U.S. Environmental Protection Agency
Office of Solid Waste and Emergency Response

Principles for Greener Cleanups

Protecting Communities and the Environment for a Sustainable Future

As a nation, we value land as a natural, cultural, and economic resource. Cleaning up contaminated land protects human health and the environment and enables communities and other stakeholders to pursue future beneficial use or reuse of resources for economic, environmental, and societal purposes. Prevention and remediation of contamination plays a central role in seeking a sustainable future.

A goal of the U.S. Environmental Protection Agency (EPA) Office of Solid Waste and Emergency Response (OSWER) and its many partners is to preserve and restore land by promoting and using protective waste management practices and by assessing and cleaning up contaminated sites. OSWER cleanup programs (including national and regional programs) address contaminated soil, groundwater, surface water, sediments, air, and other environmental media.

EPA cleanup programs include common elements such as an initial site assessment, initial site stabilization when needed to protect against imminent threats, site characterization, cleanup option evaluation, selection, and implementation, and when appropriate, longer-term management of the site When done in close consultation with local communities, these cleanup programs not only protect human health but also allow communities and other stakeholders to promote beneficial, protective future uses of the property.

Doing our Work Smarter – and Greener

Cleaning up sites can be viewed as "green" from the perspective of the cleanup improving environmental and public health conditions. However, cleanup activities use energy, water and materials resources to achieve cleanup objectives. The process of cleanup therefore creates an environmental footprint of its own. Over time, we have learned that we can optimize environmental performance and implement protective cleanups that are **greener** by increasing our understanding of the environmental footprint and, when appropriate, and taking steps to minimize that footprint.

OSWER cleanup programs should consider these Principles for Greener Cleanups during any phase of work, including site investigation, evaluation of cleanup options, and optimization of the design, implementation, and operation of new or existing cleanups. All cleanup approaches, and all elements of the cleanup process, can be optimized to enhance their overall environmental outcome; therefore, green remediation involves more than merely adopting a specific technology or technique.

These Principles 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, to be considered greener cleanup. The Principles are not intended to trade cleanup program

objectives for other environmental objectives. Successful green cleanup practices can help achieve cleanup objectives by ensuring protectiveness while decreasing the environmental footprint of the cleanup activity itself. Some examples include using equipment that emits less particulate matter to the air, sizing equipment accurately to avoid wasted energy, water, and material, and using renewable energy or recycled material to decrease greenhouse gas emissions and conserve resources.

These Principles for Greener Cleanups are intended to improve the decision-making process for cleanup activities in a way that ensures the protection of human health and the environment and reduces environmental impacts on communities. These approaches can include environmental footprint assessment, resource efficiency, best management practices, and technology innovation. Green cleanup environmental footprint assessments should be conducted in a transparent manner and should include, at a minimum, energy use, air emissions, water impacts, materials use, and land and ecosystem protection. (See the attachment for additional information on the elements that may be considered in carrying out a green cleanup environmental footprint assessment.)

These Principles for Greener Cleanups focus on the environmental footprint of *cleanup* activities. Community and stakeholder input about the reasonably anticipated future land use of the site - residential, commercial, industrial, recreational, or ecological – are important and often integrated into cleanup decisions; however, greener cleanup assessments generally are not designed to provide information on the environmental impacts associated with the future uses of the property. While not a part of a greener cleanup assessment, communities and other stakeholders are encouraged to carefully assess and consider life cycle implications associated with the future use of the site and to adopt more sustainable approaches for land use, building and infrastructure design and construction, community health and livability, and resource conservation and protection.

While preventing and cleaning up contamination is inherently "green", the terms green cleanup, greener cleanup, and green remediation are used by OSWER cleanup programs interchangeably in this and other documents.

