

Integrating Green Remediation and Climate Resilience Under the Superfund Remedial Acquisition Framework:

A Primer for Service Contractors











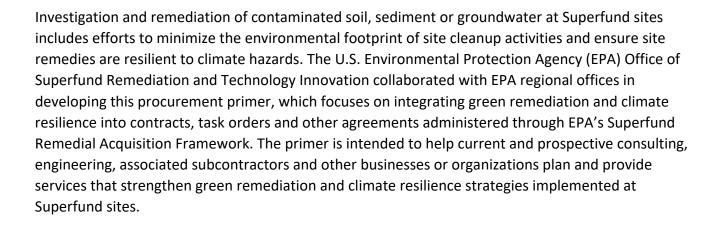








Preface



This primer is available to the public as a courtesy and does not constitute EPA quidance.

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Cover photos: as detailed in site-specific profiles or fact sheets on green remediation and climate resilience at Continental Steel, Kokomo, Indiana; Raymark Industries, Inc., Stratford, Connecticut; Vermont; Pennsylvania Mine, Keystone, Colorado; Apache Nitrogen Products, Inc., Benson, Arizona; American Cyanamid Co., Bridgewater, New Jersey; Phoenix-Goodyear Airport Superfund Site, Phoenix, Arizona; Kerr-McGee Navassa Superfund Site, Navassa, North Carolina; Lawrence Aviation Industries, Port Jefferson Station, New York

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List of Acronyms

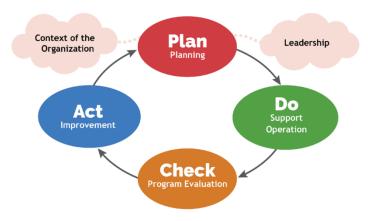
best management practice
climate vulnerability assessment
design and engineering services
U.S. Environmental Protection Agency
environmental services and operations
Federal Flood Risk Management Standard
greenhouse gas
integrated project team
Office of Land and Emergency Management
Office of Superfund Remediation and Technology Innovation
performance work statement
remedial acquisition framework
remediation environmental services
remedial project manager
Spreadsheets for Environmental Footprint Analysis
statement of objective
statement of work
traditional ecological knowledge
task order

1.0 Purposes of Contracting Provisions

Over the years, organizations such as engineering firms, construction companies and academic or non-profit groups have made valuable contributions to the U.S. Environmental Protection Agency (EPA) mission to protect human health and the environment. A remediation market study prepared for EPA in 2022 estimated that completing remediation at 1,031 sites on the Superfund National Priorities List (NPL) may cost \$15.4 billion to \$21.1 billion. Additional costs will be incurred to remediate sites added to the NPL and conduct other Superfund response actions in the future. EPA funds to procure assistance in addressing Superfund sites are currently bolstered by the U.S. Bipartisan Infrastructure Law, which allocates \$3.5 billion for Superfund cleanup work.

EPA compiled this primer to help Superfund service contractors plan and implement their work in manners that consider green remediation and climate resilience strategies, potentially as part of organizational environmental management systems.

Information in the primer also is intended to help all prospective organizations prepare for responding to future contract solicitations under EPA's Superfund Remedial Acquisition Framework (RAF). Many Superfund contracts are awarded on a competitive basis involving ratings for criteria that increasingly include green remediation and climate resilience strategies.



Concepts of an EMS, which consists of a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency.

Green Remediation

Incorporation of greener cleanup provisions under the Superfund RAF aims to minimize the potential or actual environmental footprint of remediation services and promote sustainability of remedial actions. EPA's Principles

<u>for Greener Cleanups</u> serve as the foundation for the Agency's greener cleanup policy. The Principles establish a policy goal to evaluate cleanup actions comprehensively to ensure the protection of human health and the environment and reduce the environmental footprint of cleanup activities to the maximum extent possible.

In context of acquisition processes, sustainability of remedial actions may be described in terms of green remediation or greener cleanup activities.

A <u>2016 memorandum from EPA's Office of Land and Emergency Management</u> (OLEM) to regional Superfund and Emergency Management Divisions and regional counsels recommended approaches for regional remedial Superfund programs to consider when evaluating greener cleanup activities throughout the remedy selection process, including response action selection and implementation. <u>Best management practices</u> (BMPs) of green remediation involve specific activities to address the core elements of greener cleanups:

- Reduce total energy use and increase the percentage of energy from renewable resources.
- Reduce air pollutants and greenhouse gas (GHG) emissions.
- Reduce water use and preserve water quality.
- Conserve material resources and reduce waste.
- Protect land and ecosystem services.



