CHAPTER 1

Introduction

Installation layout of testing site #1.

1.1 Overview

This evaluation/verification was done in accordance with the *Environmental Technology Evaluation Plan for Installation of Silt Fence Using the Tommy® Slicing Method*, May 2000. The plan was developed by the Environmental Technology Evaluation Center (EvTEC) Technical Evaluation Panel to verify the performance of the Tommy® Silt Fence Static Slicing Method. The overall goal of this project was to independently verify the performance of the slicing method installation and provide a baseline comparison using this innovative installation technique against the trenching method currently used for installing most silt fences.

1.2 Technical Background and Current and Future Regulatory Drivers

Over the past 30 years, the general public has become increasingly aware of the need for technologies to minimize the impact of human-induced environmental degradation. Of the many ways in which mankind can affect the natural environment, non-point source discharges of dirty, sediment-laden storm water from construction sites into natural receiving waters is a practice receiving considerable attention. The desire of the citizens of the United States to minimize the degrading effects of such construction activities is embodied in the Clean Water Act (CWA) and the National Pollutant Discharge Elimination System (NPDES), as published in the Code of Federal Regulations, Volume 40 (CFR-40), “Protection of Environment.”

The NPDES and CWA regulations and requirements raised awareness within the construction industry of the need for environmentally responsible development practices. This awareness typically manifests itself in three different approaches:

1. The use of “conventional” best management practices (BMPs) typically employing non-proprietary products and systems such as hay bales, silt fence, blown straw, and/or loose-placed rip-rap;
2. The use of “advanced” BMPs typically employing proprietary products such as hydraulically applied mulches, blankets and mattings, and heavy-armor systems; or
3. The “do nothing,” bare soil approach, often as a result of limited enforcement resources or lack of knowledge of BMPs and existing regulations within the construction industry.

In the interest of meeting NPDES requirements and developing environmentally sound projects, designers are eager for performance information to support their decisions. Not only are designers requesting this information, project constructors and owners are also demanding reliable performance information. However, performance data and application guidelines on many of these BMPs are either non-existent or very limited.

It is currently difficult or impossible to compare performance information on one BMP with another, due to lack of continuity and consistency between testing procedures, and in some cases, basic scientific inadequacies. One of the biggest impediments to gathering good performance information on BMPs is the regional differences regarding location of the various structures. Regional characteristics such as rainfall, soil types, topography, and vegetation make it difficult to gather comparative performance data on the various practices.

A silt fence is a temporary construction product that prevents the movement of sediment from the construction site to the surrounding environment. Silt fences usually consist of a fabric that is placed around the perimeter of the construction site and is installed such that the bottom of the fence is embedded in a shallow trench, which is backfilled to prevent the storm water from flowing underneath the fence. In the event of water runoff from the site, the silt fence "filters" or holds the water behind the fence so that the silt and sediment settles and prevents the migration of these materials off the site. This prevents costly clean up of adjacent property during and following a construction activity and protects nearby surface water quality. It is essential that silt fences be installed properly.

Typically, silt fences are installed at the outer edge of the cleared construction site and along the side of a stream or surface water such as a pond, lake, or river. The soils on a construction site that are disturbed and have little or no vegetation are considered "open" and subject to runoff in any rain event. It is important to prevent silts and soil sediments from these open sites from being transported via runoff and contaminating nearby surface waters. Sediment-laden runoff has been shown to result in the loss of in-stream habitats for fish and other aquatic species, an increased difficulty in filtering drinking water, the loss of drinking water storage capacity, and the negative impacts on the navigational capacity of waterways (EPA833-F-00-001, January, 2000 Storm Water Phase II Fact Sheet 1.0).

Silt fences need to be maintained in order to give the best service; in reality, few are routinely maintained. The silt fence will usually load up and clog with sediments and debris that accumulate on the fence's fabric after several runoff events. As a result, fences that were meant to filter do not, and over time the force of the water behind the fence can eventually cause the silt fence's failure by undermining the fence and seeping past or blowing out the backfill soils around the fence.

Improper installation practices for silt fences are the cause of many of the problems associated with their use and, over time, have caused many specifiers to stop using the silt fence as BMPs for their sites. Often, the soil that is excavated from the trench and later backfilled to embed the silt fence is not adequately replaced and compacted. This lack of compaction is compounded when the support posts are installed prior to backfilling the trench. Additionally, the silt fence may not be inserted to a uniform depth over the run of an installation. As a result, the silt fence has variable amounts of material in the sub-grade vertical dimension, e.g., one location on the fence may be embedded six inches and another only two inches.

1.3 Project Goals and Objectives

The silt fence was originally conceived as a "filtering" system for removing sediments. However, as stated above, over time and storm events, silt fences actually act to "retain" runoff and rely on sedimentation to remove and capture the majority of sediments. This evaluation/verification compared two different installation techniques for silt fences. It focused on the methods and not the equipment to execute the installation, in order to not limit the future use of the protocol for other technology types. The EvTEC Panel felt that the testing protocol should not focus on the Tommy Silt Fence Machine, but compare the slicing method to the trench method.

Panel members developed a list of concerns and questions regarding the Tommy Silt Fence Slicing method during a meeting held in Washington, D.C., on July 29-30, 1999. From the list of concerns, the following goals and objectives for the verification program were developed:

- Determine if the slicing method of silt fence installation (using the Tommy Silt Fence Machine) is superior to the trenching method;
- Determine if the slicing method is more cost-effective to install than the trenching method; and,
- Detail the implementability, including ease of operation and installation, of each method.

1.4 Summary/Overview of Field Operations

The evaluation/verification was overseen and coordinated by EvTEC, a program of the Civil Engineering Research Foundation, an affiliate of the American Society of Civil Engineers.

The field evaluation was performed in Des Moines, Iowa, over a period of six days in early August 2000. Employees of Carpenter Erosion Control performed the fieldwork with independent oversight by EvTEC's on-site representatives from TRI/Environmental, Inc. All fieldwork involved full-scale installation equipment and experienced silt fence installers. Two primary sites were used for the evaluation, while additional sites were used to demonstrate installation in a variety of conditions. Productivity data, performance data, and density data from the field activities are available upon request from EvTEC.