STORMWATER PROGRAM

California State University, Sacramento
University of California, Davis (UCD)
California Department of Transportation (Caltrans)

Turbidity and Nutrient Removal Using Coagulation in Small-Scale Treatment Studies

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This work reflects the author's opinions and does not represent official policy or endorsement by the California Department of Transportation, the California State University, or the University of California.

Abstract:

For two years, the California Department of Transportation has sponsored research at its smallscale test facility in South Lake Tahoe to develop treatment technologies to meet the Tahoe Basin effluent limits. “Mechanized” treatment systems consisted of chemical addition, followed by slow mixing, settling and pressure filtration. Non-mechanized systems consisted of chemical addition without slow mixing, settling, and gravity filtration. The major coagulant used was a liquid polyaluminum chloride (PAC) product. An organic polymer was also added in the mechanized systems.

During the 2001/02 wet season, PAC was added at a constant dose of 100 mg/L of product. In non-mechanized systems, turbidity and phosphorus limits were met by filtration in most of the experimental runs. In the mechanized system tested, the turbidity standard was met by sedimentation, and the phosphorus standard was usually met by subsequent filtration. The use of PAC improved nitrogen removal, but the discharge standard was rarely met.

During the 2002/03 wet season, the PAC dose was optimized for each batch of storm water treated using jar tests. Optimal doses ranged from 75 to 200 mg/L of product. Filter hydraulic loading rates were also reduced. In the non-mechanized systems, the turbidity and phosphorus standards were nearly met by sedimentation and were met consistently by filtration. In the two mechanized systems tested, turbidity and phosphorus standards were met consistently by sedimentation. During this season, the nitrogen standard was met consistently, but the influent concentrations were significantly lower than those of the previous season.

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Audio visual requirements: PowerPoint slides planned.