The <u>Green Remediation Focus</u> area of EPA's Contaminated Site Clean-Up Information (CLU-IN) website provides related technical information and profiles of sites where green remediation BMPs were used to achieve improved environmental outcomes.

Climate Resilience

The <u>U.S. EPA Climate Adaptation Action Plan</u> released in October 2021 describes priority actions that the Agency will take to increase human and ecosystem resilience as the climate changes and disruptive impacts increase. One priority action is to integrate climate adaptation into EPA programs, policies, rulemaking processes and enforcement activities. In September 2022 associated <u>implementation plans</u>, including those relevant to the Superfund program, were released by OLEM and each EPA regional office.

Climate adaptation in the Superfund program seeks to assure that contaminated site remedies remain protective of human health and the environment as the climate continues to change. Resilience is the capability to anticipate, prepare for, respond to and recover from significant multi-hazard threats with minimum damage to social well-being, the economy and the environment.

Synergies exist among certain greener cleanup practices and climate adaptation or mitigation measures, such as integrating renewable energy, using green infrastructure, and enhancing vegetation capacity to sequester atmospheric carbon.

A <u>2021 memorandum</u> (Dir. No. 9355.1-120) from the EPA Office of Superfund Remediation and Technology Innovation (OSRTI) to regional Superfund program managers recommends approaches to consider when evaluating climate resilience throughout the remedy selection and implementation process. For a given site, the approaches involve activities to:

- Understand what a forward-looking climate analysis indicates about future site conditions.
- Identify the associated "delta" over current site conditions.
- Determine how that delta may impact remedial investigations, feasibility studies, remedy designs, remedy operation and maintenance, five-year reviews and long-term monitoring.

EPA's <u>Superfund Climate Resilience</u> website offers examples of climate resilience and associated adaption measures taken at specific sites.

Drivers Cutting Across Sustainability and Resilience

Incorporation of greener cleanup and climate considerations in service procurements and other acquisition vehicles can help meet federal goals concerning sustainability as well as climate resilience.

Executive Order 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, of January 20, 2021, sets federal policy to advance environmental justice guided by listening to the science; improving public health and protecting our environment; ensuring access to clean air and water; limiting exposure to dangerous chemicals and pesticides; holding polluters accountable, including those who disproportionately harm communities of color and low-income communities; reducing GHG emissions; bolstering resilience to impacts of climate change; restoring and expanding our national treasures and monuments; and prioritizing both environmental justice and job creation.

Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, of January 27, 2021, sets policy and initiatives to advance our transition to clean energy and reduction in GHG emissions. Use of greener cleanup strategies in the U.S. EPA's Superfund programs helps meet the policy goals by integrating renewable energy, deploying cleaner fuel and emission technologies, protecting water, sequestering carbon, conserving land, protecting critical ecosystems and biodiversity, and using nature-based solutions.

Executive Order 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, of December 8, 2021, requires each federal agency to adapt to the impacts of climate change by developing or revising polices and processes to promote climate resilient investment; conducting climate adaptation analysis and planning; reforming policies and funding programs that are maladaptive to climate change and increase the vulnerability of communities, natural or built systems, economic sectors, and natural resources; and developing and enhancing tools that assess climate change impacts and support climate adaptation planning and implementation.

Executive Order 14072, Strengthening the Nation's Forests, Communities, and Local Economies, of April 22, 2022, sets federal policy to deploy climate-smart forestry and other nature-based solutions to improve resilience of lands, waters, wildlife and communities in the face of disturbances and stress arising from climate impacts. The solutions include actions that protect coasts and critical marine ecosystems, reduce flooding, moderate extreme heat, replenish groundwater sources, capture and store carbon dioxide, and conserve biodiversity.

Examples of Relevant Language in <u>Executive Order 14057</u>

<u>Sec. 205</u> (c)(iv): Use performance contracting, in accordance with the provisions of section 1002 of the Energy Act of 2020 (Public Law 116-133, division Z), to improve efficiency and resilience of Federal facilities, deploy clean and innovative technologies, and reduce GHG emissions from building operations.

<u>Sec. 207</u>: Each agency shall minimize waste, including the generation of wastes requiring treatment and disposal; advance pollution prevention; support markets for recycled products; and promote a transition to a circular economy ... <u>Sec. 301</u>: Consistent with applicable law, agencies shall pursue procurement strategies to reduce contractor emissions and embodied emissions in products acquired or used in Federal projects.

