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Standard Guide for Integrating Sustainable Objectives into Cleanup[1]

This standard is issued under the fixed designation E2876; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide presents a framework that allows and encourages the user to address sustainable aspects (environmental, economic and social) within cleanup projects. The user may implement this guide to integrate sustainable objectives into cleanup while working within applicable regulatory criteria.

1.2 The guide provides an overarching, consistent, transparent and scalable framework that helps the user identify and incorporate sustainable best management practices (BMPs) into site cleanup (which includes assessment and remediation), and enables the user to perform measurement of BMPs during the cleanup process. See Appendix X1 for example BMPs.

1.3 The guide is intended to encourage incremental steps to incorporate sustainable elements into cleanup projects. The user chooses whether to pursue BMP implementation alone (Section 6) or to also measure the benefits of the implemented BMPs (Sections 6 and 7). The user also chooses the phases of the cleanup to which they apply the guide.

1.4 The guide should be implemented within the existing site assessment and remediation process. The approach described in this guide should be used with other existing technical tools and policy to encourage the consideration of a more holistic approach with a broader range of cleanup options and activities than traditionally employed (NICOLE 2012(**1**))[2].

1.5 BMPs implemented under this guide should address all three aspects of sustainability: environmental, economic and social, while assuring that human health and safety as well as ecological risks are addressed. The goal of implementing BMPs is to take actions to address the sustainable objectives identified for the site.

1.6 3.1.17 defines sustainable objectives; 3.1.15.1 defines sustainable aspects; 5.3 provides detail about core elements; and Section 6 describes a process to identify, evaluate, select, and implement BMPs.

1.7 While the guide specifically applies to the cleanup phases of a project (which includes assessment and remediation phases), decisions made in the cleanup may influence reuse activities. The anticipated reuse of the site may influence cleanup activities.

1.8 This guide may not be used as a justification for elimination or reduction of cleanup actions that are required to protect human health and the environment.

1.9 The guide is composed of the following sections: Section 2 Referenced Documents, Section 3 Terminology, Section 4 Significance and Use, Section 5 Planning and Scoping; Section 6 Selection and Implementation of best management practices (BMPs); Section 7 Quantifying Site-Specific results from BMPs; and Section 8 Documentation. Fig. 1 Using the guide is provided to assist the user in navigating the guide.

1.9.1 The user may pursue either the BMP implementation section or both the BMP implementation and measurement sections.

1.9.2 The environmental portions of the guide align with the Greener Cleanup Principles released by USEPA in August 2009 (**2**).

1.9.3 When evaluating the sustainable BMPs the user should consider the short and long-term environmental, economic and social aspects, including the potential negative impacts, while ensuring protection of human health and the environment.

1.10 The guide is intended to provide an overarching framework for integrating sustainable objectives in cleanup projects. The user may choose to consider the ASTM Work Item WK 35161 for greener cleanups along with this guide to more fully address the environmental elements of a project.

1.11 When implementing this guide, the user must comply with all applicable federal, state, and local statutes and regulations requiring or relating to protection of human health and the environment. This includes, but is not limited to, laws and regulations relating to health and safety, of the surrounding community, or on-site workers. No action taken in connection with implementing this guide should generate unacceptable human health or ecological risks.

1.11.1 CERCLA and RCRA include worker safety as part of health and safety plans following OSHA regulations.

[1] This guide is under the jurisdiction of ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action and is the direct responsibility of Subcommittee E50.04 on Corrective Action.

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[2] The boldface numbers in parentheses refer to a list of references at the end of this standard.

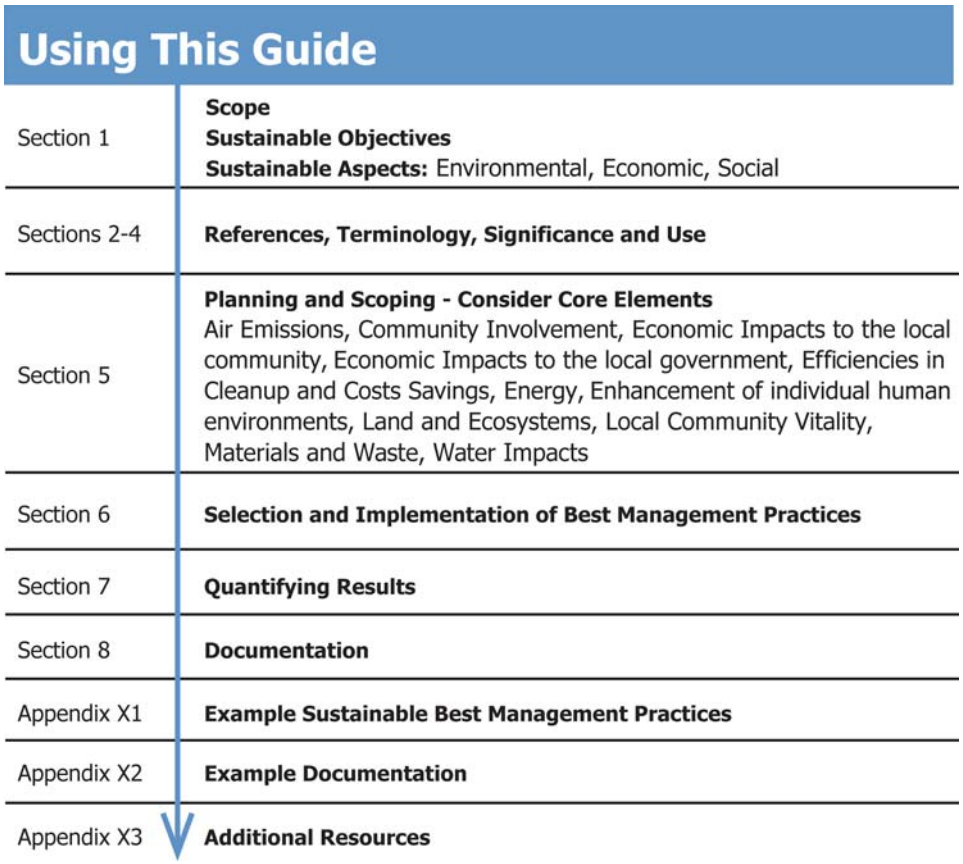

FIG. 1 Using this Guide

1.11.2 Most sites fall under specific regulatory programs that include provisions for health and safety plans following OSHA regulations. For more information see OSHA FAQ (**3**).

1.11.3 For all sites, the user must identify potential risks to the surrounding community as well as to site workers and manage those potential risks appropriately.

2. Referenced Documents

2.1 *ASTM Standards:*[3]

E1527 Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process

E1903 Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process

E1984 Guide for Brownfields Redevelopment (Withdrawn 2012)[4]

E2081 Guide for Risk-Based Corrective Action

E2091 Guide for Use of Activity and Use Limitations, Including Institutional and Engineering Controls

E2137 Guide for Estimating Monetary Costs and Liabilities for Environmental Matters

E2348 Guide for Framework for a Consensus-based Environmental Decision-making Process

WK 35161 New Practice for Greener Site Assessment and Cleanup (GSAC)

3. Terminology

3.1 *Definitions:*

3.1.1 *Best Management Practice (BMP)*—for the purposes of this guide, an activity that, under most situations, improves one or more sustainable aspects (environmental, social, economic) of a cleanup at a specific site.

3.1.1.1 *Discussion*—For example, a BMP for the environmental aspect would reduce the environmental footprint of a cleanup activity.

3.1.2 *CERCLA*—the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601 *et seq*., as amended, the primary federal statute that governs the imposition of liability for environmental cleanups. CERCLA is commonly referred to as Superfund.

3.1.3 *cleanup*—the range of activities that may occur to address releases of hazardous substances or petroleum products at a site.

3.1.3.1 *Discussion*—In the environmental industry this term is also referred to as assessment and remediation.

3.1.4 *community engagement charrette*—a meeting or series of meetings where the user identifies the stakeholders and invites them into the discussion of actions for the site.

3.1.4.1 *Discussion*—The community engagement charrette is one option for stakeholder collaboration. The interactions

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[4] The last approved version of this historical standard is referenced on www.astm.org.

between and among the user and the stakeholders (including the regulatory agency) have the intent of sharing information and options where collaboration and consensus are goals of the meetings. The user and stakeholders discuss the important aspects, issues, and preferences for the site assessment or remediation. The community engagement charrette can be a series of meetings held as the user continues to implement subsequent steps of a cleanup.

3.1.5 *economic multiplier effect*—the increased value of currency/money that is inserted into an area, city, or region (in the form of wages, purchased goods, services, and manufactures) due to the fact the currency/money circulates close to where it is first spent.

3.1.5.1 *Discussion*—For example, *(a)* $10 from a city worker's wages, buys *(b)* lunch from a corner restaurant, that pays *(c)* a cook's wages, that buy *(d)* shares in a community solar garden.

3.1.6 *hazardous substance* —a substance defined as a hazardous substance pursuant to CERCLA, 42 U.S.C. § 9601(14), as interpreted by EPA regulations and the courts.

3.1.7 *petroleum products*—those substances included within the meaning of the petroleum exclusion to CERCLA, 42 USC § 9601(14), as interpreted by the courts and EPA: "petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs *(A)* through *(F)* of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas)."

3.1.8 *project team*—the group of individuals and experts brought together to implement the activities identified by this guide for a specific site. Typically, the project team includes the user (for example, environmental consultant, specialists), the state or federal regulator, site owner representative and additional experts as needed. For some sites the project team may include community stakeholders.

3.1.8.1 *Discussion*—For the purposes of this guide, multidisciplinary project teams will often be the most effective. Additional members of the team may include specific experts (for example, solar power engineers, architectural or historic preservation specialists, economists, social scientists, life-cycle analysts, risk assessors, decision-support specialists) and facilitators.

3.1.9 *RCRA*—the Resource Conservation and Recovery Act, 42 U.S.C. § 6901 *et seq*., as amended, sometimes also known as the Solid Waste Disposal Act, the primary federal statute that, *inter alia*, establishes a framework for regulation of solid and hazardous waste and for promoting resource recovery through a federal-state partnership.

3.1.10 *reasonably anticipated future use*—future use of a site that can be predicted with a reasonably high degree of certainty given historical use, current use, local governmental planning and zoning.

3.1.10.1 *Discussion*—Other factors that may be considered in determining reasonably anticipated future use include accessibility of the site to existing infrastructure, recent development patterns, cultural factors, environmental justice, regional trends, and community acceptance.

3.1.11 *site*—the area(s) defined by the likely physical distribution of the chemical(s) of concern from a source area. A site could be an entire property or facility, a defined area or portion of a facility or property or multiple facilities or properties. One facility may contain multiple sites. Multiple sites at one facility may be addressed individually or as a group.

3.1.12 *small, non-complex site*—a site that meets the attributes in the guide for a project that is not large or potentially complex, as identified by the user.

3.1.12.1 *Discussion*—In the case of a small project of limited complexity and scope, the user may consider the following site attributes to streamline the implementation of the evaluation. If the site meets the following attributes, the site may be considered small and non-complex and use the adaptations identified in the guide, including reduced documentation. The attributes are:

3.1.12.1 *limited release complexity*—small number or well understood chemicals of concern (COCs), limited light non-aqueous phase liquids (LNAPL) and no dense non-aqueous phase liquids (DNAPL).

3.1.12.2 *small scale site (such as a service station) and well defined soil and/or groundwater impacts*—generally limited to a relatively small area.

