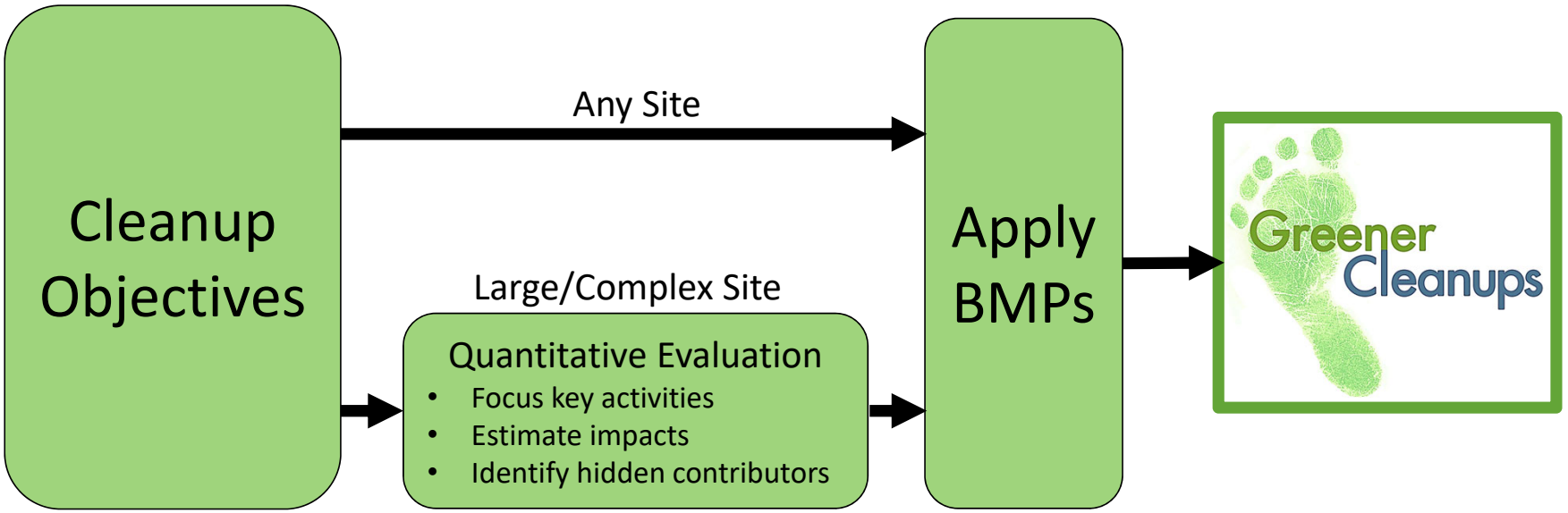
Why Greener Cleanups?

Greener cleanups build sustainable practices into our core mission: protect human health and the environment