2.0 Provisions in Descriptions of Work at the Contract Level

EPA procurement personnel work with project managers to incorporate greener cleanup practices and climate adaptation measures throughout the placement and execution of a service contract. Related clauses that are consistent with the Federal Acquisition Regulation may be incorporated in any of the RAF's three suites of multiple-award contracts, which provide:

- Design and engineering services (DES): professional services of a scientific, architecture and engineering nature for remedial investigations, feasibility studies, remedial designs and general technical assistance.
- Remediation environmental services (RES): performance-based remedial and removal action services, which may include significant construction components.
- Environmental services and operations performance-based (ESO): technical oversight of the environmental remediation work being financed and performed by another federal agency, state, tribe or potentially responsible parties, as well as EPA-lead remedy operations such restoration groundwater and source treatment activities.

Design and Site Specific Contracts Remediation Environmental Engineering Environmental Services & Interagency Agreements **Services Suite** Services Suite **Operation Suite** and Cooperative Agreements Multiple Award Multiple Award Multiple Award Indefinite Indefinite Removal Contracts • Indefinite Delivery Delivery Delivery (ERRs, START) · A&E Professional Remedial Remedial Regional Specialty services from Cleanup services, Cleanup Contracts including operation and (e.g., Mining, Sediments, Risk through design construction oversight Regional construction Contracts)

The RAF also includes regional or site-specific acquisition vehicles to complete work at Superfund sites, such as site-specific contracts; interagency agreements and cooperative agreements; removal contracts; regional oversight contracts; and regional specialty contracts. Accordingly, relevant contract types include fixed-price, cost-reimbursement, incentive, indefinite-delivery, time-and-materials and agreement contracts, as defined by <u>Federal</u>

<u>Acquisition Regulation</u>. Over time, the clear contract specifications regarding greener cleanups and future climate considerations are anticipated to help private sector organizations such as engineering firms institutionalize relevant approaches as standard operating procedures.

Sample Language for Descriptions of Work at the Contract Level

All new contracts administered under the RAF since 2014 have contained descriptions of work that include general requirements for greener cleanup considerations. Some but not all contracts have contained descriptions of work with requirements relating to climate adaptation or mitigation.

To maintain structural consistency across DES, RES and ESO contracts, the requirements are typically incorporated as Subtask 1.4 under "Task 1: General Requirements." Due to synergies among certain greener cleanup practices and climate adaptation or mitigation measures, as well as shared goals concerning sustainability, relevant clauses at the contract level may (but not always) combine the two topics. *Recommended* language for such a clause is provided below.

Descriptions of work at the contract level provide opportunities to integrate broad, non-prescriptive requirements regarding green remediation and climate resilience. Depending on the relevant contract type, the description is presented as a statement of work (SOW), statement of objective (SOO), or performance work statement (PWS).

Task 1: General Requirements

1.4 Green Remediation and Climate Change Considerations: The contractor shall consider the environmental footprint of activities performed under this contract. In particular, to the extent practicable and/or feasible, the contractor shall explore and implement green remediation strategies to reduce energy and water usage, promote carbon neutrality, promote industrial materials reuse and recycling, and protect and preserve land resources.

The contractor shall consider the potential impacts of climate change on activities performed under this contract. The contractor shall integrate climate change vulnerability analyses based on projections of future site-specific climate conditions. The contractor also shall identify and, as needed, implement adaptation measures to ensure the resilience of remedies throughout their service lives. The contractor shall conduct such activities by using evidence-based, best-available climate data sets, information resources and decision-support tools including federal, state, territory, tribal and local resources.

The contractor may be requested to outline green remediation and climate mitigation/adaptation approaches during systematic project planning meetings, provide cost analyses for the approaches in related work plan budgets, maintain records of associated activities, and report this information to EPA as needed or requested.

Contract-level descriptions of work may contain additional green remediation and climate resilience provisions under Task 1 General Requirements, depending on factors such as the nature of required services, the extent of field activities, and site-specific conditions. For example, RES and ESO contract scopes include Subtasks 1.5 and 1.6 that focus on air emissions and renewable energy, respectively. *Sample* language for these subtasks, which are entitled slightly differently in RES versus ESO contracts, is provided below.

