Erosion Control
Land Application of Anionic Polyacrylamide
Code 1050

Department of Natural Resources
Conservation Practice Standard

I. Definition

The land application of products containing water-soluble anionic polyacrylamide (PAM) as temporary soil binding agents to reduce erosion.

II. Purpose

The purpose of this practice is to reduce erosion from wind and water on construction sites and agricultural lands.

III. Conditions Where Practice Applies

This practice is intended for direct soil surface application to sites where the timely establishment of vegetation may not be feasible or where vegetative cover is absent or inadequate. Such areas may include agricultural lands where plant residues are inadequate to protect the soil surface and construction sites where land disturbing activities or winter shutdown prevent establishment or maintenance of a cover crop.

This practice is not intended for application to surface waters of the state as defined by the Wisconsin Department of Natural Resources (WDNR) ch. NR 102.

IV. Federal, State and Local Laws

Anionic PAM application shall comply with all federal, state, and local laws, rules or regulations governing anionic PAM. The operator is responsible for securing required permits. This standard does not contain the text of the federal, state, or local laws governing anionic PAM.

V. Criteria

A. Toxicity Criteria. Anionic PAM mixtures shall be environmentally benign, harmless to fish, aquatic organisms, wildlife, and plants. Anionic PAM mixtures shall be non-combustible.

1. Cationic PAM shall not be used at any level because its toxicity to aquatic test species occurs at very low concentrations.
2. Anionic PAM mixtures shall have ≤ .05% free acrylamide monomer by weight as established by the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA).
3. Each manufacturer or supplier shall provide to the WDNR acute toxicity test data from a certified lab, as defined in ch. NR149 Wis. Adm. Code, for their anionic PAM mixture. Procedures specified in the "State of Wisconsin Aquatic Life Toxicity Testing Methods Manual", WDNR, as referenced in s. NR219.04, Wis. Adm. Code shall be used. The WDNR use restriction shall be developed from this data.
4. Users of anionic PAM mixtures shall obtain and follow all Material Safety Data Sheet requirements, manufacturer recommendations, and WDNR use restrictions.

B. Application Criteria

1. The manufacturer or supplier shall provide a product expiration date for anionic PAM mixtures based on product expiration date of PAM in pure form. The manufacturer or supplier shall provide general written application methods, based on site conditions, such as slope and soil type.
2. Application rates shall not exceed manufacturer's written application rate recommendations that shall not exceed the WDNR use restrictions.
3. Maximum application rates, in parts per million (ppm or mg/L or mg/kg), shall be determined by multiplying 1.4 by the number of pounds applied per acre. This number shall be less than or equal to the WDNR use restriction. Higher concentrations of anionic PAM mixtures may actually decrease

effectiveness. Repeated applications of anionic PAM mixtures may be applied, if necessary, to ensure adequate effectiveness.

4. The application method shall provide uniform coverage to the target area and avoid drift to non-target areas.
5. The manufacturer or supplier shall provide written instructions to insure proper safety, storage, and mixing of their product.
6. Anionic PAM mixtures shall be used in conjunction with other Best Management Practices (BMPs).
7. When used on bare soil, without seed or mulch, anionic PAM mixtures shall be used on slopes 2.5:1 or flatter.
8. Anionic PAM mixtures shall not be applied to channel bottoms.
9. The applicator of anionic PAM mixture shall document, at the time of application, the following: name of applicator, application rate per acre, date applied, product type, weather conditions during application, and method of application. Copies of this documentation shall be entered into the contractor's monitoring log or project diary and made available upon request.
10. Unused liquid anionic PAM mixtures shall be minimized. Excess material shall not be applied at a rate greater than the maximum application rate. Disposal shall not occur in stormwater conveyance systems (ie. storm sewer manholes, storm sewer inlets, ditches, and culverts).

C. Product Approval Criteria

1. Toxicity test results shall be reviewed by the WDNR and shall receive a written product use restriction. Toxicity test results shall be submitted to: Water Quality Standards Section, WDNR, 101 South Webster St., P.O. Box 7921, Madison, WI 53707, as a pre-qualification for field testing.

2. Anionic PAM mixtures shall achieve ≥ 80% reduction in soil loss as measured by a 1 hour storm duration 2"/hour rainfall simulator test performed in accordance with methods used by Bubenzer and Patterson (1982) as a pre-qualification for field testing.

3. Performance of anionic PAM mixtures shall be verified and field-tested by the WisDOT or other WisDOT-designated facility.

4. The Wisconsin Department of Transportation, Erosion Control Storm Water – Product Acceptability List Committee (ECSW), will review and approve products as per the process set forth in WisDOT's PAL. **Only products approved for use in Wisconsin may be used.** Copies of the PAL are available off the State DOT web site: http://www.dot.state.wi.us/dtid/bhc/pal.html Questions may be sent to: New Products Engineer, WisDOT, Technology Advancement, 3502 Kinsman Blvd., Madison, WI 53704.

