



## **Sustainable and Green Remediation**

**Course Number:** CH-02-420

**PDH:** 4

**Approved for:** AK, AL, AR, FL, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NV, NY, OH, OK, OR, PA, SC, SD, TN, TX, UT, VA, VT, WI, WV, and WY

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## GREEN AND SUSTAINABLE REMEDIATION: A PRACTICAL FRAMEWORK

### 1. INTRODUCTION

Green and sustainable remediation (GSR) has emerged as a beneficial approach to optimize all phases of site remediation, from site investigation to project closeout. This course was developed to provide a guide for users interested in the application of GSR approaches. It provides important background information on GSR, including an approach to GSR planning and implementation and tools to conduct GSR evaluations. The course provides references to a number of key documents and initiatives that supplement this course and will also be helpful.

This section provides key background information related to GSR, including a problem statement, key definitions, and GSR's relationship to other ITRC teams and products. In addition, this section summarizes a survey of state interest, state and federal perspectives, and related GSR guidance.

Section 2 describes the GSR planning process; Section 3 describes the GSR implementation process. Together, these two processes represent the GSR framework. Section 4 describes a wide array of tools that can be used to conduct GSR evaluations.

Finally, this course contains several key appendices. Appendices A and B contain the survey of state interest questionnaire and responses, Appendix C provides a set of case studies highlighting the application of GSR approaches,

#### 1.1 Problem Statement

The ultimate goal of remediation is to protect human health and the environment. To meet this goal, many remedies have been focused on site-specific risks and may not have been developed in consideration of external social and economic impacts beyond identified environmental impacts. By identifying approaches that address environmental, social, and economic impacts, projects can be improved while still meeting regulatory objectives.

The GSR planning and implementation framework provided herein intends to provide the user with a generalized approach for integrating environmental, social, and economic considerations into site management decisions.

## 1.2 Applicability

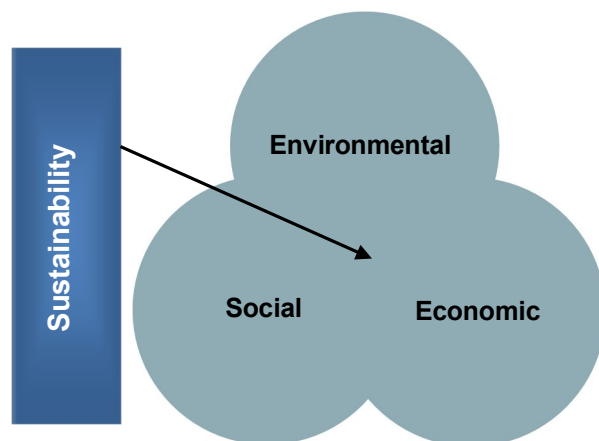
This course is intended to apply to any remediation program in the United States. It can be used by state regulators, federal employees, and the private sector, including consultants and industrial and commercial companies. The GSR framework may be used in part or in its entirety. The GSR framework may be used for a particular project phase or used as a model for development of internal GSR guidance, and it can be applied at small or large sites or projects. The GSR framework and associated evaluations provided in this course are intended to supplement the various phases of site remediation, from investigation through to long-term monitoring (LTM). It is not intended to supplant any regulatory requirement. This course may be given concurrence by any user but may not comprehensively align with existing guidance due to variations in existing rules and statutes. Users of this course should tailor their GSR evaluation process to their individual program of interest using this course as a guide.

## 1.3 Definitions

The GSR overview document provides several GSR-specific definitions. The following section provides definitions of terms key to this technical and regulatory guidance document. These definitions were discussed extensively by the GSR Team and represent consensus-based definitions. While the definitions in this section capture fundamental GSR tenets, they are subject to interpretation by the user depending on the context in which they will be implemented. The GSR Team anticipates further maturation of the definitions provided below as the topic of GSR evolves.

### 1.3.1 Sustainability

“Sustainability” is a general concept with a wide array of existing definitions. As noted in the GSR overview document, common themes of sustainability include the holistic consideration of environmental, social, and economic impacts of an activity and evaluation of these impacts on future generations. Figure 1-1 depicts sustainable development, similar to that adopted in 2005 by the International Union for Conservation of Nature (IUCN) and published in *The Future of Sustainability: Re-Thinking Environment and Development in the 21<sup>st</sup> Century* (IUCN 2006).