1.5 Air Emissions Associated with Fossil Fuel Consumption

The contractor shall use nonroad vehicles and mobile or stationary equipment that meet the U.S. Environmental Protection Agency's (EPA's) <u>Tier 4 emission standards</u>. The standards may be met by deploying newer vehicles and engines that were manufactured to meet the standards, using newer emission control components to rebuild older engines, or retrofitting diesel engines with exhaust aftertreatment devices verified by <u>EPA</u> or the <u>California Air Resources Board</u>.

The contractor shall ensure all deployed vehicles and equipment are properly maintained according to manufacturer's recommendations to assure optimum vehicle/equipment performance and fuel efficiency. Where available, the contractor shall use lower carbon fuels such as E15 for gasoline vehicles, E85 for flexfuel vehicles, diesel blends containing up to 20% biodiesel (B20), or renewable diesel. The contractor also shall implement an idle reduction strategy involving techniques such as engaging automated engine shutdown devices or using takeoff power from stand-alone battery banks.

This requirement applies to all vehicles and equipment engines, whether fueled by diesel, gasoline, propane or compressed natural gas and whether owned, leased or rented by the contractor or a subcontractor. The contractor shall document the anticipated approach to meeting this requirement in quality assurance project plans for task orders. The documented approach shall include descriptions of specific tools, methods and other means to evaluate and address the effect of fossil fuel consumption on local communities with environmental justice concerns. EPA reserves the right to exempt this requirement for certain vehicles or equipment at the project level based on project-specific circumstances; any exemptions will be communicated to the contractors in the request for task order proposals.



1.6 Integration of Renewable Energy

The contractor shall evaluate opportunities to deploy onsite sources of renewable energy for conducting work under this contract and shall integrate renewable energy systems determined to be feasible. Potential sources of renewable energy include solar, wind, geothermal resources, landfill gas and low-impact hydropower. Examples of renewable energy technologies that may be used to meet this requirement include photovoltaic panels, solar thermal systems, wind turbines, windmills, heat exchange systems and microturbines. Evaluation of the opportunities shall include potential storage of excess renewable energy in transportable battery banks for as-needed onsite use. The contractor also shall consider purchasing green power from organizations that offer green power to meet a project's energy demand more fully. The contractor may be requested to analyze the energy costs and air emissions associated with using renewable energy sources versus utility-provided electricity over the expected life of the project.



In DES and ESO descriptions of work, climate-related provisions also may be integrated under Task 7 "Other Initiatives."

Contract-level descriptions of work in regional or site-specific acquisition vehicles may contain additional provisions to address regional or site priorities or comply with relevant federal, state or local mandates. For example, *sample* language regarding stormwater management is provided below.

Green Infrastructure for Stormwater Management

The contractor shall develop and implement a stormwater management plan that accounts for site-specific climate projections over the lifecycle of the site remedy(s), including but not limited to remedy design and construction and site restoration. The stormwater management plan shall include but not be limited to green infrastructure elements such as bioswales, wet detention ponds, constructed wetlands, cisterns and tree canopies. The contractor may be requested to estimate the rates of stormwater runoff under multiple climate scenarios projected for the site in the future.



Region 10 Example in a 2023 ESO Contract

Site Operations: The contractor shall explore and propose green remediation strategies to maximize sustainability, reduce energy and water usage, promote carbon neutrality, promote industrial materials reuse and recycling, and protect and preserve land resources through green applications, including considering the environmental footprint when performing activities.

3.0 Site-Specific Factors in Task Orders

Development of green remediation and climate resilience provisions in task orders (TOs) takes into account factors such as site conditions, the specific purpose of anticipated services, and potential leveraging of activities meeting shared goals.

Site Conditions and Supporting Infrastructure

Due to the wide variation in Superfund site characteristics and conditions, technical and administrative considerations vary. Considerations commonly include:

- Remedial components and activities anticipated or shown to contribute to the project's environmental footprint.
- Known or potential climate vulnerabilities of the site, including those based on recent extreme weather events.
- Sustained changes in site conditions over time, which may become apparent during conceptual site model development, feasibility studies or five-year reviews.
- Duration and complexity of remedial activities.
- Existing and planned infrastructure of remedial components.
- Current and anticipated use of the site and associated infrastructure.
- Community priorities concerning sustainability and resilience.
- Local availability of preferred services and goods.

Task orders may require a contractor to use construction materials and products with substantially lower levels of <u>embodied GHG emissions</u>, which EPA interprets as the 20% of materials/products with the lowest embodied carbon when compared to similar ones.