VI. Considerations

The following are additional recommendations, which may enhance the use of, or avoid problems with the practice.

A. Adding seed to the anionic PAM mixture may provide additional erosion protection beyond the life of the anionic PAM.

B. Mulching is typically needed to protect the seed from the effects of wind and sun. Seed germination is not enhanced or impeded by the anionic PAM mixture.

C. Using a minimum 30 ft setback when applying anionic PAM mixture near surface waters of the state is recommended.

D. Applying anionic PAM mixture to soil may provide benefits of improved water quality, infiltration, soil fertility, and visibility by reducing wind and water erosion.

E. For erosion control, the anionic PAM mixture may be applied upgradient of lands planted in food crops.

F. Application of anionic PAM mixture may be particularly effective in the following situations:
- During rough grading operations
- Phased construction projects
- Stockpiles
- After final grading and before paving or final seeding and planting
- Sites having a winter shutdown
- Agricultural lands where plant residues are inadequate
- Sites receiving final landscaping, but where adequate vegetation cannot be established prior to winter.

G. Application of anionic PAM mixture may not be as effective in the following situations:
- When the soil surface is pure sand or gravel with no fines.

- When applied over snow cover.

H. Visible tracer or colorant to visually track application is recommended.

I. Anionic PAM mixtures may be applied in liquid and granular forms.

J. Application rates of anionic PAM mixtures may need to be adjusted based on soil type, slope, and type of erosion targeted (ie. wind or water). Based on manufacturer's recommendations, higher application rates may be necessary when applied in granular form.

K. Anionic PAM mixtures combined with water are very slippery and can be a safety hazard. Care must be taken to prevent spills of anionic PAM mixtures onto paved surfaces. During an application of anionic PAM mixture, prevent over-spray from reaching pavement, as pavement will become slippery.

L. Care should be taken when applying anionic PAM mixtures in liquid form on saturated slopes due to the possibility of slope structural failure. Anionic PAM mixtures may be applied to steeper slopes when used with other erosion control BMPs such as seed and mulch or erosion mat.

VII. Specifications

Erosion control and stormwater plans specifying anionic PAM mixtures for erosion control shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

VIII. Operation and Maintenance

Maintenance will consist of reapplying anionic PAM mixtures to disturbed areas, including high use traffic areas, which interfere in the performance of this practice. Anionic PAM mixture may lose its effectiveness in as little as two months due to weather conditions. Anionic PAM mixtures should be reapplied in areas where wind or rill erosion is apparent and whenever an area has been graded, driven upon, or otherwise disturbed since the anionic PAM mixture was last applied.

IX. References

Bubenzer, G.D., and Patterson, A.E., *Intake Rate: Sprinkler Infiltrometer*, Method of Soil Analysis, Part 1, Physical and Mineralogical Method, Second Edition, Chapter 33, pp. 845-870. (Agronomy Monograph Series #9, 1982).

Managing Irrigation-Induced Erosion And Infiltration With Polyacrylamide, Proceedings From First Conference, University of Idaho Miscellaneous Publication No. 101-96, (Kimberly, Idaho, USDA-ARS Northwest Irrigation and Soils Research Lab, 1996).

Roa-Espinosa, A., Bubenzer, G.D. and Miyashita, E., Sediment and Runoff Control on Construction Sites Using Four Application Methods of Polyacrylamide Mix, National Conference on Tools for Urban Water Resource Management and Protection, Chicago, February 7-10, 2000, pp. 278- (EPA, 2000).

Roa-Espinosa, A., Bubenzer, G.D. and Miyashita, E., *Determination of PAM Use in Erosion Control on Construction Sites*, 1st Inter-Regional Conference on Environment-Water: Innovative Issues in Irrigation and Drainage, Lisbon, Portugal, September 1998 (Portuguese National Committee of ICID, 1998).

Roa- Espinosa, A., *Are there Safety Concerns or Environmental Concerns with PAM?* (Dane County Land Conservation Department, 1997).

Sojka, R.E. and Lentz, R.D., "A PAM Primer: A brief history of PAM and PAM related issues," *http://kimberly.ars.usda.gov/pamprim.ssi*, (Kimberly, ID: USDA-ARS Northwest Irrigation and Soils Research Lab, 1996).

Wisconsin Administration Code (Wis.Adm.Code), Department of Administration, Legislative Reference Bureau, Section 35.84 of the statutes (available at depository public libraries, most law school libraries, and online: http://www.legis.state.wi.us/rsb/code/index.html).

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