3.1.12.3 *lower risk land use*—open space, unoccupied commercial, or industrial land use surrounding the site; low population density surrounding the site, or areas with no current complete exposure pathways (see Guide E2081 for discussion of complete exposure pathways).

3.1.13 *stakeholders*—individuals, organizations, or other entities who directly or indirectly affect, or are affected by, site releases or cleanup activities, or other interested parties. Stakeholders are site-specific and can include members of the local community (for example, residents, regular visitors, nearby businesses, economic development corporations, and downgradient groundwater users), regulatory agencies having jurisdiction over the cleanup, site owner or responsible parties, and future users of the property.

3.1.13.1 *Discussion*—The site owners may or may not be the parties responsible for the cleanup. In addition, there may be other federal, state, and local oversight entities for permitting, historic preservation, or storm water management who should be considered when determining the stakeholders for the project. In addition, there may be commercial and industrial stakeholders or interested third parties that may be affected by the cleanup activities or that can affect the cleanup. Under the guide, the user and the project team consider the ideas, potential issues, and concerns of the different stakeholders in the decision making process.

3.1.14 *surrounding area*—land area adjacent to and contiguous with a site extending to a boundary consistent with the area identified in the planning and scoping and used in selecting BMPs.

3.1.15 *sustainability*—as defined by a US Federal Executive Order under NEPA, sustainability means "to create and maintain conditions, under which humans and nature can exist in

productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations" (NEPA[1969] (**4**); E.O.13514 [2009] (**5**)).

3.1.15.1 *sustainable aspects*—as used in this guide, this is a collective term referring to the three key elements of sustainability: environmental, economic and social.

3.1.15.2 *sustainable core elements*—as used in this guide, these are the areas of focus within the sustainable aspects that provide direction and help define actions to be taken at a site. The sustainable core elements are listed in 5.3.

3.1.16 *sustainable development*—as defined by the Bruntland Commission (1985) (**6**), sustainable development is a pattern of development, "that meets the needs of the present without compromising the ability of future generations to meet their own needs." Also, as defined by Bromley (1999) (**7**), sustainable development is, "a present-day institutional arrangement of human actions that is guided by a vision of desired future alternative arrangements." This definition means that current and future site use and BMPs should consider intergenerational impacts and outcomes for the surrounding area.

3.1.17 *sustainable objectives*—the overarching ideas and themes used to guide the implementation of sustainability for a project. These ideas and themes generally arise from outside of the specific project (for example, municipal planning goals, corporate sustainable objectives) and are not developed exclusively for the specific project. They will apply to one or more of the sustainable aspects.

3.1.18 *TSCA*—the Toxic Substances Control Act, 15 U.S.C. § 2601 *et seq*., the primary federal statute that, *inter alia*, provides EPA with the regulatory authority to require reporting, record-keeping, and testing requirements for chemical substances and mixtures, and to establish restrictions for the manufacture, use, processing, storage, distribution in commerce, and/or disposal of certain chemicals and mixtures.

3.1.19 *user*—the party seeking to use this standard to integrate sustainable objectives into cleanup. See also 3.1.8, Project Team.

4. Significance and Use

4.1 *Flexibility*—Users may desire to incorporate sustainable aspects within the scalable framework throughout any or all phases of the cleanup, or any size of site.

4.1.1 For simplicity the term cleanup is used in the guide when referring to any of the cleanup phases, for example site assessment, remedy selection, remedy design and implementation, remedy optimization, operation, maintenance and monitoring, and closure.

4.1.2 Implementation of the guide is site-specific. The user may choose to customize the implementation of the guide for particular types of sites, for example, UST sites, dry cleaner sites, or particular phases of cleanup. Customization may be particularly relevant for groups of small, non-complex sites.

4.2 *Considerations*—The information provided in this guide provides a framework to evaluate sustainable aspects in the context of site cleanup. The guide helps users identify factors and activities they may want to consider in cleanup projects, while protecting human health and the environment.

4.3 *Sustainable Performance Criterion*—Based on the sustainable objectives identified for the site, users should implement one or more best management practices that substantially benefit each of the sustainable aspects (environmental, social and economic), see Section 6 for details. The user should demonstrate these benefits through publicly available documentation. Substantial benefits must be over and above those achieved by existing regulatory requirements, unless a regulatory agency adopts this guide for cleanup sites. In that case the regulatory agency will determine what constitutes substantial benefits under its own regulations.

4.4 *Transparency Goal*—The user should document the activities and evaluations performed while using this guide. The documentation is needed to demonstrate the sustainable benefits through public disclosure and transparency. See Section 8 for more information.

4.5 *Stakeholder Involvement*—The user should engage stakeholders as early as possible in the cleanup process. The planning and scoping phase of the project should identify the perspectives and values of the stakeholders and use that information to inform decision-making (see Guide E2348). Users should consider the input of different stakeholders, including the community, and implement BMPs favored by community members wherever possible. Consideration may include review of and integration into the community's approved Master Plan.

4.6 *Elimination of Uncertainty*—Professional judgment, interpretation, and some uncertainty are inherent in the process, even when exercised in accordance with objective scientific principles. In addition, new concepts and methods for integrating sustainable objectives into cleanup results will develop in the future.

4.7 Not every property will warrant the same level of evaluation of alternatives or approaches for integrating sustainable objectives in cleanup. The appropriate level of assessment and evaluation should be guided by the complexity of the cleanup project, the extent of impacts, the relative costs and benefits of various cleanup options and sustainable improvements, the potential limitation of resources for the cleanup, the future use of the site, other considerations associated with the site and affected community, and the regulatory requirements.

4.8 Worker health and safety issues are one of many considerations in the site cleanup decision-making process. If two approaches are equally protective of human health and the environment and fully meet regulatory requirements, then the one that is expected to provide greater worker safety should generally be preferred. Worker health and safety should not be used as a rationale for avoiding cleanup at sites.

4.9 The guide is divided into various sections for ease of use. See Fig. 1.

4.9.1 Section 5 includes information for the user about planning and scoping of the cleanup project to integrate sustainable objectives.

4.9.2 Section 6 of the guide includes steps to identify, evaluate, select and implement BMPs for a particular site.

4.9.3 Section 7 presents the evaluation and measurement of improvements for selected BMPs.

4.9.4 Section 8 presents information about documenting the activities conducted while implementing the guide.

4.9.5 Appendices include example BMPs (Appendix X1), example documentation forms (Appendix X2), and Additional Resources (Appendix X3). The example BMP list in Appendix X1 is not intended to be comprehensive, but rather to serve as a starting point for the user. This list may be added to or modified in the future as more experience is gained. The user is encouraged to consult other resources for additional BMPs that may be appropriate for a site. See also 6.2.1.

4.10 The spirit and intent of the guide promotes improvements in cleanup through integration of sustainable objectives.

4.10.1 A cleanup program, developed in conjunction with implementing BMPs following this guide, should fulfill regulatory cleanup requirements and timelines. The user should consider only cleanup approaches that will not result in unreasonable delay of cleanup.

4.10.2 The cleanup program should be consistent with reasonably anticipated future use of the site.

4.11 The user should consider the over-all affect of site cleanup in a holistic manner, including the adverse impacts of the cleanup and the consequences for the community. In order to accomplish this, during cleanup planning, the user should consider the sustainable core elements to provide direction and help define actions.

4.12 *Cost Considerations*—As with all projects, costs are an important factor. It is the prerogative of the user to determine how to evaluate and accommodate the financial implications of using the guide (see Guide E2137). The economic well-being of persons neighboring a cleanup and others within the community should be considered in the evaluation. The user should document the cost considerations. See Section 8 for information about documentation.

4.12.1 The user is encouraged to consider long-term benefits and financial savings in addition to short- and long-term costs associated with cleanups performed using this guide.

4.12.2 The user should consider advancing the benefits of persons not yet born as an alternative to those who enjoy current day, status quo benefits. Conventional economic efficiency assessment favors the latter persons. (Bromley, 1999) **(7)**.

4.12.3 The user, when applicable, should evaluate short-term and long-term costs and implement appropriate financing strategies. An activity under this guide may have higher up-front capital costs (for example installation of solar panels or energy efficient insulation) but the overall long-term net costs associated with reduced energy use may result in a significantly less net cost compared to an alternative which relies on higher annual energy use.

4.12.4 This guide is intended to use environmental and community resources efficiently and to increase the short- and long-term benefits of a cleanup to its environment and community. This guide is not intended to justify the avoidance of regulatory requirements or any applicable cleanup standards.

4.13 *Regulatory Context*—Regulatory contexts where this guide is applicable include voluntary cleanups, brownfields cleanups performed in compliance with state voluntary cleanup programs, or brownfield initiatives, state-led enforcement cleanups, for example, most underground storage tank corrective actions by states paid through the American Recovery and Reinvestment Act of 2009, CERCLA removal and remedial actions, and other corrective actions required under RCRA. Users should, however, determine the regulatory context for each site and comply with all applicable laws, regulations and guidance (for example, environmental laws under CERCLA, RCRA, TSCA), including health and safety requirements under the OSHA and parallel state statutes and regulations.

4.13.1 Current state and federal cleanup processes already incorporate some greener cleanup principles or sustainable objectives (see NAS 2011) **(8)**. This guide expands the evaluation and consideration of these aspects for interested users.

4.13.2 This guide provides ideas and options within a broad range of actions that integrate sustainable objectives throughout all phases of the cleanup. The guide is not, however, a stand-alone document and does not provide all the information needed to complete the cleanup process. In addition, when implementing this guide, the user must comply with all applicable state and local professional licensing requirements.

4.13.3 The use of this guide does not ensure compliance with any regulatory requirements. Additionally, users are cautioned that environmental regulators may not review or evaluate any particular aspect or results from using this guide as part of the cleanup approval process and the regulatory program.

4.14 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

5. Planning and Scoping

5.1 *Introduction*—After a user decides to use this guide for a cleanup project, they should begin planning and scoping activities.

5.1.1 In the planning and scoping activities, the user identifies the project team and stakeholders, collects information and considers the many aspects of the cleanup project.

5.1.1.1 The user identifies the sustainable objectives (see 3.1.17) for each sustainable aspect (environmental, economic, social)

5.1.1.2 The user considers the applicable core elements in each sustainable aspect (see 3.1.15.1 and 5.3).

5.1.1.3 The user determines the cleanup activities and time horizon that may be involved in the application of the guide.

5.1.2 The user implements the activities in planning and scoping, working with the project team and stakeholders as applicable for the site.

5.1.3 Based on the information collected in planning and scoping, the user conducts the BMP selection and implementation (see Section 6 and Appendix X1).

5.1.4 Fig. 2 illustrates the connection between the sustainable aspects, core elements and BMPs.

5.2 *Information Gathering:*

5.2.1 The user ensures the cleanup is protective of human health and the environment and complies with all regulatory requirements.

5.2.2 The user identifies the current impact of the release, including COCs and impacted environmental media and the cleanup activities that are planned. This is typically achieved by analyzing sources, pathways and receptors (see Practices E1527, E1903 and Guide E2081).

5.2.3 The user identifies the relevant sustainable objectives for the specific project and site. Some users (or their clients) have corporate, municipal, regional, state or federal policies about sustainable objectives. To the extent that these exist and are applicable for the cleanup project and site, they should be identified and considered in planning and scoping. The sustainable objectives can be translated into actions (which are BMPs) through the core elements.

