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SAMPLING AND
ANALYSIS OF
ENVIRONMENTAL
CHEMICAL
POLLUTANTS



A Complete Guide

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INTRODUCTION

An environmental project is a complex, multi-step, and multidisciplinary undertaking. It engages many participants, who, while having a common goal, may have different or even conflicting priorities or agendas. For example, the priority of the property owner is to have the most cost-effective and efficient site investigation or remediation. The consulting company's first priority is to meet the client's demands for 'faster, cheaper, better' investigation or cleanup and at the same time to be profitable. The members of the regulatory community, who oversee the project, are usually not concerned with the cost of the project execution, as their priority is to enforce existing environmental regulations.

Various professionals who participate in the project execution also see it from different angles. Environmental projects require technical expertise in different disciplines, such as geology, chemistry, engineering, environmental compliance, and risk assessment. Each professional makes a partial contribution to the project overall effort and often has a narrowly focused view of the project, which is determined by the technical specialty of the participant and his or her role in the project organization. A geologist, who collects samples at the site, may have a poor understanding of analytical laboratory needs and capabilities, and the laboratory, in turn, has no knowledge of the sampling strategy and conditions at the project site or of the purpose of sampling. When participants focus solely on their respective tasks without taking a broader view of the project objectives, the projects tend to lose direction and as a result may arrive at erroneous conclusions. When the project objectives have not been clearly defined and understood by all members of the project team in the early stages of project execution, the project has an increased risk of failure. That is why it is essential for all team members to have a common understanding of the project's broader goals as well as a sense of what the other participants in the projects are trying to accomplish.

An understanding of the project objectives comes from initial systematic planning and continuous sharing of information during project execution. Many projects lack precisely these features, and consequently limp along in a manner that is confusing and frustrating for all participants. By analogy, a properly planned and well-executed project can be compared to a ball that moves in a straight line from point to point. By contrast, a poorly designed and badly coordinated project is akin to a multifaceted polygon, which has a general ability to roll, but its rolling swerves, lingers, or stops altogether. Needless to say, this is not an efficient way to do business.

To improve their skills in project planning and implementation, the team members seek guidance from recognized subject matter experts, such as the United States Environmental Protection Agency (EPA), Department of Defense (DOD), and Department of Energy (DOE). However, at this point they encounter an impenetrable

thicket of published material, the relevance of which is not immediately clear. The enormous volume of this literature is by itself a deterrent to many professionals; the difficulty in identifying relevant information and interpreting it in practical terms is another obstacle that curbs its usefulness. Nevertheless, within the lengthy EPA, DOD, and DOE documents lies a body of core material, to which we refer daily. It takes many years of experience to orient oneself and to correctly interpret the legalistic, vague, and sometimes contradictory language of the environmental field's technical literature.

The premise of this Guide is to digest this core material into a single reference source that addresses the basic aspects of environmental chemical data collection process, such as the systematic planning, sensible field procedures, solid analytical chemistry, and the evaluation of data quality in context of their intended use. This core material, although based on the USA standards, is of a universal nature, because wherever environmental chemical data are being collected throughout the world, they are collected according to common principles. The Guide emphasizes the data collection fundamentals that are applicable to every environmental project. On a practical side, the Guide offers field procedures for basic sampling techniques that can be used in daily work. These procedures have been adapted from the EPA, DOD, and DOE protocols and revised to reflect the practical field conditions, the current state-of-the-art technology, and industry standards. The Guide will enable practicing professionals to gain a wider view of the complexities of project work and to better understand the needs and priorities of other project participants. To students of environmental data collection, the Guide offers a comprehensive view of project work, step-by-step detailed procedures for common field sampling tasks, and a wealth of practical tips for all project tasks.

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