NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

ANIONIC POLYACRYLAMIDE (PAM) EROSION CONTROL

(Acre)
CODE 450

DEFINITION

Erosion control through application of water-soluble anionic polyacrylamide (PAM).

PURPOSE

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

- Minimize or control irrigation-induced soil erosion,
- Reduce wind and/or precipitation erosion,
- Reduce early season irrigation water application,
- Flocculate clay particles to improve infiltration rate.

CONDITIONS WHERE PRACTICE APPLIES

- On irrigated lands susceptible to irrigation-induced erosion, excluding peat soils, and where the sodium adsorption ratio (SAR) of irrigation water is less than 15;
- On areas where the timely establishment of vegetation may not be feasible or where vegetative cover is absent or inadequate;
- On areas where plant residues are inadequate to protect the soil surface from wind erosion; and
- On sites where disturbance activities prevent establishment or maintenance of a cover crop.
- On sites where early season irrigation requires excessive water application to adequately wet the seedbed for germination.

This standard does not apply to the application of polyacrylamides to flowing, non-irrigation, waters.

CRITERIA

Changes in management shall be implemented where excess water infiltration rates are a result of implementing this practice.

PAM shall:

- Be of the 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, and
- Conform to all federal, state, and local laws, rules, and regulations.

Irrigation Induced Soil Erosion. Surface and Sprinkler irrigation have particular requirements as well.

With Surface Irrigation:

- PAM has been effective if used during the first irrigation. It might prove to be beneficial to apply PAM after any soil disturbance (pre-plant irrigation is considered irrigation) and during later irrigations if soil movement is observed.
- In some instances the use of PAM has shown a reduced time of application for early season irrigations, primarily pre-planting irrigation.
- Mixed concentrations of PAM is most effective when added to irrigation water only during the advance phase of a surface

irrigation. The advance phase shall be considered the time irrigation starts until water has advanced to the end of the field.

- Dry or "patch" treatments of PAM shall be placed along the first five feet of furrow.
- The resulting concentration of PAM in irrigation water shall not exceed 10 parts per million (ppm) of pure form polyacrylamide, applied on a total product basis. 10 ppm equals about 2.25 pounds per acre-inch of water.

With Sprinkler Irrigation:

- The maximum application rate of Polyacrylamide active ingredient shall not exceed 4 pounds per acre per single application event.
- PAM mixtures will be totally mixed and liquefied prior to injection into the irrigation system.
- Injection shall occur on the downstream side of all screens and/or filters. Injection shall conform to federal and state chemigation standards. Refer to Conservation Practice Standard 430DD, High Pressure, Underground, Plastic Pipeline for check valve requirements for backflow prevention.

Wind and/or Precipitation Erosion. The maximum application rate of pure form polyacrylamide shall not exceed 200 lb./ac per year.

Emulsion batches shall be mixed with pure form polyacrylamide not exceeding 200 pounds per batch.

Application method shall insure uniform coverage to the target area, minimizing drift to non-target areas.

CONSIDERATIONS

The following relate to the application of the polyacrylamide practice 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 erosion targeted.

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

Use of polyacrylamide in combination with other conservation and Best Management Practices will improve erosion control.

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

PAM may result in an increase in surface irrigation infiltration of up to 60%, with 15% being typical on medium textured soils.

To compensate for changes in infiltration due to the use of PAM, adjustments in flow rates, time of set, and tillage practices should be considered.

Reduction of PAM application rates should be considered so long as no visible erosion occurs.

Secondary applications on undisturbed soil may be needed in surface irrigation when sediment or erosion is noted.

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

For sprinkler systems, before and after injecting concentrated liquid PAM (30 to 50% active ingredient) into sprinkler irrigation systems, it is a good practice to pump a surfactant (crop oil) through the injection system (pump, tubing, valves, etc.). Surfactants provide 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 injection pump should be started only after water is flowing in the sprinkler system and stopped just prior to when the irrigation pump stops.

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

Erosion by Wind or Precipitation. Adding seed to polyacrylamide mixture may provide additional erosion protection beyond the life of the PAM material.

PAM may improve water quality, infiltration, soil fertility, and air quality.

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.

Inhaled in large quantities, 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 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.

PLANS AND SPECIFICATIONS

Specifications will be developed site specifically 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 use by the landowner or operator responsible for PAM application. The plan should provide specific instructions for PAM applications to insure it is used properly. Plan items may consist of:

- 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.
- Equipment being operated and maintained to provide uniform application rates.
- Maintenance of screens and filtering facilities.
- Rinsing all PAM mixing and application equipment thoroughly with water to avoid formation of PAM residues.

PAM is a flocculating agent. When it encounters sediment-laden waters, It may cause deposition downstream. This deposition may require periodic cleaning to maintain normal functions.

REFERENCES

NRCS Conservation Practice Standard 430DD, High Pressure, Underground, Plastic Pipeline

NRCS Conservation Practice Standard 449, Irrigation Water Management