5.2.4 The user identifies the anticipated future use of the site, which may be continued operation of the current facility, a re-development of a property that is not currently in use, or another scenario. The use of the property before, during and after the cleanup will have important implications for the applicable core elements and potential BMPs to be implemented. For some sites, the future use is not known.

5.2.5 The user identifies what level of stakeholder collaboration is appropriate. See 5.4 for more information. The user considers the feedback and outcomes of the collaboration. Stakeholder collaboration may include a community engagement charrette (see Section 6 for more information).

5.2.6 The user considers the core elements that are applicable to the site based on the cleanup activities planned and the sustainable objectives to be integrated.

5.2.6.1 The complexity of the site may have an influence on the core elements and potential BMPs that could be practical or reasonable for a site.

5.2.6.2 Where there is interest from the community, the user and project team should consider community feedback when identifying the core elements.

5.2.6.3 The core elements are a useful tool to identify the specific areas where improvements in the cleanup project can be made that are applicable to the sustainable aspects.

5.2.6.4 The user identifies the core elements likely to be applicable to the project, so that as a group the core elements address all of the sustainable aspects. When the user considers the BMPs, the applicable core elements may be revised.

5.2.7 The user identifies the surrounding area within which the application of the guide would be used. For any project, the surrounding area is determined based on the extent of the release and the planned cleanup activities. When the user considers the BMPs, the definition of the surrounding area may be refined based on the specific BMPs to be implemented.

5.2.8 The user identifies the time horizon applicable to the project. Addressing some core elements and implementing some BMPs will have time factors. Some activities may be implemented throughout the life of the cleanup project; some may be specific to a particular phase of the work.

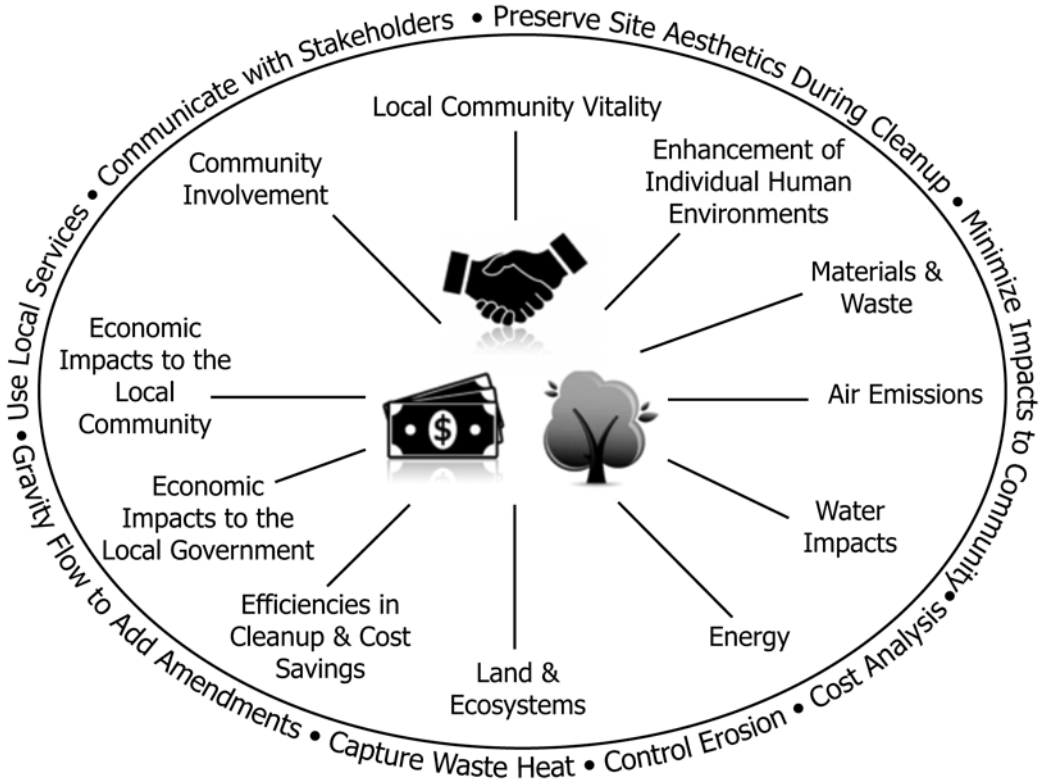

FIG. 2 Relationship Between the Sustainable Aspects (Center), Core Elements (Spokes) and BMPs (Outer Rim of Wheel)); see Appendix X1 for a more complete list of BMPs.

5.2.9 The user identifies the data that may be needed (see 5.5 for information about data needs) for using the guide.

5.2.10 The user should document the activities conducted under 5.2.1 through 5.2.9 and the results of the planning and scoping. See Section 8 for information about documentation.

5.3 *Sustainable Core Elements*—The following core elements are used to identify the activities within the cleanup project that could be improved by using the guide. The list is alphabetical and not hierarchical. This list includes the EPA's current five core elements for the environmental aspect (EPA 2009 (**2**)). EPA's core elements are total energy use and renewable energy use, air and atmospheric pollutants and greenhouse gas emissions, water use and impacts to water resources, materials management and waste reduction, and land management and ecosystem services. Additional core elements are included in this section to address all of the sustainable aspects. Each core element may have a primary connection to one sustainable aspect (for example, protection of water resources may be considered primarily an environmental aspect). The user is encouraged to consider the connections of the core elements across the sustainable aspects. For example, minimization of total energy use may apply as an environmental aspect and also an economic aspect.

5.3.1 *Air Emissions*—The user should attempt to reduce total air emissions of the cleanup, including emissions of air pollutants and greenhouse gases. Possible methods for reducing total air emissions may include minimizing the generation and transport of airborne chemical(s) of concern and dust, efficient use of emitting equipment (for example, vehicles), use of advanced emission controls, use of cleaner fuels or hybrid technologies, and use of non-mechanical treatment systems, such as in situ remediation. While this element addresses primarily environmental aspects, it may also have important social and economic benefits.

5.3.2 *Community Involvement*—Stakeholder participation in the decision-making process is fundamental to integrating sustainable objectives into cleanup. While this element is primarily social, it could have important economic and environmental benefits.

5.3.2.1 As a practical matter, the involvement of the community in the cleanup is a scalable activity depending on the complexity and size of the site, its cleanup activities and the interests of the community.

5.3.2.2 For small, non-complex sites, the community involvement activities could include public notices, site signage, web site information, community meetings, radio or television announcements, or distribution of fact sheets about the selection and implementation of sustainable BMPs.

5.3.2.3 At sites with complex activities, or with high level of interest on the part of the community, the level of involvement should be increased. In these circumstances, the user should identify and recruit representatives of key stakeholder groups (for example, through activities such as identifying local community groups, civic associations, chambers of commerce, homeowners associations, parks associations, clubs and contacting group leaders through personal invitations, door-to-door, letters, or phone calls). The user should encourage the active participation of the representatives in deliberative and decision-making processes, and aim for outcomes reflective of the interests of their constituent group and of the community as a whole. A wide range of activities may be used for community engagement.

5.3.2.4 At some sites community members may not be interested in participating in the cleanup. The user should proceed with the BMP selection and implementation by considering the best options that provide benefits to the sustainable aspects (environmental, economic and social). See 8.1.4, efforts taken for stakeholder collaboration and 8.2.4, making the documentation publicly available for information.

5.3.3 *Economic Impacts to the Local Community (for example, neighborhood)*—The user should identify and maximize the positive public economic impacts in the local community. One measurement of economic impacts is the economic multiplier effect. The user considers the local economy when selecting and managing contractor and supply companies. For example, consider supporting local service businesses, creating local jobs, purchasing supplies locally, and consider the fraction of the local labor pool that will be used to fill cleanup associated jobs. This element could also benefit social aspects.

5.3.4 *Economic Impacts to the Local Government (for example, city or county)*—The user should identify and maximize the positive public economic impacts and opportunities to the local government. For example, consider jobs, economic development areas, and increased grant and loan opportunities. While primarily economic, this element could benefit social aspects as well.

5.3.5 *Efficiencies in Cleanup and Cost Savings*—The user should consider the current anticipated cleanup actions for the site as a point of comparison for evaluating efficiencies and cost savings (see also 4.12). There are numerous ways to integrate sustainable objectives into the cleanup such as: reuse of resources, recycling, considering different remedial strategies for the source areas versus the diffuse contamination, retrofitting equipment, efficient operation and pump cycling, streamlining project management, and electronic reporting. Often, costs of cleanup alternatives and activities are compared as part of standard practice. The user could include this comparison of the cleanup activities across the alternative approaches, by looking at different BMPs. The comparison and follow-up documentation of the efficiencies and cost savings would provide a document that supports the use of sustainable methodologies, and the value of sustainable business practices. While this element is primarily economic, it could benefit social and environmental aspects as well.

5.3.6 *Energy*—The user should attempt to minimize conventional energy use by either reducing consumption and/or using renewable sources of energy. Possible methods may include evaluation and reduction of energy use, no idling policies on site, use of energy efficient equipment, cycling or pulsing operation, use of onsite renewable resources (for example, wind, solar, etc.), purchase of renewable energy credits, and purchase of commercial energy from renewable resources. While this element addresses primarily environmental aspects, it may also have important social and economic benefits.

5.3.7 *Enhancement of Individual Human Environments*—Cleanup decisions can impact individuals working or living in proximity to the site, which may include cleanup personnel, and residents. The user should: choose work schedules and working hours that are compatible with community needs, make minimally invasive parking provisions for cleanup personnel, and abate noise, dust, and odor nuisances. This element may be considered under social, economic or environmental benefits, depending upon the application to the individual project.

5.3.8 *Land and Ecosystems*—The user should attempt to reduce impacts to the land and ecosystem. Possible methods may include minimizing the area requiring activity or use limitations or the removal or destruction of chemical(s) of concern. The user should limit the disturbance of vegetation, soils and habitat in the cleanup area, restore ecosystems by planting native vegetation, restore or create wetlands, preserve parkland, restore forested areas, and minimizing noise and light disturbance. While this element addresses primarily environmental aspects, it may also have important social and economic benefits.

5.3.9 *Local Community Vitality*—For the area or neighborhood immediately surrounding the site, there are numerous decisions, from the initial stage of site investigation through the final stages of post-cleanup demobilization and reuse that may impact the local community, from a human health, social and economic standpoint, often with a multiplier effect. The user should promote good relations with the community throughout the project. Examples include improved transportation and open space; preservation of other valued resources (for example, culturally or historically significant features); the choice of route for demolition and construction traffic and its impact upon noise, odors, dust, and congestion; (and the extent to which selection of the site reuse/redevelopment option, if applicable, addresses unmet community needs). Non-profit organizations in the area and public entities, such as state and local governments, are valuable resources and partners for information and input needs for the community. This element may be considered under both social and economic benefits.

5.3.10 *Materials and Waste*—The user should attempt to minimize the use of virgin materials and generation of waste throughout the cleanup. Possible methods may include using recycled and locally generated materials, reusing waste materials (for example, concrete made with coal combustion products), diverting construction and demolition debris from disposal by recycling recovered resources, and using rapidly renewable materials or certified wood products. While this element addresses primarily environmental aspects, it may also have important social and economic benefits.

5.3.11 *Water Impacts*—The user should attempt to minimize the use of water and impacts to water resources throughout the cleanup. Possible methods may include evaluation and reduction of water use in cleanup processes, use of water efficient products, water capture and reclamation for reuse, xeriscaping for revegetation, and employing BMPs for storm water, erosion, and sedimentation control. While this element addresses primarily environmental aspects, it may also have important social and economic benefits.

