

# Influence of Potential Soil Contamination on Construction Projects

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Construction Industry Institute  
The University of Texas at Austin  
3925 W. Braker Lane (R4500)  
Austin, Texas 78759-5316  
(512) 232-3000  
FAX (512) 499-8101

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# **Influence of Potential Soil Contamination on Construction Projects**

*Prepared by the  
Construction Industry Institute  
Environmental Remediation Technology Research Team*

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# Executive Summary

Construction projects on active plant sites have too commonly been disrupted by surprise encounters with contaminated soil and/or water. Even “small” projects are not immune. Improper management of this issue has caused project delays of months, and incurred out-of-scope costs in the millions of dollars.

Planning and implementation of projects must consider possible encounters with contaminated soil or water, and the project team must assume responsibility for such encounters early in project development. Project managers are frequently ill-prepared to deal with this non-construction responsibility, and the technology and regulatory framework in which the work is performed is complex and continually changing.

The central purpose of this document is to provide the project team with a basic knowledge of this complex problem so that they can:

- incorporate the necessary **planning** into the project schedule;
- assemble the requisite **team** of technical specialists, and understand their responsibilities sufficiently to effectively manage them;
- assure that appropriate **site studies** and soil testing (if needed) are conducted;
- incorporate appropriate evaluation, response and reporting **procedures** into the contractors’s scope of work;
- **sufficiently understand the basic technologies** and regulatory issues involved to appreciate their potential impact on project cost and schedule;
- **be prepared to respond appropriately** should a “surprise” occur.

**Think First, Dig Later**



## Introduction

Unanticipated environmental conditions at proposed expansion projects can create significant problems for construction: schedule delays, out-of-scope costs, and needlessly expensive site remediation. This document has been prepared to provide senior management, capital planners and construction managers with highlights of a planning process that will limit the impact of environmental site conditions on both the project budget and schedule.

Reducing the negative impact of dealing with soil contamination on a construction project starts with research into the history of the site long before the project enters the construction phase and ends with effective management of excess soils and proper disposition of contaminated soils. Elements that should be added to a project manager's "tool box" include a working knowledge of how to manage an environmental site assessment, familiarity with the requirements for managing excavation and excess soils, and an understanding of the types of landfills available for various levels of contaminated soils.

### Avoid Surprises

The best means of avoiding "surprise" environmental problems is to be proactive during project planning by reviewing past operations and current site conditions to assess the likelihood for problems. Plant or corporate environmental professionals need to participate in project planning. Their ideas can enhance the success of the project by:

- defining environmental "critical path" decisions;
- identifying any regulatory permits or notifications;
- identifying any site limiting conditions such as wetlands, or identifying problem issues (such as contaminated soils management) in the planning stage.

The planning process outlined in this document will assist the management team in asking the right questions and knowing what to do with the answers. It is not intended to render legal advice on specific problems. Experienced professionals should be consulted to deal with complex engineering, environmental and legal issues.

## 1: Introduction

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Contaminated soil and water are not traditional project management concerns, but have an impact on projects in important ways, specifically cost and schedule. What is most significant about the issue of soil contamination is that the impact can be so great. Something that traditionally might have been treated lightly—“Let’s scrape off a little dirt and dig a few holes so we can get started”—today requires thorough planning. The case histories that follow illustrate the cost and schedule impact on a project when the possibility of contaminated soils is not considered.

### **Poor Plan/No Plan—Pay the Price**

- The foundation excavation for a 70,000 square foot chemical processing building revealed significant soil contamination. An 11-month, \$600,000 investigation resulted in a disposal estimate of 15,000 yards of contaminated soil, via a combination of hazardous waste landfill and incineration, at a cost of almost \$17 million. Subsequent redesign of the facility reduced the disposal problem to 600 yards and \$240,000. Proper planning at the start of the project could have saved the project as much as \$650,000 and a 15-month delay.
- Excavation of a 30-year-old parking lot to construct a new preschool revealed oil stained soil. The hastily organized investigation took eight months and cost \$400,000. Implementation of the clean-up took an additional six months and cost \$100,000. Subsequent review of historic aerial photographs identified a gas station had been located at the site. Proper investigation at the start could have substantially reduced, and possibly avoided, both the delay and cost.
- About 100 cubic yards of unanticipated contaminated soil was inadvertently mixed with 3000 yards of clean soil from an adjacent construction site. Lack of appropriate planning and procedures increased the ultimate cost of disposal from less than \$50,000 to more than \$1 million.
- A contractor performing a subsurface pipeline replacement during a refinery turnaround encountered a spill of a volatile, hazardous material. The owner was notified, but no spill reports were filed and no samples analyzed. Construction productivity declined when the contractor’s personnel utilized protective clothing, but the work was pushed to completion. Because possible subsurface contamination was not anticipated, questions pertaining to liabilities and scope changes of this fixed-price contract led to costly legal action.

- A major sports arena was constructed on the site of a former iron works. Despite finding evidence of soil contamination during demolition activities, construction proceeded on a fast-track basis, with minimal soil testing, inadequate soil management, and no comprehensive assessment. Ultimately, small quantities of heavily contaminated soil were mixed with larger quantities of relatively clean soil. Disposition of several hundred thousand cubic yards of contaminated soil from the site has still not been settled. The current estimated cost to correct the problem is \$35 million.

Clearly, “moving a little dirt” to get going on a construction project is not a step to be taken casually. A good project manager knows the importance of being prepared for “unplanned” encounters with contamination.

The good news is that problems can be prevented, and “success stories” do exist. The following is a real story of a project that dealt with a contaminated soil problem in a successful way. It may not be as exciting as a project that went wrong, but the project manager can be justifiably pleased to tell it.

### A Success Story

A 50,000 square foot warehouse, plus associated loading and unloading docks, were scheduled for construction at a manufacturing site undergoing a facility investigation. Initial soil testing indicated the presence of arsenic in the first six inches of the soil at the proposed contamination site. An evaluation of the problem resulted in the determination that the arsenic was in a relatively insoluble form and would not leach to groundwater. By modifying the foundation and using a raised slab design, the contaminated soil could be placed (in effect, stored) under the building slab, thus minimizing long-term dermal contact and potential of inhalation. The three-month, pre-construction effort, which included regulatory review, resulted in a timely completion of the warehouse and a cost avoidance of \$2 million for offsite disposal to a secure landfill.