https://www.epa.gov/greenercleanups

Footprint Reduction:
Two Approaches, Same Endpoint

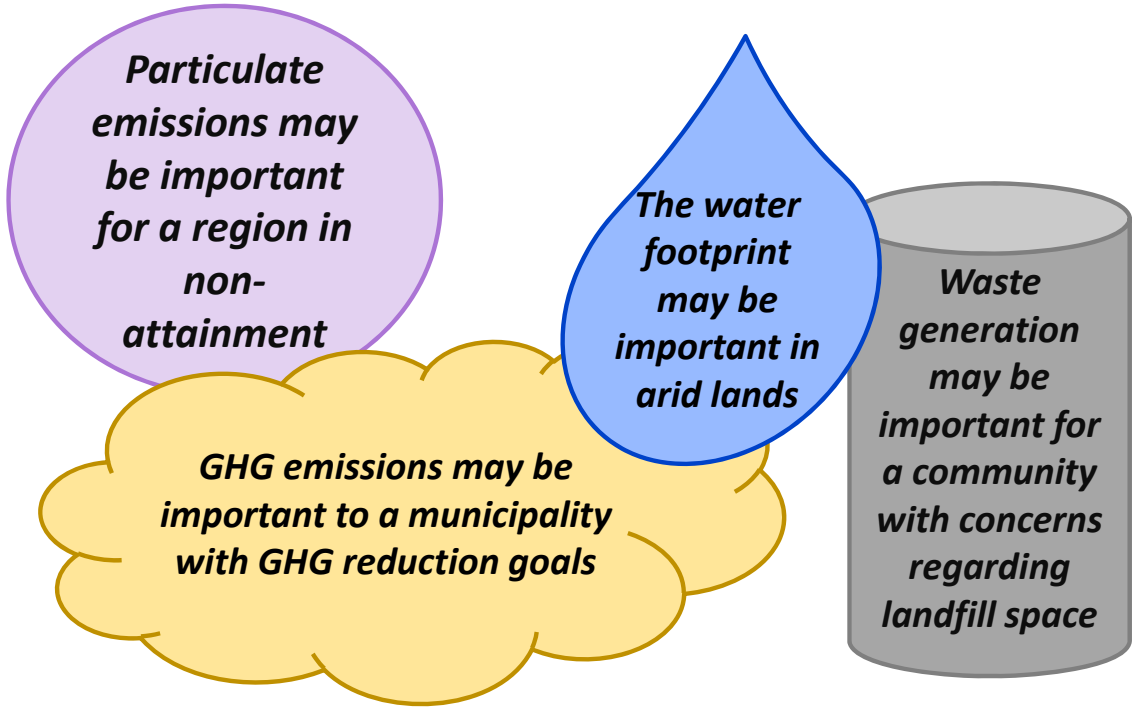


ASTM's Standard Guide for Greener Cleanups

- Supports the tenets of EPA's Greener Cleanup Principles
- Applies to individual or multiple phases of a cleanup
- Comports with all cleanup programs
- Identifies and employs **best management practices "BMPs**"
- Offers an option for a **quantitative evaluation**
- Promotes transparency through a **robust reporting structure**

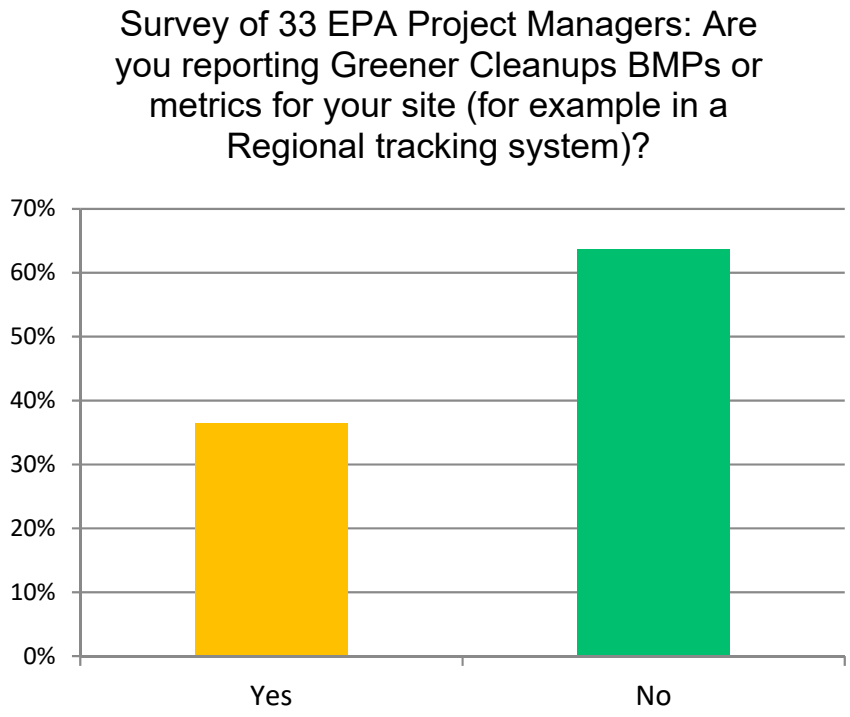
Best Management Practice Process

- **Step 1:** Opportunity Assessment
- **Step 2:** BMP Prioritization
- **Step 3:** BMP Selection
- **Step 4:** BMP Implementation
- **Step 5:** BMP Documentation



Goals in Quantifying a Remedy Footprint

- Inform remedy decisions
- Inform remedy operations
- Inform BMP decisions
- Document footprint reduction at a site, program, Agency or site portfolio level



Existing Footprint Quantification Tools

- Spreadsheets for Environmental Footprint Analysis (SEFA)
  - Allows detailed remedy breakdown to ID hidden footprint contributors
  - Facilitates development of footprint reduction measures, by core element
  - Typically used at large or complex sites
  - Updated version to be released in April 2019
- SiteWise, update coming soon
- Proprietary tools developed by C&E firms

Greener Cleanup Metrics: Development

- The US EPA Engineering Forum identified the need in early 2016
- Early/mid 2016: Developed an initial streamlined approach and new spreadsheets based on SEFA
  - Do not "deconstruct" remedy operations
- July 2017: Pilot-tested the new spreadsheets at 12 sites and identified challenges
  - Difficulty in obtaining data on certain processes or inputs
  - Certain design and usability aspects of the spreadsheets and overall tool
- Mid/late 2017: Took the draft spreadsheets back to the drawing board for improvements

Basics of a Greener Cleanup Metrics Tool

- Provides a uniform set of environmental footprint metrics
- Provides a streamlined way to capture basic information about quantities of used or conserved materials, waste, water and energy
- Includes built-in calculations that estimate footprint reductions based on user input
- Offers an alternate, cost-effective format for tracking and reporting footprint reductions
- Simplified MS Excel workbook based on the SEFA workbooks
- Publicly available online at no cost