5.4 *Identification and Inclusion of Stakeholders:*

5.4.1 The cleanup activities may impact and involve various stakeholders. A key objective of this guide is encouraging collaborative participation with stakeholders and ensuring that the needs and preferences of stakeholders are considered. The user, working with the project team, should consider and accommodate stakeholder preferences to the extent possible, given regulatory and financial constraints, during the various phases of the cleanup. These preferences will vary greatly from site to site and the complexity of the cleanup. A small non-complex site with an underground storage tank and soil removal may not generate a large degree of stakeholder participation compared to a large former industrial facility that will be redeveloped with commercial and residential uses.

5.4.2 The user should consult all affected stakeholders and also potentially interested parties for the cleanup activities that are being designed and implemented.

5.4.3 The user should consider and address unique stakeholder groups for different phases of the cleanup process, as applicable for the site.

5.4.4 Users may choose to consult with third party organizations, for example, environmental organizations, professional organizations, non-governmental organizations, trade associations, and academic institutions, regarding potential ideas, issues, concerns, and impacts related to integrating sustainable objectives into cleanup activities and their implementation.

5.4.5 The user should identify potential issues that may need pro-active measures to reduce disturbance to stakeholders. These include off-site emissions, noise, and zoning changes, the associated level of effort required, and the possible need, resources, and time to conduct the cleanup.

5.4.6 The user should encourage stakeholders to reach a common understanding of the sustainable objectives and the core elements to be addressed during the cleanup project. For example, these objectives could be to include more recycling and waste minimization at the site or could be more significant, such as revitalization of the site for a higher value use (for example, brownfields redevelopment). Other factors that could be considered and discussed with stakeholders include the cost of various alternatives, and the positive, or negative, impacts of a cleanup on tax revenues, employment, owners, and businesses.

5.5 *Identification of Data Needs:*

5.5.1 The consideration of the core elements and identification of BMPs may require information that is beyond what is typically required for a cleanup project. In the planning and scoping activities, the user should identify these additional data needs and plan for the collection of these data.

5.5.2 Some information that should be collected is more typical of traditional cleanup projects. The user is encouraged to collect and document the data and information used in applying this guide to support the transparency goal (see 4.4) for the application of the guide. For example:

5.5.2.1 The regulatory or voluntary program that will govern the cleanup, if applicable.

5.5.2.2 The reasonably anticipated future use of the site (for example residential, commercial, industrial, or recreational

land use). Effective management or stewardship of short and long-term activities is an essential component of any cleanup project. Future obligations may include engineering controls, institutional controls, and activity and use limitations (Guide E2091), and can be accompanied by an environmental covenant, deed notice, or deed restriction.

5.5.2.3 *Project Schedule and Budget*—In some situations, it may not be feasible, given budgetary or schedule limitations, to implement an extensive evaluation of the different possible BMPs. Use of this guide should not unduly delay a cleanup, or result in the imposition of unwarranted or unjustifiable costs.

5.5.3 The user should consider available tools and data sources for information rigorous enough to meet the sustainable objectives (see NICOLE 2012) (**1**).

5.5.4 The user should consider and assemble an appropriate project team for the site.

5.5.5 The user and the project team should discuss, select and coordinate likely sources and methods for obtaining site data and other information for the project. This includes the tools required to undertake the project and the necessary engineering, technical, legal, and other professional support.

5.5.6 The user should consider the current anticipated cleanup actions of the site as a point of comparison for evaluating potentially applicable BMPs under this guide.

5.5.7 The user should apply existing guidance, as applicable, such as that provided by U.S EPA (EPA 2006) (**9**), to develop data quality objectives for determining the type, quantity, and quality of data for the application of this guide to the cleanup. The collected information should be relevant to the particular aspect evaluated and should satisfy the data quality objectives and goals for the decision.

6. Selection and Implementation of BMPs

6.1 The user considers the information collected in the planning and scoping performed under Section 5 to determine the activities they will conduct when selecting and implementing BMPs.

6.2 *Considerations*—Fig. 3 depicts the BMP selection and implementation process.

6.2.1 The goal of implementing BMPs is to take actions to address the sustainable objectives identified for the site. Appendix X1 includes an example list of BMPs. The user may find the following references helpful when identifying and considering BMPs: Guide E1984-03; ITRC 2011a (**10**) and ITRC 2011b(**11**); Interorganizational Committee on Principles and Guidelines for Social Impact Assessment, 2003 (**12**); ISI, 2012; UNEP 2008 (**13**); CL:AIRE 2010 (**14**); CL:AIRE 2011

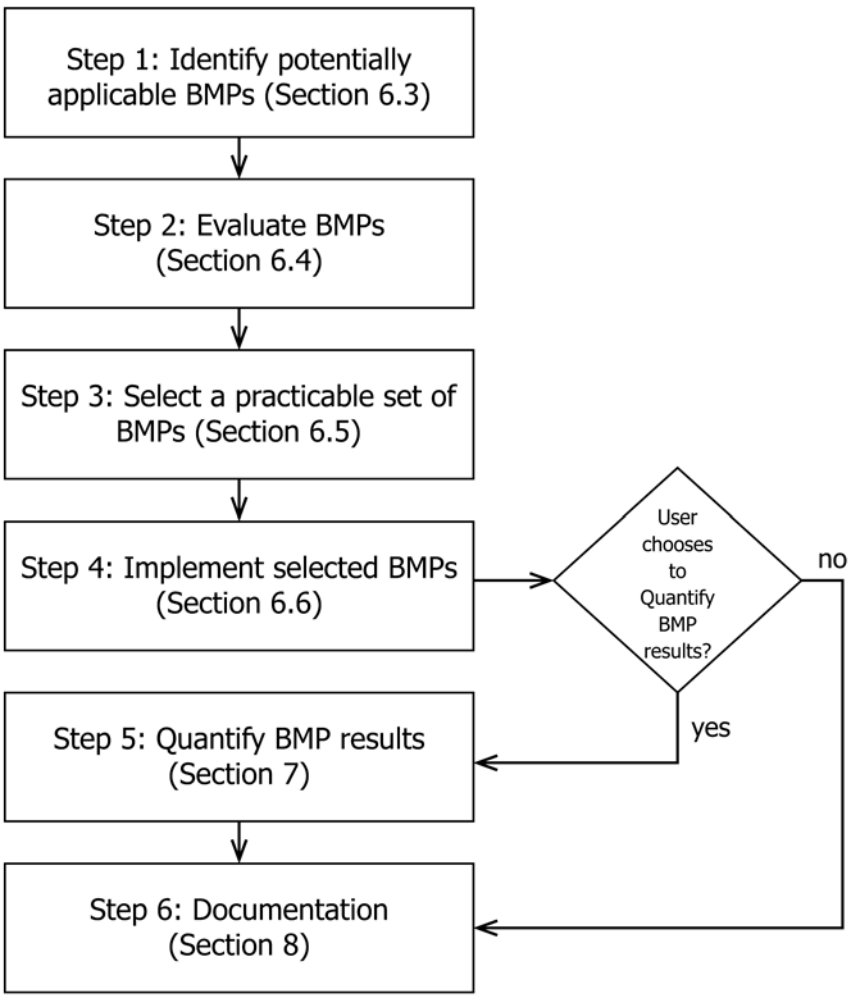

FIG. 3 BMP Selection and Implementation Process

(15); SURF-US 2009 (16); Butler et al, 2011 (17); Havranek et al, 2010 (18); Holland et al, 2011 (19); Social Audit Network, 2009 (20).

6.2.2 The user selects and implements one or more BMPs that, as a group, address the sustainable objectives and substantially benefit all of the sustainable aspects (environmental, economic and social), without causing a significant negative impact to any of the individual sustainable aspects.

6.2.3 The user considers the BMPs that, individually, may address one or more core elements for the site.

6.2.4 Depending on the complexity of the site and the number of BMPs to consider, the user may choose from a range of evaluation methods (for example, comparison of advantages and disadvantages, ranking or rating systems, multi-criteria decision models) as the basis for selecting the BMPs (see USEPA 2011 (21), ITRC 2011b(11), Belton and Stewart, 2002 (22), Clemen 1996) (23).

6.2.5 The user is encouraged to consider and propose BMPs not included in Appendix X1 (see references in 6.2.1) that address the core elements for the site.

6.2.6 The BMPs may be applied independently to one phase of the cleanup, or carried through multiple phases of the cleanup, as selected by the user.

6.2.7 The user must document all of the BMPs (see 4.4) and the substantial benefits across the sustainability aspects (see 4.3).

6.2.8 The user engages stakeholders, in particular the community, prior to and during the selection of the BMPs. This will ensure that the site-specific interest and needs of stakeholders are incorporated into the decision-making processes.

6.3 *Identify Potentially Applicable BMPs.:*

6.3.1 The user confirms the phase or phases of the cleanup project for the current application of the guide.

6.3.2 The user identifies the unique technical tasks or activities needed to complete the phase or phases (for example, sampling, laboratory analyses, or equipment installation).

6.3.3 The user identifies the technical alternative(s) or approach(es) that best meet the criteria identified through the stakeholder collaboration and the regulatory and project requirements for each unique task (see Guide E2081).

6.3.4 The user confirms the core elements to be addressed for the phase or phases. BMPs should address each of the sustainable aspects (environmental, economic and social). Many BMPs actually provide benefits across multiple core elements and aspects (social, economic, and environmental). For each implemented BMP, the user should document which core elements and aspects (environmental, economic and social) are addressed and why.

6.3.4.1 Currently, state and federal cleanup regulatory authorities may not have the authority to review certain BMPs, for example those addressing social and economic aspects. However, it is recommended that all sustainability aspects are nevertheless addressed to enable a holistic application of sustainability to the project.

6.3.5 The user reviews the example list of BMPs in Appendix X1, and other resources for BMPs (for example, Holland et al. 2011 (19), Butler et al. 2011 (17)), the technical alternatives or approaches, and the core elements to identify those BMPs that could be applied.

6.3.5.1 The user may choose BMPs to cover each of the core elements (for example, a simple list of one BMP with substantial benefits for each core element for each sustainable aspect).

6.3.5.2 The user may choose BMPs that provide substantial benefits across multiple core elements and therefore cover more than one core element and sustainable aspect.

6.3.5.3 Users should select BMPs that provide benefits over and above those achieved by regulatory requirements (see 4.3 for more information).

6.3.5.4 The user is not limited in the number of potential BMPs identified. The user is encouraged to evaluate (see 6.4), select (see 6.5) and implement (see 6.6) as many BMPs as provide substantial benefits while minimizing negative impacts.

6.3.6 The user identifies the BMPs based on the planning and scoping activities and results, the scope and complexity of cleanup project, input from the project team, and comments and feedback from the community participation.

6.3.7 The list of BMPs may include BMPs that will be applicable throughout the cleanup project.

6.3.8 The user compiles the list of the potentially applicable BMPs.

6.4 *Evaluate BMPs:*

6.4.1 The user identifies a method to evaluate the BMPs identified in 6.3.

6.4.1.1 The evaluation method could be a ranking or rating system, a multi-criteria decision model (see USEPA 2011 (21), Belton and Stewart, 2002 (22), Clemen 1996 (23)), or another applicable method.