Level of Detail in Task Order Provisions

EPA procurement personnel maintain discretion regarding the level of specificity in TO provisions, which may describe applicable sustainability or resilience goals or require that contractors perform specific activities. Relevant *examples* include:

- Identifying green remediation BMPs that apply to a given site or its remedy components. This process may be facilitated by use of EPA's "Green Remediation: Best Management Practices" fact sheet series.
- Using a tool such as the <u>ASTM Standard Guide for Greener Cleanups</u> to screen and prioritize green remediation BMPs and guide activity decision making.
- Quantitatively or qualitatively estimating the environmental footprint of certain remedial activities.
- Tracking selected performance metrics and submitting periodic reports.
- Developing an approach to energy and water conservation.
- Identifying climate adaptation measures as needed to address a site's vulnerabilities to future climate conditions. A site-specific climate vulnerability assessment (CVA) may be needed to understand how changes in climate conditions may impact a remedy's protectiveness.
- Developing a plan to maximize onsite sequestration of atmospheric carbon.
- Complying with General Services
 Administration guidelines on <u>buying green</u>
 products, services and vehicles.

Green Procurement Compilation

The Green Procurement Compilation (GPC) is a comprehensive green purchasing resource designed for federal contracting personnel and program managers.

Leveraging Sustainability and Resilience Requirements

Development of TO requirements may capitalize on activities that are able to synergistically minimize the environmental footprint of remediation activities while building the remedy's resilience to (and potentially help mitigate) climate change. Such leveraging is anticipated to minimize project lifecycle costs. For example, TOs may include requirements to:

- Use one or more sources of renewable energy and associated energy storage capacity to power remedial and auxiliary equipment, thereby reducing the energy-related footprint of remedial activities while providing energy resilience during weather-related grid outages.
- Develop onsite structures such as stormwater basins to store precipitation runoff, thereby avoiding stormwater diversion to a municipal water treatment facility while providing ecosystem habitat during dry weather or a sustained drought.
- Reclaim treated groundwater for onsite or offsite use, thereby reducing the use of clean groundwater for remedial purposes or ongoing site activities while building the community's supply of non-potable water.
- Use local sources of industrial byproducts as an alternative to highly processed or manufactured products in selected treatment processes, thereby beneficially using waste materials while adapting to potentially reduced supply chains affected by climate conditions.
- Revegetate lands damaged by historical site activities or remedial activities through use of native plant species, thereby minimizing vegetation maintenance while promoting infiltration of rainwater and snowmelt and sequestration of atmospheric carbon.



Early collaboration with other federal, state or local agencies, affected tribal communities, or certain organizations may be needed for TO requirements relating to long-term remedial operation and maintenance at specific sites.

Supporting References

EPA procurement personnel may choose to point to specific information sources to be used under a given TO.

Green Remediation

- Green Remediation: Best Management Practices fact sheet series.
- ASTM Standard Guide for Greener Cleanups (E2893-16e1).
- OLEM Memorandum: Consideration of Greener Cleanup Activities in the Superfund Cleanup Process, 2016.
- Greener Cleanups website.
- Relevant EPA regional policies.

Climate Resilience

- OLEM Dir. No. 9355.1-120, Consideration of Climate Resilience in the Superfund Cleanup Process for Non-Federal National Priorities List Sites, June 2021.
- <u>Superfund Climate Resilience</u> website: Vulnerability Assessment, Resilience Measures, Adaptive Capacity.

A climate change-related hazard potentially affecting a remediation system may involve:

- An event, such as a hurricane.
- A sustained change in the local climate regime, such as drought.
- A gradual change in project parameters, such as the depth of groundwater.
- A technological problem arising in the system or site infrastructure, such as a weather-related power loss.

Cross-Cutting Information

- Effective Use of the Project Life Cycle Conceptual Site Model, 2011.
- Cleanup Optimization at Superfund Sites.
- Five-Year Review tools.

4.0 Sample Task Order Language

Sustainability and resilience requirements at the TO level may apply to work performed under any phase of the Superfund pipeline. A remedial project manager (RPM) or other key staff should collaborate with an integrated project team (IPT) to develop and incorporate TO language addressing the identified site-specific factors influencing sustainability and resilience of the site or remedy.

An IPT is composed of representatives from appropriate functional disciplines working together to identify and resolve issues and make sound and timely recommendations to facilitate decision making throughout the acquisition process.

Examples of Task Order Language

Greener cleanup provisions are typically incorporated in a TO as Subtask 1.4 under "Task 1: General Requirements." Climate resilience considerations may be included in Subtask 1.4 or integrated as subtasks under other tasks such as "Task 5: Other Work Areas/General Technical Assistance" or "Task 7: Other Initiatives."

