WISCONSIN
DEPT. OF NATURAL RESOURCES

BUREAU OF WATERSHED MANAGEMENT TECHNICAL STANDARD

Storm Water Management Program

Land Application of Additives for Erosion Control Technical Standard 1050

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APPROVED:

Pam Biersach

Pam Biersach, Director
Bureau of Watershed Management

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Date

Land Application of Additives for Erosion Control

(1050)

Wisconsin Department of Natural Resources
Conservation Practice Standard

I. Definition

The land application of products containing water-soluble and non-soluble *additives*[1] (products that are added to soil to create soil particle bonding) to temporarily reduce erosion. Products include *polyacrylamide (PAM)* and other *polymers.*

II. Purpose

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

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 intended for land application of additives (with an established *allowable usage rate*) when runoff could enter *surface waters of the state* as defined by the Wisconsin Department of Natural Resources (WDNR) ch. NR 102, Wis. Adm. Code. Additives shall not be directly applied to *surface waters of the state*.

IV. Federal, State and Local Laws

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

V. Criteria

A. Toxicity Criteria

Where additives could discharge to surface waters of the state, the WDNR reviews toxicity data for the *additive mixture* based on the guidance titled "Water Quality Review Procedures for Additives".

This technical standard outlines the toxicological analysis of land applied additive mixtures to arrive at an allowable usage rate (in mg/l or ppm) that is environmentally benign, harmless to fish, aquatic organisms, wildlife, and plants. This guidance lists the toxicity test results, parameters, and physical information needed to enable the WDNR to calculate the allowable usage rate for the specific product.

When additives could discharge to groundwater, polyacrylamide additives shall have < 0.05% free acrylamide monomer by weight as established by the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA).

B. Application Criteria

1. Application rates shall not exceed manufacturer's written application rate recommendations or the WDNR *allowable application rate* (expressed in lbs/acre).
2. The allowable application rate (lbs/acre) is determined by multiplying the allowable usage rate (mg/l) by (lbs/acre)/1.4 mg/l.
3. The application method shall provide uniform coverage to the target area and avoid drift to non-target areas.
4. The manufacturer or supplier shall provide written instructions (including the *Material Safety Data Sheet or the Safety Data Sheet)* to ensure proper safety, storage, and mixing of their product. The manufacturer shall provide general written application methods based on site conditions (such as slope and soil type) and the product degradation rate and rainfalls before the need for re-application.

[1] Words in the standard that are shown in italics are described in X. Definitions. The words are italicized the first time they are used in the text.

5. The additive shall be used in conjunction with other Best Management Practices (BMPs).
6. When used on bare soil, without seed or mulch, additives shall be used on slopes 3:1 or flatter.
7. Additives shall not be applied to channel bottoms.
8. Unused additive mixtures shall be minimized. Excess material shall not be applied at a rate greater than the allowable application rate. Disposal shall not occur in storm water conveyance systems (i.e., storm sewer manholes, storm sewer inlets, ditches, or culverts).
9. At the time of application, the applicator of the additive mixture shall document the following:
   - Name of applicator
   - Application rate in lbs/acre
   - Date applied
   - Product type
   - Weather conditions during application
   - Method of application

   Copies of this documentation shall be entered into the contractor's monitoring log or a project diary and made available upon request.
10. The manufacturer or distributor shall provide the following for the applicator:
    - Labels affixed to the additive mixture containers that indicate the recommended application rate and the allowable application rate based on the allowable usage rate.
    - A product expiration date for the additive mixture based on product expiration dates of the polymer.
    - General written application methods.
    - Written instructions to provide proper safety, storage, and mixing of the product.

C. Product Review Criteria

1. Toxicity test results for the additive mixtures shall be submitted to: Runoff Management Section-Additive Review, WDNR, 101 South Webster St., P.O. Box 7921, Madison, WI 53707, as a pre-qualification for field use.

   The WDNR will review the toxicity test (water flea minimum) results and will provide a written product allowable usage and application rate.
2. The additive mixture shall be resubmitted for toxicity testing if any portion of the mixture is altered subsequent to its receiving an allowable application rate. Such alterations may include:
   - The amendment of base additive and/or any other additives.
   - The ratios of individual components.
3. Additives reviewed with regard to toxicity may still be subject to additional performance evaluation by end users.
4. Land applied additives intended for use on WisDOT sponsored projects shall be reviewed through the WisDOT pre-approval process for erosion control materials. Information can be found at the WisDOT product acceptability list (PAL).