6.4.1.2 Detailed decision methods may not be valuable for small, non-complex sites.

6.4.2 Using the identified method, the user evaluates the BMPs. The user should consider:

6.4.2.1 *General Factors*—The implementability, potential linkages and synergies among the BMPs, advantages and disadvantages, potential negative impacts or tradeoffs among core elements, preferences of stakeholders, benefits to the community, and costs for the identified BMPs, see 4.12 for cost considerations, all may be important factors in evaluating the BMPs to be used.

6.4.2.2 *Time Horizon*—The time horizon for implementation and for the benefits to be realized for each BMP may be an important factor in evaluating the BMPs to be used.

6.4.2.3 *Surrounding Area*—The surrounding area identified for the application of BMPs may be an important factor in evaluating the BMPs to be used.

6.4.3 *Additional Considerations*—In some circumstances the large number of BMPs or implementation of BMPs, or both, may be complex. In these cases, it may be necessary to conduct a more detailed analysis of various BMP factors in order to understand potential benefits, limitations, and tradeoffs among the core elements. This analysis may be qualitative or quantitative and it identifies the key factors that guide decision making on any particular site, including, which factors have only marginal impacts on BMP selection.

6.4.4 The results of the conducted evaluations are used to identify the BMPs to implement.

6.4.5 The user documents the evaluation methods used and the results of the evaluations. See Section 8 for information about documentation.

6.5 *Select BMPs:*

6.5.1 The user selects the BMPs to implement based on the evaluation performed in 6.4. The user should identify the practicable set of BMPs for the site. The selected BMPs should substantially benefit each of the sustainable aspects without causing a significant negative impact to any of the sustainable aspects.

6.5.2 The user documents why specific BMPs were chosen and why specific BMPs were not chosen.

6.6 *Implement BMPs*—The user implements the selected BMPs.

6.6.1 If during implementation, a selected BMP is determined not to be effective, impracticable to implement, or cost prohibitive, then the user may elect not to implement that specific BMP. The user should document the rationale for not implementing a selected BMP. See Section 8 for information about documentation.

6.6.2 The user should return to the potentially applicable BMPs (see 6.3, 6.4 and 6.5) to determine if a new BMP can be identified. The user documents the information for the new BMP.

6.6.3 The user implements the BMPs during the cleanup project. The user should consider if there are specific monitoring activities that will measure the effectiveness of an implemented BMP. If specific monitoring activities are applicable, then the user should implement those activities and document them.

7. Quantifying Site-Specific Results from BMPs

7.1 The user may choose to quantify the impacts of the implemented BMPs for their individual site. Some BMPs may not include quantifiable attributes and therefore quantification may not be possible.

7.2 The user identifies the quantifiable BMPs and the attributes, benefits, and metrics for each BMP. The user should also identify measurable attributes to understand potential negative impacts (See Havranek et al., 2010 (**18**)).

7.2.1 There are many different attributes or benefits from the implementation of BMPs that could be monitored and measured. The specific measurement associated with a BMP is its metric.

7.2.2 Examples of metrics for different BMPs include percentage of local workers hired, dollars spent within local community, tons of waste reduced, amount of material recycled, volume of water saved, number of trees planted, reduction in fuel usage, reduction in greenhouse gas emissions, and percentage of renewable energy used.

7.3 The user identifies the monitoring and data collection needed for the metric for each BMP.

7.4 The user implements the monitoring and data collection for the metrics.

7.5 The user estimates the site-specific, increased benefits based on the results of the monitoring and data collection. The user should also provide any information collected about potential negative impacts.

7.5.1 Depending on the number, type and complexity of the implemented BMPs and the benefits identified, the user may choose a qualitative or quantitative analysis to understand the benefits and the potential variation in the estimation of the benefits.

7.5.2 The user should also use any data collected to provide information about potential negative impacts, or tradeoffs among the core elements, as part of the analysis.

7.6 The user prepares documentation of the estimation methods used, and the results of the increased benefits, negative impacts, or tradeoffs, (if any), from the implemented BMPs. See Section 8 for information about documentation.

8. Documentation

8.1 It is important to document the activities and evaluations performed while implementing this guide in order to demonstrate the sustainable benefits through public disclosure and transparency (see 4.4).

8.1.1 The documentation should be in a format, at a level of detail, and in plain language that is useful to the general public. In addition, in some communities it is appropriate to prepare the documentation in multiple languages.

8.1.2 The documentation should be commensurate to the work performed and the complexity of the cleanup at the site.

8.1.3 If the site meets the definition of a small non-complex site (see 3.1.12 and Appendix X2), the user should include in the documentation the applicable information for the site.

8.1.4 The documentation of the guide's implementation is made publicly available by the user. The user should consider the applicable options for publication that are relevant to the site. Some options include: inclusion with regulatory submittals, posting to a web page, using social media, or filing at a local library or community center.

8.2 The documentation should include the activities conducted and the outcomes.

8.2.1 *Information Gathering*—Each of the tasks in planning and scoping involves collecting information relevant for the application of the guide. The documentation for planning and scoping should include information for the key issues and provide the sustainable objectives, time horizon, and surrounding area for the application of the guide.

8.2.2 *Data Needed and Collected to Implement the Guide*—The documentation should include the data and information collected under 5.5.

8.2.3 *Core Elements Addressed*—The user should document why some core elements did not apply to the cleanup phase or project.

8.2.4 *Efforts Taken for Stakeholder Collaboration*—The documentation should include the specific activities undertaken, the notices and information presented, the different venues where information was made available, and the results of the activities and notices. If community engagement charrettes, public meetings, webinars, or social media (for example, blogs, interactive forums) are used or convened the

documentation should include the comments, questions and suggestions from these interactions and the preferences regarding cleanup tasks, core elements and BMPs. The user also documents how the comments, questions and suggestions were incorporated in the selection and implementation of BMPs and the cleanup project.

8.2.5 *Cost Considerations*—The user should provide the documentation of the methods used in the cost evaluations and the results.

8.2.6 *Identification of Potentially Applicable BMPs*—The documentation should be a table or list of the BMPs, or other applicable format, that also includes the identity of the sustainable aspect; the core element to which each BMP applies; the expected benefits; and any potential negative impacts.

8.2.7 *Evaluation Process for Comparison of BMPs:*

8.2.7.1 The evaluation method used for comparing the BMPs should be identified.

8.2.7.2 The documentation should be a table or list of the BMPs, or other applicable format, along with the advantages and disadvantages, the linkages among BMPs, and other relevant information.

8.2.8 *Selected BMPs*—The documentation should include the rationale for each of the selected BMPs and the anticipated timing for the implementation of each BMP.

8.2.9 *Implementation of BMPs*—The documentation should include information about the implemented BMPs, how they benefitted each sustainable aspect, and any information about selected BMPs that were not implemented. It should also include any new BMPs that were implemented and negative impacts associated with implementation of any BMPs.

8.2.10 *Monitoring Efforts*—The documentation should include information about monitoring conducted to determine the effectiveness of the BMPs.

8.2.11 *Quantification of Site-Specific Results*—The documentation should include information about quantification efforts for BMPs, if conducted, using Section 7.

8.3 Appendix X2 includes example report formats the user may choose to use in completing the documentation. One general form and one form for small, non-complex sites are included.

APPENDIXES

(Nonmandatory Information)

X1. EXAMPLE SUSTAINABLE BEST MANAGEMENT PRACTICES

X1.1 This table covers an example list of sustainable (environmental, social and economic) BMPs. The list is not intended to be comprehensive, but rather to serve as a starting point for the user. This list may be added to or modified in the future as more experience is gained. The user is encouraged to consult other resources for additional BMPs that may be appropriate for a site (see also 6.2.1). The user is encouraged to identify other sources of information and implement BMPs that are appropriate to the site-specific conditions. The list is presented alphabetically by core element, not hierarchially (see also 5.3, and EPA 2009 (**2**)). The core element with which the BMP is identified is listed in the first column. The core elements that may additionally be benefitted are listed in the second column. These may be modified and additional benefits may be identified based on site-specific conditions. The user should note also that there may be negative impacts to other core elements. These should be identified and understood before proceding with implementing BMPs.

TABLE X1.1 Sustainable Best Management Practices

Core Element[A]	Additional Core Elements Benefitted	Best Management Practices
Air Emissions	Energy Materials and Waste	Buy carbon offset credits (for example, for airline flights) when in-person meetings are required.
Air Emissions	Energy Efficiencies in Cleanup and Cost Savings Materials and Waste	Implement a telemetry system to reduce frequency of site visits
Air Emissions	Energy Efficiencies in Cleanup and Cost Savings	Implement an idle reduction plan to reduce the amount of vehicle idling at the cleanup site.
Air Emissions	Efficiencies in Cleanup and Cost Savings Materials and Waste	Install one-way check valves in well casing to promote barometric pumping (passive SVE) as a polishing step once the bulk of contamination has been removed and venting to atmosphere is acceptable
Air Emissions	Energy Efficiencies in Cleanup and Cost Savings	Minimize diesel emissions through the use of retrofitted engines, low sulfur diesel or alternative fuels, or filter/treatment devices.
Air Emissions	Energy Efficiencies in Cleanup and Cost Savings	Use biodiesel produced from waste or cellulose based products, preferring local sources when available to reduce transportation impacts
Air Emissions	Materials and Waste	Use teleconferences rather than in- person meetings when feasible.
Air Emissions	Energy Efficiencies in Cleanup and Cost Savings	Use variable frequency drive motors to automatically adjust energy use to meet system demand on blowers, vacuum pumps, etc. that accommodate changes in operating requirements as treatment progresses
Air Emissions	Energy	When nearing asymptotic conditions and/or when continuous pumping is not needed to contain the plume and/or reach clean-up objectives, operate pumping equipment in pulsed mode
Air Emissions	Energy Efficiencies in Cleanup and Cost Savings Materials and Waste	Replace conventional vehicles with electric, hybrid, or compressed natural gas vehicles
Air Emissions	Energy Efficiencies in Cleanup and Cost Savings Materials and Waste	Use rebuilt or replaced engines to maximize emission reductions.
Community Involvement	Local Community Vitality	Develop templates of communication strategies
Community Involvement		Use a neutral party convener or facilitator for community engagement activities.
Community Involvement	Local Community Vitality	Amend planned remedial actions where stakeholder comments or concerns have merit and where feasible. Communicate the updates to the community using forums that have been identified as the most effective for that area. Communication sources could include: local news spots or articles, social networking sites, mailing to community groups, etc.
Community Involvement	Local Community Vitality	Take steps to include stakeholder needs
Community Involvement	Local Community Vitality	Communicate public participation requirements set out in different regulatory programs to stakeholders.
Community Involvement	Local Community Vitality	Communicate site activities to stakeholders and the community in a non-technical fashion so that issues of public health risk are understood.
Community Involvement	Local Community Vitality	Conduct a public involvement charrette during remediation design early in the project where possible, at times and places that, to the extent feasible, facilitate attendance or involvement by the affected public. Notify the public of potential consultation and involvement activities early enough to ensure the public has adequate time to obtain and evaluate information; consult experts, and formulate and express their opinions, options, and suggestions prior to completing specific project steps (action). Involve the public during remedy implementation and remedy operation, using methods described in this Appendix X1.[B]
Community Involvement	Economic impacts to the local community (for example, neighborhood)	Conduct onsite citizen training sessions (for members of the local community) that directly relate to site assessment and cleanup efforts.
Community Involvement	Local Community Vitality	Consider clean-up technologies which are favorable to each of the different stakeholders identified when appropriate and/or possible
Community Involvement	Local Community Vitality	Develop a contact list by consulting with community organizations and add to the list those members of the public who request they be added. Update the list regularly and subdivide the list by category of interest or geographic area. Use the list to send announcements, reports and other communication with the public.
Community Involvement	Local Community Vitality	Empathize with stakeholders. Listen carefully to what stakeholders are saying
Community Involvement	Local Community Vitality	At the start of the project, establish clear lines of communication with stakeholders, particularly the local community.
Community Involvement	Local Community Vitality	Establish regular meetings and/or workshops to provide information to the public on the status of the project. The number of meetings will be based on stakeholder needs and will be site-specific.
Community Involvement	Local Community Vitality	Extend public participation activities beyond regulatory requirements, especially for sites with impacts extending beyond the site boundary. Set up a hotline and/or web site that community members can access to aid in public participation.
Community Involvement	Local Community Vitality	Follow through on one or more recommendations that was generated during the remediation design charrette.
Community Involvement	Local Community Vitality	Identify a community liaison for effective stakeholder communication.