At the TO level, one or more subtasks may be used to require specific activities relating to sustainability and resilience in context of the TO description of work.

Sample language for a "General Requirements" subtask specifying greener cleanup provisions, only, is provided below. For simplicity and illustration purposes herein, each sample clause is enumerated as "1.4.X" to provide flexibility in selecting, tailoring, sequencing or adding applicable clauses as needed for the required services.

Task 1: General Requirements

- **1.4 Greener Cleanup Considerations:** The contractor shall consider the environmental footprint of activities described in this TO scope. To the extent practicable, the contractor shall explore and implement green remediation strategies seeking to minimize energy and water usage, integrate renewable energy, improve air quality, preserve water quality, maximize materials reuse and recycling, minimize waste generation, and protect land and ecosystem services.
- 1.4.X The contractor shall specify BMPs to be implemented when planning and conducting work under this TO. The contractor shall use EPA's series of green remediation BMP fact sheets as a point of reference.
- 1.4.X The contractor shall apply the <u>ASTM Standard Guide for Greener Cleanups</u> for the purpose of screening, determining applicability, prioritizing and selecting BMPs to be implemented.
- 1.4.X The contractor shall conduct a quantitative evaluation of the environmental footprint of activities to be performed under this TO through use of EPA's <u>Spreadsheets for Environmental Footprint Analysis</u> (SEFA) or a similar tool. The contractor may use the analytical results to meet relevant reporting requirements identified by the TO Manager.
- 1.4.X The contractor shall track and periodically report to the TO Manager the project's actual usage of energy, water and processed or raw materials.
- 1.4.X The contractor shall conduct an energy audit to identify measures that may be taken to increase efficiency and reduce energy usage by the existing groundwater treatment system.
- 1.4.X The contractor shall equip groundwater extraction pumps with photovoltaic systems wherever feasible as a means to supplement or substitute for grid-supplied electricity.
- 1.4X The contractor shall develop and implement an approach to minimizing air emissions due to deploying nonroad vehicles and mobile or stationary equipment powered by fossil fuels. The approach shall include but not be limited to complying with EPA's <u>Tier 4 emission standards</u>, using lower carbon fuels, and adhering to an idle reduction policy.
- 1.4X The contractor shall comply with product procurement requirements in accordance with federal green purchasing guidelines established by the U.S. General Services Administration. Relevant product categories may include but not be limited to construction materials, HVAC/mechanical, pest management, landscaping products and office electronics. The contractor may use the EPA <u>Framework for the Assessment of Environmental Performance Standards and Ecolabels to identify suitable options.</u>
- 1.4.X The contractor shall identify options for onsite or offsite beneficial use of treated groundwater.
- 1.4X The contractor shall identify options for beneficial use of clean earthen materials removed during remedy construction.

Tracking and reporting of project parameters such as electricity usage may include estimating associated GHG emissions.

A Sampling of Electricity Used by SVE System Components over Three Years

Component	Electricity Used
Vacuum blower	108,000 kWh
Off-gas treatment system	90,000 kWh
Data monitoring and processing	33,000 kWh
Aboveground treatment structure	1,800 kWh
Total electricity usage:	232,800 kWh
Estimated carbon dioxide emission:	182 tons

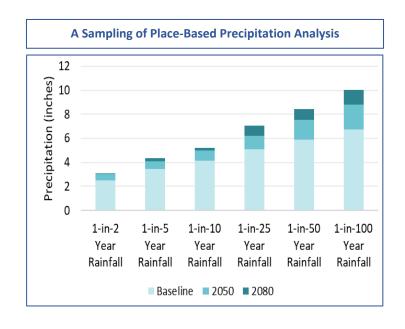
Sample language for climate considerations specified in a TO's "Task 5: Other Work Areas/General Technical Assistance" is provided below.

