

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

ANIONIC POLYACRYLAMIDE (PAM) APPLICATION

(Acre)
Code 450



DEFINITION

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

PURPOSE

This practice is applied as part of a conservation system to support one or more of the following:

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

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 standard does not apply to:

- soils with peat or organic matter surface horizons;
- the application of polyacrylamides to flowing, non-irrigation, waters.

CRITERIA

Impact to cultural resources, wetlands and Federal and state protected species shall be evaluated and avoided or minimized to the extent practicable during planning, design and implementation of this conservation practice in accordance with established National and Florida policy, General Manual (GM) Title 420-Part 401; Title 450-Part 401, Title 190-Parts 410.22 and 410.26, National Planning Procedures Handbook (NPPH) Florida Supplements to Parts 600.1 and 600.6, National Cultural Resources Procedures Handbook (NCRPH), National Food Security Act Manual (NFSAM), and the National Environmental Compliance Handbook (NECH).

General Criteria Applicable To All Purposes

All application rates listed in this standard are based on 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.

Make changes in management where increases in soil infiltration rates can be expected as a result of implementing this practice.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

The PAM shall:

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

Additional Criteria Applicable to Reduce Soil Erosion by Water or Wind

Surface Irrigation. Use PAM during the first irrigation (pre-irrigation is considered irrigation), after any soil disturbance (for example cultivation), and during later irrigations if soil movement is observed.

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

Place dry or patch treatments of PAM over an area of the first five (5) feet of furrow.

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

Sprinkler Irrigation. The maximum application rate of PAM active ingredient shall not exceed four (4) pounds per acre (lb/ac) per single application event.

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

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

Conform to all Federal and state chemigation standards.

Critical Areas. The maximum application of pure form PAM shall not exceed 200 lb/ac per year.

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

CONSIDERATIONS

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

General

Adjust PAM application rates as necessary based on soil properties, slope, and type of resource concern targeted.

Where reasonably possible, store tailwater or runoff containing PAM for re-use or recycled on other land areas.

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

The use of PAM may increase downstream or offsite deposition of sediment.

Irrigation Induced Erosion Considerations

Use other conservation treatments such as land leveling, irrigation water management, reduced tillage, reservoir tillage, crop rotations, etc., in conjunction with this practice to control irrigation induced erosion.

On fine to medium textured soils, PAM may result in an increase in surface irrigation infiltration of up to 60%, with 15% being typical on medium textured soils. Infiltration increases can be expected to diminish or be eliminated in succeeding treated irrigations, if there is no soil disturbance between applications. Use of higher than recommended application rates will usually decrease infiltration rates, rather than increase them. PAM use on coarser textured soil is more likely to decrease infiltration.

To compensate for PAM changes in infiltration, consider adjustments in flow rates, set times, and tillage practices.

Consider reduction in PAM rates and volumes from maximum allowed so long as no visible erosion occurs.

Sprinkler systems will likely need multiple applications to achieve a significant erosion reduction.

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

Wind or Precipitation Erosion Considerations

Combing 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 rules and guidelines.

PAM dust can cause choking and difficulty in breathing. Persons handling and mixing PAM shall use a dust mask of a type 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.

To prevent slick conditions, avoid sprinkling roadways when applying PAM.

PLANS AND SPECIFICATIONS

Specifications will be developed site specifically for each application. Specifications for this practice shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. 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.

Record specifications using approved specification sheets, job sheets, narrative statements in the conservation plans, or other acceptable documentation specifying applicable requirements, and components necessary for applying and maintaining the practice to achieve its intended purpose(s).

As a minimum, include the following in the plans and specifications for each field where PAM is applied:

- Location of area to be treated.
- Purpose of the application.

- The concentration of PAM in irrigation water applied on a total product basis.
- The application rate of PAM active ingredient.
- Sodium adsorption ratios of irrigation water.
- Chemical composition of PAM to be used.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance (O&M) plan for use by the landowner or operator responsible for PAM application. The plan shall document needed actions to ensure that practices perform adequately throughout their expected life.

O&M requirements shall be included as an identifiable part of the design. Depending on the scope of the project, this may be accomplished by brief statements in the plans and specifications, the conservation plan narrative, or as a separate O&M plan.

The O&M Plan shall provide specific instructions for PAM applications to ensure it is used properly.

The O&M plan shall include the, but not limited to the following provisions:

- Reapplying PAM to disturbed or tilled areas, including high traffic use areas.
- Monitoring advance phases of the irrigation to assure applications are discontinued when runoff begins.
- Operating and maintaining equipment to provide uniform application rates.
- Maintaining screens and filtering facilities.
- Clean all PAM mixing and application equipment thoroughly with water to avoid formation of PAM residues.
- 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 ingredients). 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 injection pump before the irrigation stops.

- Downstream deposition from the use of PAM may require periodic cleaning to maintain normal functions.

REFERENCES

Lentz, R.D. and R.E. Sojka. Applying Polymers to Irrigation Water: Evaluating Strategies for Furrow Erosion Control. Trans. ASABE 43(6): 1561-1568.

Aase, J.K., D.L. Bjorneberg, and R.E. Sojka. Sprinkler Irrigation Runoff and Erosion Control with Polyacrylamide - Laboratory Tests. Soil Sci. Soc. Am. Journ. 62:1681-1687.

Sojka, R.E., D.L. Bjorneberg, J.A. Entry, R.D. Lentz, and W.J. Orts. Polyacrylamide in Agriculture and Environmental Land Management. Advances in Agronomy 92:75-162.

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