TABLE X1.1 *Continued*

Core Element[A]	Additional Core Elements Benefitted	Best Management Practices
Community Involvement	Local Community Vitality	Identify and implement opportunities to enhance community dynamics
Community Involvement	Local Community Vitality	Identify organizations with common environmental, social and/or economic concerns. Determine how best to partner with these organizations or individuals to build a relationship with the local community.
Community Involvement	Local Community Vitality	Identify the various groups who constitute the stakeholders and the community.
Community Involvement	Local Community Vitality	Implement strategies to develop a more collaborative relationship with stakeholders beyond existing regulatory requirements to the extent possible, for example by engaging the stakeholders and increasing the transparency of operations at the site.
Community Involvement	Local Community Vitality	Monitor on a continuing basis, both the effectiveness of the efforts to improve public involvement, and the effectiveness of public involvement activities.
Community Involvement	Local Community Vitality	Obtain and review stakeholder feedback early in the project and implement to the extent possible.
Community Involvement	Economic impacts to the local community (for example, neighborhood)	Plan and budget for the public involvement. Budget documents should include resources for public involvement separate from and in addition to funds required to comply with statutes and executive orders that require public involvement.[C]
Community Involvement	Local Community Vitality	Provide feedback to stakeholders.
Community Involvement	Economic impacts to the local community (for example, neighborhood)	Provide financial assistance for public involvement, when needed, for example providing public transportation to public meetings for community members.
Community Involvement	Local Community Vitality	Provide the public with adequate and timely information concerning forthcoming actions or decisions. Fact sheets, news releases, summaries, and similar publications in print and on the Internet may be used to provide notice of availability of materials.
Community Involvement	Local Community Vitality	Resolve conflicts, for example, diverging opinions about site end uses or redevelopment, with stakeholders as early as possible.
Community Involvement	Local Community Vitality	Respond to stakeholder questions and concerns in a timely fashion to ensure that their needs are addressed as quickly as possible.
Community Involvement	Local Community Vitality	Take steps to resolve conflicts among stakeholders regarding site end uses or redevelopment as early as possible by acknowledging and recording each divergent opinion.
Economic impacts to the local community (for example, neighborhood)	Economic impacts to the local government (for example, city or county)	Acquire supplies such as cleanup products, safety supplies, work equipment, fuels/lubricants from the area of or adjacent to the cleanup site to the maximum extent practicable.
Economic impacts to the local community (for example, neighborhood)	Economic impacts to the local government (for example, city or county)	Encourage contractors to use local services while working on the site (for example motels, trailer parks, restaurants, grocery stores) from the area of or adjacent to the cleanup site to the maximum extent practicable.
Economic impacts to the local community (for example, neighborhood)	Community Involvement	Gather information on each potential contractor's and supplier's social responsibility for its employees. Review wages, benefits, personnel policies and discrimination complaints during the contractor and supplier selection process where feasible.
Economic impacts to the local community (for example, neighborhood)	Economic impacts to the local government (for example, city or county)	Identify a post-cleanup land-use development type which spurs the neighborhood-scale economy, without displacing legacy residents.
Economic impacts to the local community (for example, neighborhood)	Local Community Vitality	Make provisions to accommodate temporary access to local businesses, public facilities and residences to the extent possible.
Economic impacts to the local community (for example, neighborhood)	Community Involvement	Modify cleanup approaches to address concerns about disruptions and disturbances to local residents and businesses. Solicit opinions from local residents and implement suggested mitigation measures that are appropriate.
Economic impacts to the local community (for example, neighborhood)	Materials and Waste	Provide on-site collection and storage area for compostable materials for use on-site or by the local community
Economic impacts to the local community (for example, neighborhood)	Economic impacts to the local government (for example, city or county)	Use local staff (including subcontractors) when possible to minimize resource consumption
Economic impacts to the local government (for example, city or county)	Economic impacts to the local community (for example, neighborhood)	Employ local contractors, where possible. Hire labor including skilled and professional labor as well as manual labor from the area of or adjacent to the cleanup site to the maximum extent practicable. Labor includes subcontractors, part-time labor, security, environmental technicians, professional geologists, professional engineers, and health and safety professionals. The project could specify a minimum percentage of jobs that must be given to qualified local residents and businesses, or semi-qualified residents who can be qualified with minimal training.
Economic impacts to the local government (for example, city or county)	Economic impacts to the local community (for example, neighborhood)	Encourage the provision of training (for example, Hazwoper training per 29 CFR 1910.120) for the local workforce (for example, apprenticeships for young adults between the ages of 18 to 25) so as to expand opportunities for site employment activities.
Economic impacts to the local government (for example, city or county)	Economic impacts to the local community (for example, neighborhood)	Identify and implement innovative techniques to create economically and socially sustainable opportunities. Techniques may include 1) looking for funded programs from a local, State, or federal agencies to improve post-remediation land use (for example, parks, stormwater management, community gardens, or green market), 2) requesting temporary property tax waivers for neighboring property owners impacted by the remediation project so as to avoid adverse effects.

TABLE X1.1 *Continued*

Core Element[A]	Additional Core Elements Benefitted	Best Management Practices
Economic impacts to the local government (for example, city or county)	Materials and Waste	Incorporate project and site activities into local recycling program, requirements and regulations
Economic impacts to the local government (for example, city or county)	Economic impacts to the local community (for example, neighborhood)	Place or keep private property (at and/or near cleanup site) on local government tax rolls.
Economic impacts to the local government (for example, city or county)	Economic impacts to the local community (for example, neighborhood)	Purchase equipment and materials locally when available
Economic impacts to the local government (for example, city or county)	Energy Materials and Waste	Reuse, recycle or retrofit equipment where feasible. With public and environmental health and safety aspects being equal, reusing or recycling cleanup equipment, (or scheduling equipment across a group of similar small sites), reduces the cost of equipment, uses the equipment more efficiently and avoids the waste of throwing away equipment. There may also be opportunities to re-purpose equipment following cleanup for other needs in the community.
Economic impacts to the local government (for example, city or county)	Economic impacts to the local community (for example, neighborhood) Air Emissions	Use a local laboratory for environmental sample analysis to minimize impacts from transportation, improve the local economy, and generate good relations with the public.
Efficiencies in Cleanup and Cost Savings		Complete all required documentation at the time activities are performed
Efficiencies in Cleanup and Cost Savings	Energy	Determine appropriate season to conduct work to reduce weather delays and additional heating/cooling demands
Efficiencies in Cleanup and Cost Savings	Materials and Waste	Incorporate best management practices into contracting and procurement
Efficiencies in Cleanup and Cost Savings	Economic impacts to the local community (for example, neighborhood) Economic impacts to the local government (for example, city or county)	Perform a cost analysis of the cleanup with and without sustainable objectives for the entire site assessment and cleanup project. The user may find that conducting a cost analysis for the entire cleanup with and without sustainable objectives will help to identify opportunities for additional improvements in cleanup efficiency as well as opportunities to improve the environmetnal or social aspects of the cleanup. This analysis may have the added benefit to document the value of sustainable business practices that will benefit the local community.
Efficiencies in Cleanup and Cost Savings	Local Community Vitality	Select a site assessment and cleanup alternative that is lower in cost to the user that also yields positive benefits to the community, provided compliance with all environmental and worker/public health regulaltions is assured.
Efficiencies in Cleanup and Cost Savings	Energy Materials and Waste	Use direct sensing non-invasive, technology such as a membrane interface probe, X-ray fluorescence, laser-induced fluorescence (LIF) sensor, cone penetrometer testing (CPT), electrical resistivity tomography, and/or seismic refraction/reflection
Efficiencies in Cleanup and Cost Savings	Energy	Use equipment to increase automation such as electronic pressure transducers, thermo-couples and water quality monitoring devices coupled with an automatic data logger.
Efficiencies in Cleanup and Cost Savings	Materials and Waste	Use field test kits for screening analysis of soil and groundwater contaminants such as petroleum, polychlorinated biphenyls, pesticides, explosives, and inorganics
Efficiencies in Cleanup and Cost Savings	Materials and Waste	Use on-site mobile lab or other field analysis (for example, portable gas chromatography/mass spectrometry for fuel-related compounds and VOCs)
Efficiencies in Cleanup and Cost Savings	Energy Water Impacts Land and Ecosystems	Use seasonal removal (for example, cold and/or dry) or ground-freezing technologies, if environmentally benficial, to minimize dewatering prior to excavation
Energy	Efficiencies in Cleanup and Cost Savings Materials and Waste	Build energy efficent heating and cooling into new buildings by using natural conditions such as prevailing wind directions for cooling/heating, passive solar building design, and/or existing shade
Energy	Efficiencies in Cleanup and Cost Savings Materials and Waste	Build energy efficiency lighting into new buildings by using natural conditions such as passive lighting and by using designed systems such as energy star lighting.
Energy	Efficiencies in Cleanup and Cost Savings	Capture on-site waste heat (for example, treatment plant effluent, ground-source heat pumps, mobile waste-to-heat generators, or furnaces/air conditioners operating with recycled oil) to power cleanup activities
Energy	Efficiencies in Cleanup and Cost Savings Materials and Waste	Design energy efficient HVAC systems (for example, programmable heating and cooling systems)
Energy		Employ auxiliary power units to power cab heating and air conditioning when a machine is not operating (such as smartway generator or plug in outlet)
Energy		Install a modular renewable energy system that can be used to meet energy demands of mulitple activities over the lifespan of the project (for example, powering field equipment, construction or operational activities, and supplying energy demands of buildings)
Energy		Install amp meters to evaluate consumption rates on a real-time basis to evaluate options for off-peak energy usage
Energy		Insulate all applicable pipes and equipment to improve energy efficiency
Energy	Efficiencies in Cleanup and Cost Savings	Operate all on-site equipment during off-peak hours of electrical demand, without compromising cleanup progress
Energy		Prevent damage to equipment through use of surge protection devices, and program the equipment to restart in phases to avoid additional power surges that trip circuit breakers

