

Polyacrylamide (PAM) for Turbidity Reduction and Sediment Control

(no.)
CODE 894



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DEFINITION

The application of a granular and/or semi-hydrated block of water soluble Anionic or Nonionic Polyacrylamide (PAM) to flocculate fine clays and silts in stormwater and enhance sediment removal.

PURPOSE

The purpose of this practice is to prevent sediment and turbid stormwater from entering into drainageways, storm sewers and receiving waters.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where turbid stormwater associated with the suspension of fine soil particles needs to be clarified and sediment captured prior to discharge. Examples of applicable activities may include the following:

- dewatering
- pipe discharges

- channelized or concentrated flow paths
- storm sewer conveyance and collection systems
- temporary diversions
- bypass channels

CRITERIA

Only Anionic or Nonionic PAM shall be used for stormwater treatment. No Cationic PAM formulations shall be used for stormwater treatment due to high toxicity to aquatic life.

Polyacrylamide shall not be used in an effort to flocculate large sediment particulates such as sands and any PAM treatment system used shall be designed to protect the PAM from heavy sediment loads and larger sized sediment particulates.

When handling and mixing PAM Manufacturers' recommendations and criteria shall be followed.

Polyacrylamides for stormwater clarification are soil specific. PAM shall be tested with on-site soil and water samples to determine which formulation performs most effectively.

Polyacrylamide must mix completely within the water column for sufficient flocculation of sediment to occur. Mixing time of the polymer shall be calculated to determine where flocculated sediment will form (usually occurs within one to three minutes of mixing time).

All flocculated sediment formed during the mixing process shall be trapped before the water is discharged from the site (See IUM technical standards for TEMPORARY SEDIMENT TRAP 960 and TEMPORARY SEDIMENT BASIN 957. Capture and removal of sediment shall take place within the limits of disturbance and prior to discharge of stormwater off-site. This may include the combined usage of other sediment control best management practices in order to effectively remove sediment from stormwater discharge.

Polyacrylamides used for sediment control and turbidity reduction shall have a charge density of 8-35% by weight and have a molecular weight of 6 to 24 mg/mole.

The acrylamide used in the PAM shall have active monomer limits of $\leq 0.05\%$ by weight.

CONSIDERATIONS

The following considerations should be taken into account when designing, installing, and maintaining PAM systems for sediment control and turbidity reduction:

Soil and water samples from the site should be tested with different PAM formulations to ensure effectiveness on specific sites with the selected PAM formulation and product.

Personal protective equipment such as a dust mask, gloves, and safety goggles when handling PAM are recommended.

Polyacrylamide becomes extremely slippery when wet. Do not clean up spilled PAM with water as the surface will become extremely slippery and a fall hazard. Spilled PAM should be swept clean or removed without the addition of water.

Place semi-hydrated PAM blocks as close to the source of sediment or turbidity as possible to improve the effectiveness of the treatment and to provide additional length of flow and mixing time for treatment.

Semi-hydrated PAM blocks should be placed in a manner to protect the blocks from becoming desiccated. Moist PAM blocks remain active to dissolve into stormwater that flows over the blocks while dried blocks require a rewetting time before treatment is activated.

Care should be taken to protect semi-hydrated PAM blocks from heavy sediment loads. Heavy sediments can bury or attach themselves to the PAM block, thereby reducing the surface area exposed to stormwater and limiting their effectiveness.

PLANS AND SPECIFICATIONS

Plans and specifications for installing PAM for sediment control and turbidity reduction shall be in keeping with this standard and shall describe the

requirements for applying the practice to achieve its intended purpose. As a minimum include the following:

1. Provide clear design and installation criteria for the PAM treatment system including:
 - method of introduction of the PAM to the stormwater to be treated;
 - mixing procedures and timing of reaction;
 - method of capture and containment of flocculated sediments.
2. Location where the practice is to be applied.
3. Application rates and directions for PAM application.
4. The manufacturer and specific PAM product to be used on-site based on soil and water testing for site specific soils.
5. Material Safety Data Sheets (MSDS) for the specific PAM product to be used.
6. Acute and chronic toxicity testing for aquatic organisms for the PAM product to be used meeting USEPA Test Method EPA 600/R-92-080 or EPA 600/R-92-081.
7. Management plan of stormwater discharge locations.

Any PAM treatment system for turbidity reduction and sediment control shall be designed and installed to achieve significant reductions in turbidity levels in stormwater discharged through the system.

Standard drawings 594A and 594B
TEMPORARY MIXING SWALE WITH

OPTIONAL BAFFLE PIT may be used on the plan sheet(s).

OPERATION AND MAINTENANCE

PAM treatment system shall be inspected daily or weekly depending on the design of the system used and after rainfall events. Inspections shall be conducted to ensure the effectiveness of the treatment system and to assess the need for maintenance and clean out of the sediment capturing device(s). Monitor runoff, the treatment system, and the clarity of stormwater discharge to ensure effectiveness and direct maintenance as necessary.

Polyacrylamide shall be reapplied or additional PAM formulations shall be added as necessary to achieve proper flocculation of sediments.

Adjust PAM formulations and products as needed if soil variability is encountered during treatment.

Replace semi-hydrated PAM blocks as necessary to achieve effective flocculation of sediments.

Keep all unapplied PAM dry and protected from weather prior to use.

Maintain sediment screens, filters, traps, and other sediment containment devices used with these systems as necessary.

Sediment shall be removed from the capturing system and the impoundment restored to its original dimensions when sediment has accumulated to one-half the height of the containment area.

Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode and cause sedimentation problems.

Temporary PAM treatment systems shall be removed when they have served their useful purpose, but not before the upslope area and source of sediment or turbidity has been permanently stabilized.

IL Urban Manual Technical Committee

February 2011

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REFERENCES

Erosion and Sediment Control Technical Bulletin #2, *Application of Anionic Polyacrylamide for Soil Stabilization and Storm Water Management*, Virginia Department of Conservation and Recreation, July 2002

Georgia Soil and Water Conservation Commission. 2000. *Polyarylamide (PAM)*. Manual for Erosion and Sediment Control in Georgia, 5th Edition. pp. 6-67 – 6-68.

Soil Facts, Using Polyacrylamides (PAM) to Control Turbidity, Richard A. McLaughlin, North Carolina Cooperative Extension Service Fact Sheet AGW-439-59

University of Central Florida – Stormwater Management Academy, *Polymer Enhanced Best Management Practice Guide*,

U.S. Environmental Protection Agency. 2002. *Construction Site Storm Water Runoff Control – Chemical Stabilization*. Stormwater Phase II Menu of BMPs & Model Permits. EPA Office of Wastewater Management webpage.

U.S. Environmental Protection Agency. 1994. *Chemical Summary for Acrylamide*. Office of Pollution Prevention and Toxics. EPA-749-F-94-005a.