Environmental Restoration: Part 2 - Site Information and Regulatory Concerns

An Online Continuing Education Course for Engineers

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Credit: 2 Hours / 2 PDH / 2 CPD

Environmental Restoration: Part 2 - Site Information and Regulatory Concerns

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General Overview

This course, Part 2, is the second in a series of six sequential courses, Parts 1 through 6, that present the history and steps taken to remediate the environmental hazards created by the land disposal of Chemical and radioactive wastes on the campus of a research institute. The practice of shallow land burial of hazardous wastes was widely used throughout the US between the 1960s and the 1980s. However, since the late 1980s both federal and state legislations were promulgated requiring the environmental regulatory agencies throughout the US to investigate operating, decommissioned and abandoned landfills of all types having in mind the ultimate goal of mitigating the impacts these waste disposal sites have on the natural environment.

I decided to write this series of courses, six in all, from the perspective of a Manager who leads a team charged with the implementation of an environmental Remedial Investigation (RI), Feasibility Study (FS) and Engineered Remediation (ER) of a hazardous waste disposal site. This perspective is especially interesting to develop because a manager is usually associated with a project from its inception and he or she has a unique overview and comprehensive understanding of the scope of work that needs to be implemented. Students, who are interested in environmental issues, will be able to follow and gain an in-depth understanding, not only of the technical and contractual aspects of the project. Even more, they will be able to appreciate the countless difficulties posed by the competing goals and desires of the various parties involved in implementing an environmental investigation of a hazardous waste disposal site. Students will learn to analyze - and then reconcile – the different goals and objectives of the owners, regulators, environmental consulting firms, the interested public and the news media. Finally, the significant impacts of these interactions on scope, budget and schedule are presented and discussed as the process of completing the project unfolds.

This series of courses draws from numerous environmental investigations that I managed across the US. As such, the scenarios that are presented are similar to those a professional environmental engineering practitioner faces in real life. The case that is developed here is used as an example and a vehicle to present and discuss concepts and project implementation strategies that I gained through my long and varied experience working in the engineering consulting business. This information is not usually found or taught in traditional or standard academic courses dealing with environmental issues or investigations. In their entity this series of courses can be considered an implementation guide for conducting environmental investigations at hazardous waste disposal sites. Students will gain unique and useful insights into the data, analyses, interpretations, recommendations and conclusions that were made and that they could then easily adapt to the situations they are likely to encounter themselves in managing their own projects.

More specifically, the environmental problems are those encountered at a decommissioned hazardous and low-level radioactive waste disposal site owned by a research institute. The presentations are sequenced in the order in which investigations would be conducted by an environmental consulting firm contracted to perform and supervise the work that would be done in order to assess the magnitude of the problem and develop appropriate mitigation strategies for the rehabilitation of the site.

Starting with the use of the site for the disposal of chemical and radioactive wastes over a period of twenty years and following the eventual decommissioning and passive custodial maintenance of the site, the presentation unfolds by addressing the following topics in sequential order:

- Initial concerns raised by the regulatory agencies,
- Request for Proposals issued by the research institute,
- Bidding process and the selection of an environmental consulting firm,
- Contract negotiation,
- Compilation and review of existing data,
- Development of work plans and preparation of sampling and testing procedures,
- Implementation of geologic and hydrologic investigations at the site,
- Evaluation of the data collected and assessment of impact on public health,
- Development and evaluation of engineering options for remediation,
- Recommendation of a preferred engineered remedial option,
- Implementation of the corrective action plan, and
- Post remediation monitoring to assess the outcome.

The introduction of each course in the series summarizes briefly the key points covered by the preceding courses in the sequence. This was done to help the students remember all that has unfolded prior to getting involved in a new topic. In addition, each course in this series was structured as a stand-alone presentation of the topics listed in the **"Course Overview"** section found at the beginning of each course. This was done to accommodate the students that have a particular interest in one aspect of the work only.

The titles of the courses in this series are:

Part 1 – History Leading to Contract Award
Part 2 – Site Information and Regulatory Concerns
Part 3 – Project Plans and Procedures
Part 4 – Phase 1 Field Investigations
Part 5 – Phase 2 Field Investigations
Part 6 – Risk Assessment and Engineered Remediation

Part 2 Course Overview

This course, ***Part 2: Site Information and Regulatory Concerns***, follows the systematic examination of existing information about the disposal activities that took place at the site and the interpretation of

archived environmental testing results. The purpose was to understand what information was already available and what interpretations could be made in order to plan the next phase of work. The specific items addressed include:

- Definition of the property boundary and adjacent land uses,
- Reconstruction of the history of waste disposal at the site,
- Performance of a preliminary site reconnaissance,
- Reconstruction of the locations and geometry of the disposal trenches,
- Compilation of a radioactive waste inventory,
- Compilation of a chemical waste inventory, and
- Review existing soil, vegetation, surface water and groundwater testing results.

The course identifies when assumptions had to be made where data were incomplete, missing, or of suspect quality. The analytical results of early groundwater, surface water and soil testing are summarized and the value of this information in planning additional field sampling and testing is discussed. This case history explains the difficulties encountered in attempting to interpret existing conditions using this often incomplete or questionable data set.

Once compiled, the existing information was presented to the Institute and appropriate state regulatory agencies. Their comments and the Institute's responses are presented in this course. A newspaper article announcing that environmental contamination was detected at the site is also presented.

A glossary of terms and acronyms used in this series of courses follows the summary section at the end of this course.