TABLE X1.1 *Continued*

Core Element[A]	Additional Core Elements Benefitted	Best Management Practices
Energy	Efficiencies in Cleanup and Cost Savings Materials and Waste	Properly insulate buildings
Energy	Air Emissions	Purchase renewable energy via local utility and Green Energy Programs or renewable energy credits/ certificates (RECs or Green Tags) to power cleanup activities
Energy	Efficiencies in Cleanup and Cost Savings Materials and Waste	Reuse or recycle recovered product (such as resale of captured petroleum products, precipitated metals) and materials (for example, cardboard, plastics, asphalt, concrete)
Energy	Air Emissions	Use a gravity flow to introduce amendments or chemical oxidants to the subsurface when high-pressure injection is unnecessary
Energy	Efficiencies in Cleanup and Cost Savings Materials and Waste	Use biodegradable hydraulic fluids on hydraulic equipment such as drill rigs
Energy		Use compact fluorescent lighting (CFL) or LED lighting in all on-site equipment and properly recycle CFLs or LEDs.
Energy		Use Energy Star appliances
Energy		Use gravity flow where feasible to reduce the number of pumps for water transfer after subsurface extraction
Energy	Efficiencies in Cleanup and Cost Savings Materials and Waste	Use heat pumps or solar heating in place of electrical resistive heating when preheated extracted groundwater is required prior to treatment.
Energy	Efficiencies in Cleanup and Cost Savings Materials and Waste	Use materials that are made from recycled materials (for example, steel, concrete, plastics and asphalt; tarps made with recycled or biobased contents instead of virgin petroleum-based contents)
Energy		Use on-site generated renewable energy (for example, solar photovoltaic, wind turbines, landfill gas, geothermal, and biomass combustion) to power cleanup activities
Energy	Economic impacts to the local community (for example, neighborhood) Efficiencies in Cleanup and Cost Savings Materials and Waste	Use on-site/local materials when installing cap
Energy		Use programmable thermostats to minimize energy use
Energy		Use pulsed rather than continuous injections when delivering or extracting air to increase energy efficiency when nearing asymptotic conditions
Energy		Use solar power pack system for low-power system demands (for example, security lighting, system telemetry)
Enhancement of Individual Human Environments	Local Community Vitality	Adopt and implement assessment and cleanup steps and sequences that design-out opportunities for accidents, emergencies, and spill events.
Enhancement of Individual Human Environments	Local Community Vitality	Cleanup contractors document holding regular (for example, daily morning, pre-work day "tailgate") health and safety meetings with cleanup site workers, identifying possible hazards for the day and measures in place to mitigate hazard risks.
Enhancement of Individual Human Environments	Local Community Vitality	Consider weather effects on workers health and safety above and beyond the minimum required by law or liability. Evaluate potential exposure to hot, cold, and/or humid conditions and determine the necessary rest period. Ensure workers wear protective clothing based on hot/cold/humid conditions weather.
Enhancement of Individual Human Environments	Materials and Waste	Contract laboratory that uses sustainable practices and/or chemicals
Enhancement of Individual Human Environments	Community Involvement	Create fact sheets describing site conditions, technologies employed etc. and make them available to the public for example through a website or at a library. Include information on how the technology works, its advantages and disadvantages, and why the technology was selected. The fact sheets should address site-specific stakeholder needs and should identify the sustainable aspects of the project.
Enhancement of Individual Human Environments	Economic impacts to the local community (for example, neighborhood)	Ensure that the health and safety plans of all organizations working at the site are available for review.
Enhancement of Individual Human Environments	Land and Ecosystems	Establish sustainable requirements (for example, BMPs) as evaluation criteria in the selection of contractors and include language in RFPs, RFQs, subcontracts, contracts, etc.
Enhancement of Individual Human Environments	Local Community Vitality	Identify members of the local community who may be more vulnerable to environmental hazards. Ensure the fair treatment and meaningful involvement of all people affected by the project regardless of gender, age, race, color, national origin, sexual orientation, physical ability or income.
Enhancement of Individual Human Environments	Community Involvement	Implement a local education program about site impacts and remediation impacts.
Enhancement of Individual Human Environments	Economic impacts to the local community (for example, neighborhood) Economic impacts to the local government (for example, city or county)	Include specific focus on sustainable aspects at technical scoping & kick-off meetings and periodic meetings with all parties including clients, stakeholders, regulatory agencies, and consultants; Update project team if goals and responsibilities change.
Enhancement of Individual Human Environments	Local Community Vitality	Minimize site noise levels. For example, insulate pumps, blowers and other active equipment , maximize vehicle mufflers, and limit vehicle movement to business hours.

TABLE X1.1 *Continued*

Core Element[A]	Additional Core Elements Benefitted	Best Management Practices
Enhancement of Individual Human Environments	Local Community Vitality	Monitor potential adverse impacts at the site and communicate or post the results on a regular basis.
Enhancement of Individual Human Environments	Enhancement of individual human environments	Reduce and/or mitigate dust-generating activities. Use of heavy equipment and vehicles on sites can generate dust that is a nuisance to the community and a health hazard to people with respiratory illness. Take actions to either minimize the use of equipment or to mitigate through techniques such as water application to reduce dust.
Enhancement of Individual Human Environments	Enhancement of individual human environments	Reduce and/or optimize light-generating activities during night time operations to minimize impact to the community.
Enhancement of Individual Human Environments	Air Emmissions Materials and Waste	Select facilities with sustainable policies for worker accommodations and periodic meetings
Enhancement of Individual Human Environments	Local Community Vitality	Solicit and evaluate potential contractor's proposed health and safety plans, practices, and safety record above and beyond the minimum required by law or liability during the contractor selection process.
Enhancement of Individual Human Environments	Land and Ecosystems	Soundproof all aboveground equipment housing to prevent noise disturbance to surrounding environment
Enhancement of Individual Human Environments	Economic impacts to the local community (for example, neighborhood)	Take actions to either reduce truck traffic and/or mitigate the impacts of traffic that could pose a risk to community members due to accidents.
Enhancement of Individual Human Environments	Energy Materials and Waste Air Emissions Land and Ecosystems	Use centrifugal blowers, rather than positive displacement blowers, and intake air line mufflers to decrease noise levels
Enhancement of Individual Human Environments	Materials and Waste	Use methods to prevent contaminant spreading during various project stages above and beyond the minimum required by law or liability. For example, cover the waste and any contaminated areas where active work is not performed instead of water spraying or other energy intensive methods for dust suppression.
Enhancement of Individual Human Environments		Purchase products from vendors that pay employees a living wage.
Enhancement of Individual Human Environments		Use contractors and vendors that have a strong environmental track record.
Land and Ecosystems	Materials and Waste	Cover filled excavations with biodegradable fabric to control erosion and serve as a substrate for ecosystems
Land and Ecosystems	Materials and Waste	Enhance existing natural resources and promote carbon sequestration by incorporating wetlands, bioswales and other types of vegetation into overall remedial approach.
Land and Ecosystems		Maximize vegetative cover across the site during restoration
Land and Ecosystems	Efficiencies in Cleanup and Cost Savings Materials and Waste	Minimize clearing of trees throughout investigation and cleanup
Land and Ecosystems	Materials and Waste	Restore and maintain surface water banks in ways that mirror natural conditions
Land and Ecosystems	Materials and Waste	Salvage uncontaminated and pest- or disease-free organic debris, including trees downed during site clearing, for use as fill, mulch, compost, or habitat creation
Land and Ecosystems	Materials and Waste	Use a leachate collection system for a landfarm (along with a leachate treatment system) to fully preserve the quality of downgradient, water bodies, soil and groundwater
Land and Ecosystems	Materials and Waste	Use excavated areas to serve as retention basins in final stormwater control plans
Land and Ecosystems	Materials and Waste	Use gravel roads, porous pavement and separated pervious surfaces to maximize infiltration
Land and Ecosystems	Materials and Waste	Use non-chemical solarizing techniques to minimize need for pesticide use during restoration
Local Community Vitality	Enhancement of individual human environments	Ensure site is secure at all times
Local Community Vitality	Materials and Waste	Ensure that the site is kept neat, clean and orderly during the clean-up process. Implement programs to avoid site degradation from on-site activities. Assign staff to police the area and remove trash on a regular basis. Provide recycling, solid waste disposal and sanitary facilities for site workers.
Local Community Vitality	Enhancement of Individual Human Environments	Identify potential environmental services that could be provided by unused space, consider using native vegetation and landscaping to incorporate these services (for example, wetlands).
Local Community Vitality	Air Emissions	Minimize adverse effects to existing local traffic flow and patterns. Plan out truck traffic patterns that minimize impacts to the community and infrastructure and to drive on roads during times of lower traffic to reduce public risks. If local traffic flows and patterns need to be temporarily disrupted, solicit and coordinate temporary traffic plans with appropriate governmental agency.
Local Community Vitality	Enhancement of individual human environments	Minimize working at night, during weekends, and holidays if the task has the potential to generate noise or other nuisances for nearby residents, businesses, or community functions (for example, sporting events).
Local Community Vitality	Enhancement of individual human environments	Minimze the intensity, pitch, frequency, and duration of all noises or vibrations from the cleanup site at all times
Local Community Vitality	Enhancement of Individual Human Environments	Provide public training on sustainability.
Local Community Vitality	Materials and Waste	Provide solid waste collection and disposal service during social hours.
Local Community Vitality	Enhancement of Individual Human Environments	Restore site surroundings so that they are visually attractive

TABLE X1.1 *Continued*

Core Element[A]	Additional Core Elements Benefitted	Best Management Practices
Local Community Vitality	Enhancement of individual human environments	Select a site assessment and cleanup alternative that can be completed as soon as possible, provided compliance with all environmental and worker/public health regulations is assured; the exception to this is the situation whereby an ongoing subsurface remediation system is operating [within its terminal mode without the need for frequent adjustments to air/chemical flow rates (for example, monitored natural attenuation cleanup phase)] and site is available for its designated post-cleanup land use.
Local Community Vitality	Enhancement of Individual Human Environments	Use sustainable landscaping to restore vegetation at the minimum to its pre-project level. For each cut tree, plant new ones and use local/indigenous species.
Materials and Waste	Water Impacts	Consider discharging wastewater to a POTW or other regional water treatment plant rather than building and operating an on-site treatment plant, when feasible and environmentally beneficial based on additional analysis
Materials and Waste	Water Impacts	Construct engineering controls such as earth dikes and swales to prevent upgradient surface flow into excavated areas
Materials and Waste	Water Impacts	Employ closed-loop graywater washing system for decontamination of trucks
Materials and Waste		Implement a flexible network of piping which allows for future modular increases or decreases in the extraction or injection rates and treatment modifications
Materials and Waste	Efficiencies in Cleanup and Cost Savings	Install energy recovery ventilators to allow incoming fresh air while capturing energy from outgoing, conditioned air
Materials and Waste	Water Impacts	Install silt fences and basins to capture sediment runoff along sloped areas
Materials and Waste		Integrate schedules to allow for resource sharing and fewer days of field mobilization
Materials and Waste	Energy	Maintain vehicles on a regular basis such as tune-ups and proper tire inflation. Use green vehicle maintenance products such as biodegradable lubricants.
Materials and Waste		Maximize the reuse of existing wells for injections or extractions
Materials and Waste	Water Impacts	Minimize off-site disposal of solid waste by improving solids dewatering with a filter press or other technologies
Materials and Waste	Efficiencies in Cleanup and Cost Savings	Minimize the size of the housing for above-ground treatment system and equipment
Materials and Waste		Minimize use of pesticides through the use of green alternatives and an integrated pesticide management plan.
Materials and Waste		Prepare, store, and distribute documents electronically
Materials and Waste	Efficiences in Cleanup	Provide sanitary facilities for site workers.
Materials and Waste		Purchase liquids in concentrated form to reduce shipping volumes and frequencies
Materials and Waste		Purchase materials in bulk quantities and packed in reusable/recyclable containers and drums to reduce packaging waste
Materials and Waste		Reclaim and stockpile uncontaminated soil for use as fill or other purposes
Materials and Waste	Water Impacts	Recycle condenser water as supplemental cooling water where contaminant concentrations permit
Materials and Waste	Efficiencies in Cleanup and Cost Savings	Retain equipment that has potential for reuse
Materials and Waste	Efficiencies in Cleanup and Cost Savings	Reuse existing structures for treatment system, storage, sample management, etc.
Materials and Waste	Efficiencies in Cleanup and Cost Savings	Segregate drilling waste based on location/composition to reduce the volume of drilling waste disposed off-site; collect needed analyitical data to make on-site reuse decisions.
Materials and Waste	Efficiencies in Cleanup and Cost Savings	Segregate hazardous waste and non-hazardous waste
Materials and Waste	Water Impacts	Treat condensate in onsite systems where contaminant types and concentrations permit
Materials and Waste	Water Impacts	Treat potentially contaminated purge water with an on-site treatment technique prior to reinjecting into an on-site well, or discharge to a storm drain or waterway, as permissible
Materials and Waste		Use biodegradable cleaning products
Materials and Waste		Use by-products, waste or less refined materials from local sources in place of refined chemicals or materials (for example, cheese whey, molasses, compost, or off-spec food products for inducing anaerobic conditions; limestone in place of concentrated sodium hydroxide)
Materials and Waste	Efficiencies in Cleanup and Cost Savings	Use filters (for example, bag/cartridge filters) that can be backwashed to avoid frequent disposal of filters
Materials and Waste	Water Impacts	Use low flow sampling methods
Materials and Waste		Use paper with recycled content and use double-sided printing option when document must be printed
Materials and Waste		Use products, packing material, and equipment (for example, laboratory containers) that can be reused or recycled
Materials and Waste		Use rechargeable batteries for handheld data loggers and other field instruments
Materials and Waste		Use timers or feedback loops and process controls for dosing for injection of chemicals
Materials and Waste	Water Impacts	Use uncontaminated wastewater or treated water for tasks such as wash water, irrigation, dust control, constructed wetlands or other uses
Materials and Waste	Efficiencies in Cleanup and Cost Savings	Use wood based materials and products that are certified in accordance with the Forest Stewardship Council (FSC) Principles and Criteria for wood building components