Task 5: Other Work Areas/General Technical Assistance

- **1.5 Climate Considerations:** A climate vulnerability assessment for a Superfund site generally requires using forward-looking climate data to determine if climate change may present future onsite hazards such as more frequent flooding, sustained drought conditions, heatwaves or wildfires. By mapping the site's identified hazards against the site remedy sensitivities to hazard exposures, the assessment determines how changes in climate conditions may impact a remedy's protectiveness. The results of a climate vulnerability assessment are used to determine whether adaptation measures already in place can sufficiently address the exposures or additional measures are needed.
- 1.5.X The contractor shall conduct a <u>climate vulnerability assessment</u> to identify critical intersections among future climate exposures and potential site-specific remedy sensitivities and vulnerabilities. The assessment will use climate scenarios projected over the remedy's expected lifespan in addition to existing data on current and historical conditions.
- 1.5.X The contractor shall incorporate climate adaptation measures into services to be performed under this TO. The contractor shall use information on EPA's <u>Superfund Climate Resilience</u> website as a point of reference.
- 1.5.X The contractor shall identify options for reducing or preventing greenhouse gas emissions associated with site activities and otherwise mitigating climate change.
- 1.5.X The contractor shall develop designs and construction plans that fully meet the Federal Flood Risk Management Standard (FFRMS) and, wherever feasible, apply the flood elevations of the FFRMS freeboard value approach.
- 1.5.X When constructing new buildings or reroofing existing buildings, the contractor shall adhere to standards that are similar to or more stringent than the roof construction standards established by the National Fire Protection Association or applicable model building code established by the International Code Council.

Historic indicators of climate conditions provide a good understanding of what climate hazards are present at a site. However, the rapid rate of climate change requires that we project future conditions to better inform key remedy decisions such as selection, design, and operations, and to anticipate the impact on contaminant movement.

Climate screening is a high-level assessment of climate exposure to changes in climate hazards such as heavy precipitation, extreme temperature, drought, sea level rise, wildfires and landslides.



5.0 Deliverables, Metrics and Costs

Types of Deliverables

Typical deliverables associated with green remediation and climate resilience considerations consist of qualitative or quantitative information presented as narration, supporting data tables and descriptions of associated work approaches. **Examples** of potential deliverables include:

- An assessment of the environmental footprint of anticipated or implemented remedial activities.
- A list of proposed or implemented green remediation BMPs to address specific contributions to the environmental footprint of remedial activities.
- The results of a site-specific climate vulnerability assessment.
- A list of proposed or existing measures that address specific climate vulnerabilities.
- A report on applied technologies and techniques to reduce the emission of nitrogen dioxide, sulfur dioxide and particulate matter in geographic areas that are disproportionately affected by fossil fuel pollution.

To assure progress in meeting sustainability and resilience goals of a given task, periodic deliverables may contain recent data on remedy or site parameters such as:

- Energy, water and material usage; waste generation; and ecosystem health indicators such as vegetation growth.
- Precipitation rates, temperature ranges, surface water heights, groundwater well levels, topsoil depths or other metrics related to extreme weather events, sustained changes in the local/regional climate or associated impacts such as soil erosion or desiccation.

A Sampling of Place-Based Prioritization of Climate Adaptation Measures

Potential Points of System Vulnerability		Potential System Disruption Due to Extreme Weather				Resilience Measures for
		Power Interruption	Physical Damage	Water Damage	Reduced Access	High-Priority Vulnerabilities
Groundwater	Wells		0		0	
Extraction or	Extraction pumps	•	•	•	•	Build well-head housing
Containment	Vertical barriers		0		0	
System	Monitoring equipment	•	•	•	•	Add a remote access system
	Electrical controls	•	•	•	•	Elevate above worst-case flooding
	Transfer pumps	0	0	0		
	Pipe system		0			
Aboveground Components	Electric equipment	•	0	•		Install a photovoltaic energy system for backup power
of the	Natural gas-driven equipment	0	0	0		
Treatment	Flow-through units	0	0	•		
System	Chemical storage containers		•	0	•	Relocate to higher ground Use tie down systems
	Residuals disposal system		0	0	0	
	Treated water discharge system	0	0	0		
Site	Buildings, sheds, or housing	•	•	•	0	Install hurricane straps
Operations	Electricity lines	•	0	•	•	Bury lines below ground surface
and	Liquid fuel storage and transfer	0	0	•	•	Fortify concrete pads Install anchor systems
Infrastructure	Water supplies	0	0		•	
	Surface water drainage systems		•	0	0	Construct vegetated swales
(high priority		● medium	priority	·	O low priority

Other deliverables may present the results of specific analyses regarding aspects of particular concern, such as:

- Identifying renewable energy systems to power energy-intensive components of a remedy.
- Analyzing green infrastructure options to resolve recurring flooding in vulnerable areas of the site.
- Recommending nature-based solutions that increase long-term biodiversity and ecosystem services during site restoration.

