

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
ANIONIC POLYACRYLAMIDE (PAM) APPLICATION
(Ac.)

CODE 450

DEFINITION

Application of water-soluble Anionic Polyacrylamide (PAM) to meet a resource concern.

PURPOSE

This practice may be applied as part of a resource management system to achieve one or more of the following purposes:

- Reduce soil erosion by water or wind.
- Improve water quality.
- Improve air quality by reducing dust emissions.
- Reduce energy use.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to:

- Irrigated lands susceptible to irrigation-induced erosion where the sodium adsorption ratio (SAR) of irrigation water is less than 15.
- Critical areas where the timely establishment of vegetation may not be feasible or where vegetative cover is absent or inadequate.
- Areas where plant residues are inadequate to protect the soil surface from wind or water erosion.
- Sites where disturbance activities prevent establishment or maintenance of a cover crop.

This practice does not apply to soils with peat or organic matter surface horizons. This practice does not apply to the application of PAM to flowing, non-irrigation waters.

CRITERIA

General Criteria Applicable To All Purposes

All application rates listed in this standard are based on the active ingredient of PAM in the product. Various formulations of PAM products should be applied according to the actual amount of PAM contained in the product.

The PAM application shall:

- Be of the anionic type meeting acrylamide monomer limits of ≤ 0.05 percent.
- Have a charge density of 10 to 55 percent, by weight.
- Have a molecular weight of 6 to 24 Mg/mole.
- Be mixed and/or applied in accordance with Occupational Safety and Health Administration (OSHA) Material Safety Data Sheet requirements and the manufacturer's recommendations.

Additional Criteria Applicable to Reduce Soil Erosion by Water or Wind

Surface Irrigation. PAM shall be used during the first irrigation and after any soil disturbance (for example cultivation). PAM shall be used during later irrigations if soil movement is observed. Pre-irrigation is considered irrigation.

Add mixed concentrations of PAM to irrigation water only during the advance phase of a surface irrigation. The advance phase is from the time irrigation starts until water has advanced to the end of the field.

Apply dry or patch treatments of PAM over an area covering the first 5 feet of furrow.

The resulting concentration of PAM in irrigation water shall not exceed 10 ppm of pure form polyacrylamide, applied on a total product basis.

Sprinkler Irrigation. The maximum application rate of polyacrylamide active ingredient shall not exceed 4 pounds per acre per application.

Totally mix and liquefy PAM mixtures prior to injection into the irrigation system.

Inject only on the downstream side of all screens and filters.

Critical Areas. The maximum application rate of pure form polyacrylamide shall not exceed 200 pounds per acre per year.

Insure uniform application coverage to the target area, minimizing drift to non-target areas.

Additional Criteria Applicable to Reduce Energy Use

Provide analysis to demonstrate reduction of energy use from practice implementation.

Reduction of energy use is calculated as average annual or seasonal energy reduction compared to previous operating conditions.

CONSIDERATIONS

The following relate to the application of PAM that may enhance or avoid problems with the practice, but are not required to insure its basic conservation function.

General

PAM application rates may need to be adjusted based on soil properties, slope, and type of resource concern targeted.

Tailwater or runoff containing PAM should be stored for re-use or recycled on other land areas.

Use PAM in combination with other conservation and Best Management Practices that may improve erosion control.

Polyacrylamide may increase downstream or offsite sediment deposition.

Irrigation Induced Erosion Considerations

Other conservation treatments such as land leveling, irrigation water management, reduced tillage, reservoir tillage, crop rotations, etc., should be used in conjunction with this practice to control irrigation-induced erosion.

On fine-to medium-textured soils, PAM may increase infiltration up to 60 percent, with 15 percent being typical on medium textured soils. Infiltration rates can be expected to diminish or

stop in succeeding irrigation treatments if there is no soil disturbance between applications. Using higher-than-recommended application rates will usually decrease, rather than increase, infiltration rate. Polyacrylamide use on coarser textured soil will probably decrease infiltration.

Adjustments in flow rates, set times, and tillage practices should be considered to compensate for PAM-induced changes in infiltration.

Reduction from maximum PAM rates and volumes should be considered, as long as no visible erosion occurs.

Sprinkler-fed systems will probably need multiple applications to significantly reduce erosion.

Applications at the end of the season are discouraged, unless the field has been recently tilled.

Wind/Precipitation Erosion and Dust Emissions Considerations

Combining seed with the PAM mixture extends erosion protection beyond the life of the PAM material.

Safety and Health

Use proper personal protective equipment, e.g., gloves, masks, and other health and safety precautions in accordance with the label, industry, and other federal or state, and local chemigation rules and guidelines.

PAM dust can cause choking and difficulty breathing if inhaled. Persons handling and mixing PAM shall use a dust mask recommended by the manufacturer.

PAM solutions can cause floors, other surfaces, tools, etc. to become very slippery when wet.

Clean liquid PAM spills with dry absorbent material (sawdust, soil, cat litter, etc.) and sweep/collect dry PAM material without washing with water.

Avoid sprinkling roadways when applying PAM to prevent slick conditions.

PLANS AND SPECIFICATIONS

Specifications shall be developed and be site specific for each application. Specifications for this practice will be prepared for each field or treatment unit according to the criteria, considerations, and operation and maintenance described in this standard. Specifications shall

be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

An Operation and Maintenance Plan must be prepared for the landowner or operator responsible for PAM application. The plan shall provide specific instructions for:

- Reapplying PAM to disturbed or tilled areas, including high-traffic use areas.
- Monitoring irrigation advance phases to assure applications are discontinued when runoff begins.
- Operating and maintaining equipment to sustain a uniform application rate.
- Maintaining screens and filtering facilities.
- Thoroughly cleaning all PAM mixing and application equipment with water to avoid residue formation. For sprinkler systems flush injection equipment (PAM injection pump, tubing, valves, etc.) with crop oil before and after injecting concentrated liquid

PAM (30 to 50 percent active ingredient). Crop oil provides a buffer between PAM and water so non-flowing PAM does not contact water and form a gelatinous mass that can plug valves and tubing.

- For sprinkler injection, the PAM injection pump should be started after water is flowing in the sprinkler system. To flush PAM from sprinklers stop the injection pump before the irrigation pump.

REFERENCES

- Aase, J.K., D.L. Bjorneberg, and R.E. Sojka. 1998. Sprinkler irrigation runoff and erosion control with polyacrylamide - laboratory tests. *Soil Sci. Soc. Am. Journal*. 62:1681-1687.
- Lentz, R.D. and R.E. Sojka. 2000. Applying polymers to irrigation water: Evaluating strategies for furrow erosion control. *Trans. ASABE* 43(6): 1561-1568.
- Sojka, R.E., D.L. Bjorneberg, J.A. Entry, R.D. Lentz, and W.J. Orts. 2007. Polyacrylamide in agriculture and environmental land management. *Advances in Agronomy* 92:75-162.