Greener Cleanup Metrics: A Preview

Core Element	Metric	Unit of Measure	Actual	Baseline	Saved
Materials	Refined materials used on-site	Tons	81	76	-5
	Unrefined materials used on-site	Tons	0	0	0
Waste	Hazardous waste disposed of off-site	Tons	0	0	0
	Non-hazardous waste disposed of off-	Tons	14	14	0
Water	Public water used on-site	MG	0	0	0
	Groundwater used on-site	MG	0	0	0
	Other water used on-site	MG	0	0	0
	Wastewater discharged off-site	MG	0	0	0
Energy	Grid electricity used on-site	MWh	1192	4,500	3308
	Diesel used for on-site equipment	Gallons	0	0	0
	Diesel used for transportation	Gallons	470	470	0
	Gasoline used for transportation	Gallons	1040	1,040	0
	Propane	ccf	10000	0	-10000

Summary Table

- **13 core metrics**, with project actuals and baseline
- One of 5 main tabs:
  - Instructions
  - Input of actuals
  - Input of baseline values
  - Summary table
  - Notes

Greener Cleanup Metrics: 2017 Improvements

- The workbook contains significantly fewer spreadsheets, due to additional streamlining of the workbook design
- Site-specific background information entered on one input spreadsheet automatically carries forward to the remaining spreadsheets
- For each metric, the user can enter monthly values or one total value (such as an annual amount or an amount over a specific duration)
- Inclusion of an “additional notes” spreadsheet provides more flexibility for documenting input to the workbook, beyond what is possible in the individual spreadsheets

Greener Cleanup Metrics: 2018/2019 Pilot Test II

- Ran data from 6 “actual” sites with a range of remedies
  - Mechanics: Data entry, process flow, calculations and reporting are intuitive and smooth
  - Definitions: Establishment of a baseline vs “delta” is a challenge
  - Boundaries: Delineation of time and scope could be clarified, e.g. construction vs operating stages
  - Level of detail: Determination of which parameters warrant break-down varies by site

Greener Cleanup Metrics: Pilot Test II Excerpts

RESOURCES USED															
Timeframe for Data --->			2018 Site Activities												
Core Element	Metric	Unit of Measure	Inputs on a Monthly Basis												Total Resources Used
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Inputs on a Non-Monthly Basis	
Materials	Refined materials used	Tons	0	0	0	0	64.7778	64.7778	64.7778	65	64.7778	5320.78	0	0		5644.66667
	Unrefined materials used	Tons					19166.7	19,167	19,167	19166.7	19166.7	19166.7				115000
Waste	Hazardous waste generated	Tons					19166.7	19166.7	19166.7	19166.7	19166.7	19166.7				115000
	Non-hazardous waste generated	Tons	0	0	0	0	64.7778	64.7778	64.7778	64.7778	65	5320.78	0	0		5644.66667

DIESEL USED FOR TRANSPORTATION			
Mode of Transportation	Fuel Efficiency (mpg)	Total Distance Traveled (miles)	Diesel Used (gal)
Drill rig mob/demob	6	500	83
EVO	34.48275862	1001300.4	29038
EVO	34.48275862	615742.2	17857
PVC	6	1000	167
Cement	34.48275862	94037.5	2727
Gravel/sand/clay	34.48275862	26600	771.4
Total Diesel Used for Transportation			**50643**

Core Element	Metric		Resources Used	Resources Conserved
Materials	Refined materials	Tons	4220.6	0
	Unrefined materials	Tons	450530.5	385654.108
Waste	Hazardous waste generation	Tons	1264	0
	Non-hazardous waste generation	Tons	1848	0
Water	Public water	MG	0	0
	Groundwater	MG	0	0
	Wastewater generation	MG	0	0
	Other water	MG	0	0
Energy	Grid electricity	MWh	365.2	0
	Diesel for equipment	Gallons	0	0
	Diesel for transportation	Gallons	0	0
	Gasoline for transportation	Gallons	0	0
	Other energy	TBD	0	0

Forward Momentum:

Policy, Tools & Practice … and metrics

- Greener cleanups are consistent with Agency policy and authorities, and with broad federal goals, e.g. EO 13834 (May 17, 2018)
- The ASTM Standard Guide for Greener Cleanups is an effective tool for all parties at the project level
- EPA's Superfund Program continues to advance greener cleanups through related initiatives, e.g. remedy optimizations and the Remedial Action Framework
- Site cleanup consulting and engineering companies are increasingly incorporating greener cleanup practices into their standard operations
- Release of the updated SEFA tool is expected in April 2019
- Release of the Greener Cleanups Metrics tool is TBD in Fall 2019
- Watch for evolving developments in ecosystem services