Introduction

For many years a Research Institute (Institute) carried out experiments using both radioactive materials and organic and inorganic chemicals in its laboratories. In order to dispose of the waste products of this research the Institute operated a shallow land burial facility for twenty years on the grounds of its research campus. The shallow land burial was accomplished by randomly placing both liquid and solid wastes, held in various types of containers, into narrow parallel trenches dug into the soil to a maximum depth of about 8 to 12 feet below the ground surface. Once a trench was filled to within 4 feet below the surface, dirt was placed over the waste, graded, fertilized and seeded. In areas where parts of older trenches subsided, due to breakage of containers or compaction of the waste, additional dirt was placed in the sunken areas and these parts were re-graded and re-seeded. The site itself slopes gently downhill, so that surface water would run off the burial area and into the woods downslope of the landfill. The site is located in a part of the U.S. that receives about 35 to 45 inches of rainfall a year.

Once the site was no longer used, it was fenced, posted and locked. Minimal grounds maintenance was done until the State Radiation Protection Agency (State RPA) notified the Institute that they were to keep the fence clear of vegetation and the area within and just outside the fence mowed and free of trees. The following photo shows the waste disposal area after the site was decommissioned and grounds maintenance started:

Figure 1: Decommissioned waste disposal site at the Institute

Importantly, shallow land burial of chemical and radioactive wastes at this site was conducted in accordance with the accepted state and federal standards during the time of operation. The Institute was never cited for improper disposal practices or other violations. Both the Institute and the regulatory agencies agreed that the site was managed and operated properly.

Since the late 1980's, however, public awareness of the dangers of contamination from landfills of all types was growing throughout the country. In response to this heightened awareness, regulatory agencies charged with the protection of public health and safety became increasingly concerned that disposal practices that were once considered acceptable may have long-term negative impacts on the groundwater, surface water and soil. The Environmental Protection Agency issued drinking water standards that specified minimum acceptable levels for a number of common industrial chemicals, including some radioisotopes. Federal and state legislation required environmental agencies throughout the U.S. to investigate operating, decommissioned and abandoned landfills of all types. The Superfund program was also initiated at the federal level to help fund clea waste landfills.

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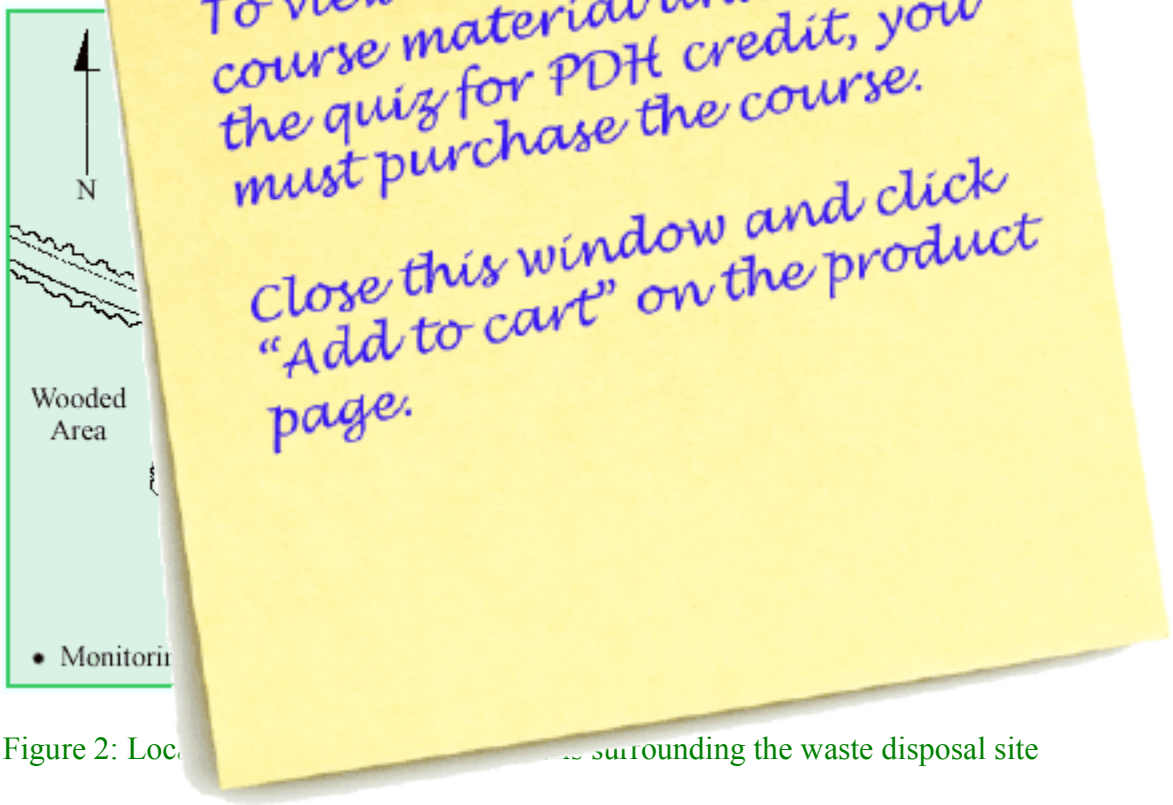

Figure 2: Loc surrounding the waste disposal site

About a month after installation, the State RPA collected groundwater samples from the five monitoring wells for radiological analysis. About a year later, one additional groundwater sample was collected from Well #3 for radiological and organic chemical analysis. The radiological analyses indicated that some of the groundwater samples in the immediate surroundings, south of the fenced area, had elevated Tritium activities. It also appeared that organic chemical contamination might be