**Figure 1-1. Sustainability schematic.** *Source:* Based on IUCN 2006.

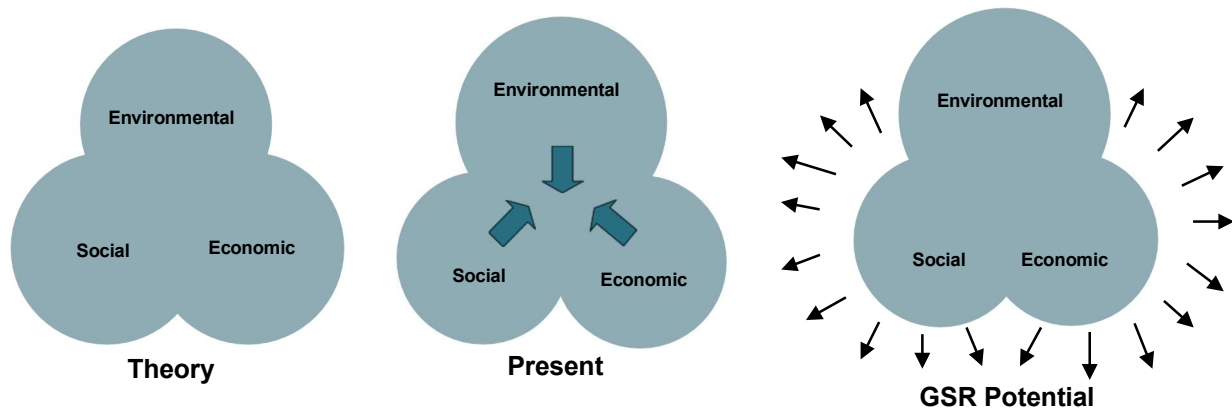
### 1.3.2 Green Remediation

“Green remediation” is the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup (EPA 2011a). The application of green remediation approaches can involve the use of best management practices (BMPs) or “environmental footprint” analyses to reduce the impact of a remedial action on the environment.

### 1.3.3 Green and Sustainable Remediation

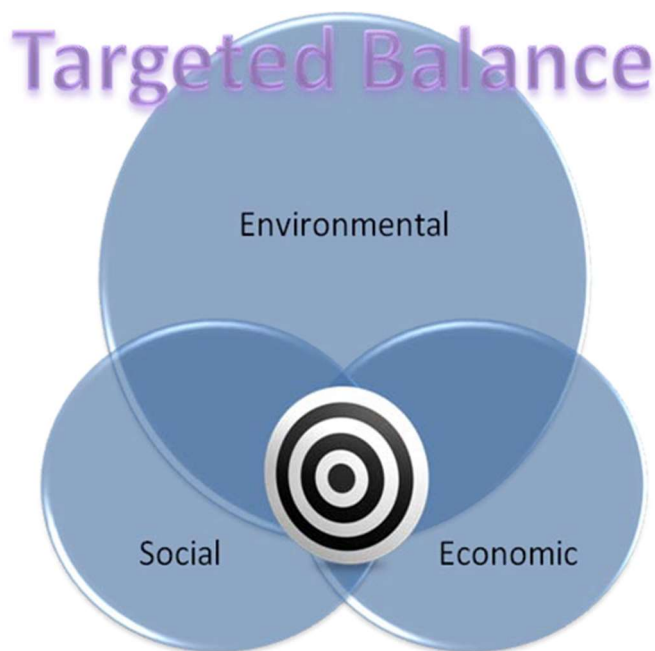
The consensus-derived definition of “green and sustainable remediation” is the site-specific employment of products, processes, technologies, and procedures that mitigate contaminant risk to receptors while making decisions that are cognizant of balancing community goals, economic impacts, and environmental effects.

Building on IUCN’s concept of sustainability, Figure 1-2 displays the GSR team’s conceptualization of the evolution of GSR and the current movement toward integration of social and economic considerations. The left schematic in Figure 1-2 presents the theoretical balance of environmental, social, and economic aspects of sustainability; the center schematic depicts how GSR is presently bringing together all three aspects of site contaminant investigation and cleanup activities. The schematic to the right in Figure 1-2 depicts the potential growth of GSR to provide greater recognition of the economic and social aspects of sustainability in remedial decision making. The term “economic” as used this course includes both economic impact to a community and the cost of project.



**Figure 1-2. Schematic representation of GSR concept development.**

Ultimately, persons conducting GSR evaluations should target a balance, as shown in Figure 1-3, integrating the three elements of GSR to the maximum degree possible, continuously aiming for the most-sustainable investigation and remedial approach.



**Figure 1-3. GSR targeted balance.**

#### 1.3.4 Greenwashing

“Greenwashing” refers to situations where GSR options have not been evaluated and backup documentation is lacking yet there is still a claim that GSR approaches have been implemented. Similar to greenwashing, misuse of the terms “sustainable” or “sustainability” may hamper integration and acceptance of GSR concepts into the environmental industry.

Whether it is the responsible party, consultant, or state regulator performing the GSR evaluation, the user should be prepared to provide documentation of evaluations where GSR was considered in the decision-making process. Assumptions used in the GSR evaluation should be based on publically available, documented, and/or generally accepted sources and approaches. The user is highly encouraged to validate, or at least substantiate through documentation, any claims of a GSR performance, no matter the stage of cleanup or level of evaluation being performed.

In the future, the potential for greenwashing may be lessened through development of a certification process using specific assigned levels of green and sustainable measures. This type of GSR evaluation certification could one day be likened to the U.S. Green Building Council’s (USGBC) Leadership in Energy and Environmental Design (LEED) certification process (USGBC 2011). The GSR concept is likely to gain acceptance, use, and credibility through the development of such a certification.

### 1.4 Relationship to Other GSR Products

As previously mentioned, this technical and regulatory guidance document is a companion to the GSR overview document (ITRC 2011a), which provided important background information to the development of this course. The overview document



Purchase this course to  
see the remainder of  
the technical materials.