Deliverables relating to activities performed at sites near tribal properties or otherwise affecting indigenous communities should include descriptions of <u>traditional ecological knowledge</u> (TEK) that was incorporated in analytical processes and associated deliberations.

Sample Metrics

Selection of appropriate benchmarks and metrics to be specified in TOs may be facilitated by review or application of pertinent tools such as EPA's:

- Greener Cleanup Metrics Workbook, which may be used to document and report each of 14 universal metrics concerning a cleanup project's environmental footprint.
- Spreadsheets for Environmental Footprint Analysis (SEFA), which offers 21 metrics and a means to quantify the environmental footprint of a cleanup project in greater detail.

TO managers maintain discretion regarding the schedule of field activities that affect project sustainability or resilience goals. Rationales for approving activity delays may include but are not limited to extreme weather events, supply chain disruptions, or the unavailability of key subcontractors.

Project managers may wish to tailor these Excel-based tools to also document climate-related parameters such as an onsite capacity to store stormwater or sequester atmospheric carbon.

Associated Costs

Costs associated with green remediation and climate resilience considerations vary due to factors such as site size, complexity and location; the complexity and duration of site-specific remedies; and the nature of routine or unique services to be performed under a given TO. Although the considerations may initially raise acquisition costs, related investments during early stages of a project can reduce lifecycle costs by avoiding future physical damages, sustained disruptions, or reconstruction of site remedies or infrastructures. Assistance from the U.S. Army Corps of Engineers may be available to refine such cost estimates.

Preliminary information from TOs recently issued for remedial investigation/feasibility study activities suggest that greener cleanup considerations could account for 1.5% of the total number of hours to be allocated. Past applications of the ASTM Standard Guide for Greener Cleanups suggest that 20-30 hours may be needed to screen and identify applicable BMPs. Subsequent prioritization and selection of applicable BMPs may require 20-30 additional hours. Completion of a detailed environmental footprint assessment, if desired, may require an additional 40-80 hours due to the need for more intensive data collection and analysis.

For an existing TO, the TO manager may elect to negotiate a modification to cover a contractor's unanticipated costs associated with activities supporting project sustainability and resilience. Justifications for such modifications may include but not be limited to obstacles encountered during field work; recent increases in material or labor costs; or differing requirements set forth in the associated contract-level description of work.

The type of professional expertise and associated labor categories typically required to consider sustainability and implement associated practices are not anticipated to affect TO costs. Consideration of climate change in TOs may require additional expertise in subject matter such as climate science and geographic information systems.

TO managers and contracting personnel are encouraged to explore and leverage funding sources that arise from recently enacted federal or state legislation and can be used to ensure Superfund remedies are constructed and operate in sustainable and resilient manners.. For example:

- <u>Bipartisan Infrastructure Law</u> funding may be available through collaboration with other federal agencies to facilitate use of cleaner energy for remedial operations.
- <u>Diesel Emissions Reduction Act</u> funding may be available through collaboration with state agencies to help retrofit or replace diesel engines in mobile or stationary equipment used for site cleanup.
- <u>Inflation Reduction Act of 2022</u> funding may be available through collaboration with local partners to reduce pollution in environmentally overburdened communities and ensure equitable access to renewable energy opportunities.

To maintain Superfund program consistency, comparable provisions on green remediation and climate resilience may be incorporated in other documentation outlining remediation work to be financed and performed by another federal agency, a state or tribal authority or a potentially responsible party. For example, similar provisions are incorporated in administrative settlement agreement and order on consent (ASAOC) SOWs for remedial investigations/feasibility studies; the model language includes:

In its description of the methodologies to be used to perform any remedial investigation (RI) work, the RI workplan shall consider the environmental footprint of all such activities and, to the extent practicable, take actions to minimize said footprint. The RI workplan shall be consistent with the *Consideration of Greener Cleanup Activities in the Superfund Cleanup Process* (Aug. 2, 2016). These considerations for greener cleanups are not intended to allow cleanups that do not satisfy threshold requirements for protectiveness, or do not meet other site-specific cleanup objectives. Greener cleanup activities refer to strategies designed to help minimize the environmental footprint of cleaning up contaminated sites and ensure a protective remedy within the applicable CERCLA statutory and regulatory framework.

Respondents shall identify which climate-related or environmental hazards (e.g., sea level changes, increased severity of wildfire, increased storm intensity, increased flood risk, etc.) may affect the potential remedies at the site. Respondents shall use forward-looking climate data to evaluate the current and potential chemical releases and unacceptable exposure pathways.

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