TABLE X1.1 *Continued*

Core Element[A]	Additional Core Elements Benefitted	Best Management Practices
Materials and Waste	Energy Efficiencies in Cleanup and Cost Savings	Consider preheating vapors to reduce relative humidity prior to treatment with vapor-phase GAC to improve adsorption efficiency when additional analysis supports approach
Materials and Waste	Energy Efficiencies in Cleanup and Cost Savings	Salvage uncontaminated objects with potential recycle, resale, donation, or onsite infrastructure value such as steel, concrete, granite, and storage containers
Materials and Waste	Efficiencies in Cleanup and Cost Savings	Steam-clean or use phosphate-free detergents instead of organic solvents or acids to decontaminate sampling equipment
Materials and Waste	Energy Efficiencies in Cleanup and Cost Savings	Use regenerated GAC for use in carbon beds
Water Impacts	Efficiencies in Cleanup and Cost Savings	Divert upgradient, uncontaminated groundwater around a contaminant plume to reduce the amount of water extracted and/or treated; when feasible based on additional analysis
Water Impacts		Install a landfarm rain shield (such as a plastic tunnel) with rain barrels or a cistern to capture precipitation for potential onsite use
Water Impacts	Efficiencies in Cleanup and Cost Savings	Reclaim clean or treated water from other site activities for use in injection slurries or as injection chase water
Water Impacts		Reinject treated groundwater to the subsurface to recharge an aquifer
Water Impacts	Land and Ecosystem	Use captured rainwater for tasks such as wash water, irrigation, dust control, constructed wetlands or other uses
Water Impacts		Use dewatering processes that maximize water reuse
Water Impacts	Efficiencies in Cleanup and Cost Savings	Use treated slurry water for other cleanup activities or non-remedial applications such as irrigation or wetlands enhancement

[A] The core elements are defined in 5.3 of the guide.
[B] User should consider using the National Charrette Institute's charrette process framework template for soliciting professionals to conduct the charrette, found at http://www.charretteinstitute.org/
[C] Statutes and executive orders that require public involvement include: the Unfunded Mandates Reform Act; the Regulatory Flexibility Act; Executive Order 13132 (Federalism); and Executive.

X2. INTEGRATING SUSTAINABLE OBJECTIVES IN CLEANUP: EXAMPLE DOCUMENTATION

X2.1 *Introduction*—This appendix supports the documentation elements described in Sections 5 through 8 of the guide. This documentation should be publicly available and include the following information:

X2.1.1 *Documentation Report*—The user should record conducted activities and their associated substantial benefits in an Integrating Sustainable Objectives in Cleanup (ISOC) report.

X2.1.2 Site Information, including impact of the release and planned cleanup activities

X2.1.3 Sustainable Objectives

X2.1.4 Use of Property Before, During, and After Cleanup

X2.1.5 Level of Stakeholder Participation

X2.1.6 Core Elements to be Addressed and Associated BMPs

X2.1.6.1 Identification of potentially applicable BMPs (see 8.2.6 of the guide)

X2.1.6.2 Evaluation process for comparison of BMPs

X2.1.6.3 Selected BMPs

X2.1.6.4 Implementation of BMPs

X2.1.7 Surrounding Area identified for application of BMPs

X2.1.8 Time Horizon for Project

X2.1.9 Project Team

X2.1.10 Data Needed

X2.1.11 Results

X2.1.12 *Example Reports*—Two example report forms are provided. X2.2 provides a general form suitable for an ISOC report for most sites. X2.3 provides a shorter form suitable for an ISOC report for small non-complex sites.

X2.2 *General Form*—This form supports the documentation of most sites.

X2.2.1 *Identify Site Information:*

(1) Site name:

(2) Site location (address, city, state): _____

(3) Site owner name: _____

(4) Tax parcel ID #: _____

(5) EPA, State, Project ID #: _____

(6) Cleanup program (for example, RCRA, State voluntary cleanup program): _____

(7) Lead oversight agency (for example, EPA, State, other): _____

(8) Site size (acres): _____

X2.2.2 *Identify Contact Information:*

(1) User Name/Organization: _____

(2) E-mail address/phone number: _____

X2.2.3 *Identify Impact of the Release and Planned Cleanup Activities:*

(1) Chemicals of Concern: _____

(2) Affected Media (for example, surface soil, groundwater): _____

X2.2.4 *Identify Sustainable Objectives:*

(1) Objective: _____

(2) Objective: _____

(3) Additional objectives as needed.

X2.2.5 *Identify Use of Property Before, During, and After Cleanup* (for example, chemical manufacturer and now a shopping center):

(1) Historical use: _____

(2) Current use: _____

(3) Post-cleanup use: _____

X2.2.6 *Efforts Taken for Stakeholder Collaboration and Community Involvement*—To maintain public transparency, the user documents dates, times and locations of:

(1) Public notifications of the availability of the project information.

(2) Public meetings to discuss the site and sustainable activities.

(3) Public document repositories such as a public library, senior center, offices of regulatory agencies or other secure public place.

(4) Community engagement charrettes.

(5) Posting of the ISOC report on a publicly available web site on the Internet or submittal of the ISOC report to the regulatory agency.

(6) Other activities conducted for stakeholder collaboration.

X2.2.7 *Identify Core Elements to be Addressed, in Alphabetical Order*—The user should identify each of the core elements to be addressed. Discuss each core element and how it applies to the site.

(1) Air Emissions

(2) Community Involvement

(3) Economic Impacts to the Local Community

(4) Economic Impacts to the Local Government

(5) Efficiencies in Cleanup and Cost Savings

(6) Energy

(7) Enhancement of Individual Human Environments

(8) Land and Ecosystems

(9) Local Community Vitality

(10) Materials and Waste

(11) Water Impacts

X2.2.8 *Identify Associated BMPs*—The user should identify the BMPs to be implemented for each selected core element and document the substantial benefits associated with each BMP. The user may choose to develop a table, or other applicable format, to include the information about the BMPs.

(1) Identify the cleanup phase of the project (for example, Site Assessment): _____

(2) For Remedy Design and Implementation or Operation, Maintenance and Monitoring, identify the specific cleanup technology(ies) being used: _____

(3) List applicable BMPs and their associated Core Elements: _____

(4) Identify the information and method used to evaluate the BMPs: _____

(5) List BMPs to be implemented. Describe what specific BMPs have or will be employed and the substantial benefits associated with each sustainable aspect.

X2.2.9 *Identify the Surrounding Area Identified for Application of the BMPs.*

X2.2.10 *Identify Time Horizon for the Project.*

X2.2.11 *Identify Project Team:*

__ Environmental consultant
__ Economist
__ Sociologist
__ Urban Planner
__ Others (Specify) _____

X2.2.12 *Identify Data Needed.*

X2.2.13 *Identify Whether Results will be Quantified and Method.*

X2.3 *Short Form*—This form supports the documentation of small, non-complex sites.

X2.3.1 *Identify General Site Information,* such as address and user contact information.

X2.3.2 Statement and documentation of site conditions that meet the description included in the guide for the site to be small and not complex (see 3.1.12):

X2.3.2.1 Limited release complexity

X2.3.2.2 Small scale site and well-defined soil and/or groundwater impacts

X2.3.2.3 Lower risk land use

X2.3.3 *Evaluation Summary:*

X2.3.3.1 List and describe core elements and all BMPs selected for applicable phases of the site cleanup.

X2.3.3.2 Describe information and method used in selecting BMPs.

X2.3.3.3 Identify if the site-specific benefits of the BMPs will be quantified and the method used.

X2.3.3.4 Provide other information, as necessary.

X3. ADDITIONAL RESOURCES

X3.1 Practice E1527-05 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process

X3.2 Practice E1903-97(2002) Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process

X3.3 Favara, P., Krieger, T., Boughton, B., Fisher, A., & Bhargava, M. (2011). Guidance for performing footprint analyses and life-cycle assessments for the remediation industry. Remediation, 21(3), 39–79.

X3.4 Illinois EPA 2008. Green Cleanups.

X3.5 International Standards Organization (ISO), 2008. International Standards Organization, 14400.

X3.6 NRC, 2012. "Alternatives for Managing the Nation's Complex Contaminated Groundwater Sites." National Academies Press. Washington, D.C. http://www.nap.edu/catalog.php?record_id=14668.

X3.7 USACE, US Navy, Battelle, 2008. Site WiseTM.

X3.8 USAFCEE, 2008. Sustainable Remediation Tool (SRT™).

X3.9 USEPA, 2006. Guidance on Systematic Planning using Data Quality Objectives Process. EPA/240/B-06/001. February.

X3.10 USEPA, 2007. Integrating Sustainability into EPA's Cleanup Programs, Deborah Goldblum, CL:AIRE Inaugural Sustainability Meeting.

X3.11 USEPA, 2008a. Green Remediation: An EPA Perspective. Michael D. Gill, EPA Region 9, 2008 International Workshop on P2 and Sustainable Development, San Diego, CA. November.

X3.12 USEPA, 2008b. Green Remediation: Best Management Practices for Excavation and Surface Restoration. EPA 542-F-08-012. December.

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