American Excelsior Company® & Applied Polymer Systems, Inc.

Case Study – Curlex® Best Management Practices with Polymer Flocculants

Introduction

Managing stormwater turbidity and suspended sediment is a major challenge in both channelized and sheet flow environments. Sites with steep slopes, exposed soils, and/or fine clays often struggle to meet compliance standards. However, combining natural-fiber erosion control Best Management Practices (BMPs) and polymer flocculants has been proven to minimize erosion and provide water quality benefits on a variety of sites and environments.

Project Scope

For this project, a channel was designed and built at American Excelsior Company's ErosionLab® to simulate real-world conditions and evaluate how natural-fiber BMPs with the addition of polymer flocculants capture sediment and provide water quality benefits.

The Plan

It is important to keep in mind that one type of flocculant does not work on all soil, sediment, or water. Therefore, the flocculants must be matched to the site-specific soil, sediment, and water via performance testing before field application. Applied Polymer Systems, Inc's (APS) Floc Logs® (see Figure 1), Floc Log Mats, and Silt Stop® powders are flocculant products that utilize environmentally safe, anionic polyacrylamide (PAM) to treat sediment-laden runoff by causing sediment particles to bind together. These products were applied directly to two of American Excelsior Company's Curlex® products for fast-acting treatment: Curlex® III FibreNet™ (see Figure 2) and Curlex® Sediment Log® (see Figure 3). Both Curlex products contain sustainably harvested Great Lakes aspen excelsior fibers that provide hydraulic roughness and surface area to slow water flow and hold soil in place. The engineered curled and barbed fibers also absorb water and create natural attachment points throughout the Curlex fiber matrix that allow sediment and flocculant to adhere within the matrix.

Figure 1: APS 700 Series Floc Log.

Figure 2: Curlex III FibreNet.

Figure 3: Close-up of Curlex fiber matrix within Curlex Sediment Log.

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Executing the Plan

A 100’ channel was constructed with 2H:1V side slopes and a 5% bed grade. The channel was lined with a Curlex III FibreNet erosion control blanket (ECB) and Curlex Sediment Logs spaced at approximate 20’ intervals, creating energy dissipation cells throughout the channel length (see Figure 4). APS Floc Logs, Floc Log Mats, and Silt Stop powder were applied in the upper cell with an additional Floc Log in the second cell (see Figure 5). Turbid water at over 300 Nephelometric Turbidity Units (NTUs) was then introduced into the system (see Figure 6). As the turbid water traveled downstream, the Curlex ECB and Sediment Logs slowed water velocity, which increased mixing and accelerated reaction time, and provided rough fiber surfaces for floc attachment. The Floc Logs, Floc Log Mats, and Silt Stop powder concurrently released polymers that bound suspended particles into heavier flocs that were captured directly on the Curlex fibers (see Figure 7).

Figure 4: Curlex III FibreNet ECB channel with Curlex Sediment Logs in combination with Floc Logs and Silt Stop powder.

Figure 5: Curlex III FibreNet ECB channel with Floc Log and Floc Log Mat.

Figure 6: Floc Logs and Floc Log Mat installed with turbid flow over the Curlex III FibreNet ECB and through the Curlex Sediment Log matrix.

Figure 7: Sediment particles settled onto and captured within the Curlex fiber matrix.

Results

The combination of Curlex erosion and sediment control products with APS flocculant products proved highly effective. When the water exited the channel, turbidity had dropped from over 300 NTUs to approximately 10 NTUs – a reduction of 97% (see Figure 8). The natural Curlex fiber matrix enhanced floc capture, while APS polymers accelerated settlement and caused flocculated sediment to stick/bind to the Curlex fibers, thereby reducing suspended sediment levels (see Figure 9).

Figure 8: Turbid water samples taken from each end of the channel. Left photo: >300 NTUs. Right photo: ~10 NTUs.

Figure 9: Curlex III FibreNet ECB and APS flocculant products working together to lower NTU values by 97%.

Next Steps

The success of this synergistic approach highlights how integrating Curlex natural-fiber BMPs with APS polymer flocculants can dramatically improve sediment and turbidity control in both temporary and long-term applications. These solutions are directly transferable to construction sites, stormwater channels, and slope stabilization projects where compliance with strict water quality standards is required. Ongoing testing and field applications will continue to refine best practices and expand the range of effective treatment options available to contractors, engineers, and regulators.