



Standard Guide for Development of Conceptual Site Models and Remediation Strategies for Light Nonaqueous-Phase Liquids Released to the Subsurface¹

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INTRODUCTION

This guide provides a framework for developing a light nonaqueous phase liquid (LNAPL) conceptual site model (LCSM) and for using that LCSM in a corrective action decision framework. LNAPLs are most commonly petroleum or petroleum products liquids. Historically, subsurface LNAPL distribution has been conceptualized based on the thickness observed in monitoring wells. However, these conceptualizations often result in an insufficient risk analysis and frequently lead to poor remedial strategies. By using this guide, the user will be able to perform a more appropriate assessment and develop an LCSM from which better remedial decisions can be made.

The design of this guide is a “tiered” approach, similar to the risk-based corrective action (RBCA) process (Guides E1739 and E2081), where an increase in tiers results from an increase in the site complexity and site-specific information required for the decision-making process. The RBCA guides apply to LNAPL and to dissolved and vapor phases. This guide supplements the RBCA guides by providing more information about identifying LNAPL, linking the LCSM to the RBCA process, and describing how the presence of LNAPL impacts corrective action at sites.

In addition to developing the LCSM, the components of this guide will support the user in identifying site objectives, determining risk-based drivers and non-risk factors, defining remediation metrics, evaluating remedial strategies, and preparing a site for closure. If the processes in this guide are adequately followed for sites with LNAPL, it is expected that more efficient, consistent, economical, and environmentally protective decisions will be made.

1. Scope

1.1 This guide applies to sites with LNAPL present as residual, free, or mobile phases, and anywhere that LNAPL is a source for impacts in soil, ground water, and soil vapor. Use of this guide may show LNAPL to be present where it was previously unrecognized. Information about LNAPL phases and methods for evaluating its potential presence are included in 4.3, guide terminology is in Section 3, and technical glossaries are in Appendix X7 and Appendix X8. Fig. 1 is a flowchart that summarizes the procedures of this guide.

1.2 This guide is intended to supplement the conceptual site model developed in the RBCA process (Guides E1739 and E2081) and in the conceptual site model standard (Guide

E1689) by considering LNAPL conditions in sufficient detail to evaluate risks and remedial action options.

1.3 Federal, state, and local regulatory policies and statutes should be followed and form the basis of determining the remedial objectives, whether risk-based or otherwise. Fig. 1 illustrates the interaction between this guide and other related guidance and references.

1.4 Petroleum and other chemical LNAPLs are the primary focus of this guide. Certain technical aspects apply to dense NAPL (DNAPL), but this guide does not address the additional complexities of DNAPLs.

1.5 The composite chemical and physical properties of an LNAPL are a function of the individual chemicals that make-up an LNAPL. The properties of the LNAPL and the subsurface conditions in which it may be present vary widely from site to site. The complexity and level of detail needed in the LCSM varies depending on the exposure pathways and risks and the scope and extent of the remedial actions that are needed. The LCSM follows a tiered development of sufficient

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