As a matter of policy,

OSWER's goal is to evaluate cleanup actions comprehensively to ensure protection of human health and the environment and to reduce the environmental footprint of cleanup activities, to the maximum extent possible. In considering these Principles, OSWER cleanup programs will assure that the cleanups and subsequent environmental footprint reduction occur in a manner that is consistent with statutes and regulations governing EPA cleanup programs and without compromising cleanup objectives, community interests, the reasonableness of cleanup timeframes, or the protectiveness of the cleanup actions. OSWER will continue to coordinate with its partners and develop approaches to facilitate continued progress in furthering these Principles for Greener Cleanups.

1. Consistent with existing laws and regulations, it is OSWER policy that all cleanups:
   - Protect human health and the environment
   - Comply with all applicable laws and regulations
   - Consult with communities regarding response action impacts consistent with existing requirements
   - Consider the anticipated future land use of the site.

2. The following five elements of a green cleanup assessment may assist in the evaluation and documentation used in selecting and implementing protective cleanup activities. (See the attachment for further information on these five elements.)

- Total Energy Use and Renewable Energy Use
- Air Pollutants and Greenhouse Gas Emissions
- Water Use and Impacts to Water Resources
- Materials Management and Waste Reduction
- Land Management and Ecosystems Protection

3 As tools are developed and deployed, when it is feasible to use greener cleanup approaches, OSWER cleanup programs will document how these five elements were considered and implement best practices to reduce the environmental footprint of cleanups. The nature of greener cleanup assessments can vary with the complexity of the site, program and community priorities, and the availability of tools. Assessment activities should be performed in a transparent manner involving the community and other stakeholders and describe how the programs have considered the items described in (1) and (2) above.

4. OSWER will evaluate progress in reducing the environmental footprint of protective cleanups.

5. Greener Cleanup approaches span multiple cleanup programs and reflect a developing set of practices. Legal authorities differ by cleanup program; environmental issues and community priorities differ from region-to-region and site-to-site; and greener cleanup best practices and assessment tools are at the early stages of development and testing. Greener cleanup approaches, therefore, may vary from site-to-site and program-to-program and will continue to evolve by incorporating lessons from the growing state of knowledge.

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Date:

Recommended Elements for Greener Cleanup Environmental Footprint Assessments and Best Practices

OSWER cleanup programs should consider these recommended elements when carrying out greener cleanup environmental footprint assessments and evaluating best practices that may be useful during the cleanup process.

1. Minimize Total Energy Use and Maximizes Use of Renewable Energy
   - Minimize energy consumption (e.g. use energy efficient equipment)
   - Power cleanup equipment through onsite renewable energy sources
   - Purchase commercial energy from renewable resources

2. Minimize Air Pollutants and Greenhouse Gas Emissions
   - Minimize the generation of greenhouse gases
   - Minimize generation and transport of airborne contaminants and dust
   - Use heavy equipment efficiently (e.g. diesel emission reduction plan)
   - Maximize use of machinery equipped with advanced emission controls
   - Use cleaner fuels to power machinery and auxiliary equipment
   - Sequester carbon onsite (e.g., soil amendments, revegetate)

3. Minimize Water Use and Impacts to Water Resources
   - Minimize water use and depletion of natural water resources
   - Capture, reclaim and store water for reuse (e.g. recharge aquifer, drinking water irrigation)
   - Minimize water demand for revegetation (e.g. native species)
   - Employ best management practices for stormwater

4. Reduce, Reuse and Recycle Material and Waste
   - Minimize consumption of virgin materials
   - Minimize waste generation
   - Use recycled products and local materials
   - Beneficially reuse waste materials (e.g., concrete made with coal combustion products replacing a portion of the Portland cement)
   - Segregate and reuse or recycle materials, products, and infrastructure (e.g. soil, construction and demolition debris, buildings)

5. Protect Land and Ecosystems
   - Minimize areas requiring activity or use limitations (e.g., destroy or remove contaminant sources)
   - Minimize unnecessary soil and habitat disturbance or destruction
   - Use native species to support habitat
   - Minimize noise and lighting disturbance