   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. Additive mixtures may be tested for erosion control performance under ASTM D6459, as modified in the American Association of State Highway and Transportation Officials (AASHTO) National Transportation Product Evaluation Program (NTPEP) work plan for erosion control products and sediment retention devices. Information about this program may be obtained at: http://www.ntpep.org/Pages/default.aspx.

B. Adding seed to the additive provides additional erosion protection beyond the life of the additive.

C. Anionic (negative charge) additives are recommended and are less toxic than cationic (positive charge) additives, which are highly toxic to fish.

   Note: The WisDOT will not approve the use of cationic polyacrylamide.

D. Additives not containing a mulch component do not enhance vegetation establishment and need to be combined with another practice for that purpose.

E. Using a minimum 30 foot setback when applying an anionic polyacrylamide mixture near waters of the state is recommended.

F. Applying an additive mixture to soil may provide benefits of improved water quality, infiltration, soil fertility, and visibility by reducing wind and water erosion.

G. For erosion control, the additive may be applied upgradient of lands planted in food crops.

H. Application of additives 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.

I. Application of additives may be ineffective in the following situations:

- When the soil surface is pure sand or gravel with no fines.
- When applied over snow cover.

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

K. Additive mixtures may be applied in liquid and granular forms.

L. Application rates of additive mixtures may need to be adjusted based on soil type, slope, and type of erosion targeted (i.e., wind or water). Based on manufacturer's recommendations, higher application rates may be necessary when applied in granular form, but cannot exceed the allowable application rate.

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

N. Care should be taken when applying additive mixtures in liquid form on saturated slopes due to the possibility of slope structural failure. Additive 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 storm water management plans specifying additive mixtures for erosion control shall be consistent 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 additive mixtures to disturbed areas, including high use traffic areas, which interfere in the performance of this practice. Additive mixtures may lose effectiveness in as little as two months due to weather conditions. Additive 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 additive mixture was last applied. Representative additive locations shall be inspected at least once per week to evaluate effectiveness.

IX. References

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

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Wisconsin Department of Natural Resources 2004. State of Wisconsin Aquatic Life Toxicity Testing Methods Manual 2nd Edition. (http://dnr.wi.gov/topic/wastewater/WET.html).

Wisconsin Department of Natural Resources. 2014. *Whole Effluent Toxicity Program Guidance Document, Revision #9*. (http://dnr.wi.gov/topic/wastewater/WETguidance.html)

X. Definitions

Additive (I): Substance, typically a commercial product including cellulose, starch, and glucosamides; vegetable-based gums (e.g., guar, plantago) or rubber (e.g., natural latex) materials used as mulch tackfiers; and pre-mixed products containing natural or synthetic binding agents combined with a fibrous or mulch component (e.g., bonded-fiber matrix), that has the potential to be directly discharged to a *surface water of the state* and may cause toxicity to fish and aquatic organisms.

Additive Mixture (V.A): Any reference to additive mixtures refers to the whole manufactured product, including the polymer and any additives.

Allowable Application Rate (V.B.1) is expressed in lbs/acre and is based on the product allowable usage rate.

Allowable Usage Rate (III): Identifies the concentration (expressed in mg/l) as calculated using the procedures described in the "Water Quality Review Procedures for Additives" guidance, below which a product is not expected to cause acute toxicity in the aquatic environment.

Material Safety Data Sheet or Safety Data Sheet (V.B.4): Provide basic information on a material or chemical product intended to help someone work safely with the material. This includes a brief synopsis of the hazards associated with using a material, how to use it safely, and what to do if there is an emergency. The retail distributor and/or manufacturer as per OSHA's Hazard Communication Standard, 29 CFR 1910.1200, must provide MSDS, with the purchase of potentially hazardous products.

Polyacrylamide (I): A generic term for polymers made up of many repeating units of the monomer acrylamide (a simple organic compound).

Polymer (I): Polymers are materials that are either natural or synthetic and that have a chain of carbon-based molecules that are identical, repeating units. Polymers can be positively charged (cationic), negatively charged (anionic) or have no charge (non-ionic).

Surface Waters of the State (III): "Surface" refers to the sub portion of the waters of the state that discharge at the surface. "Waters of the State", as defined by s. 283.01(20), Wis. Stats, means those portions of Lake Michigan and Lake Superior within the boundaries of Wisconsin, all lakes, bays, rivers, streams, springs, ponds, wells, impounding reservoirs, marshes, water courses, drainage systems and other surface water or groundwater, natural or artificial, public or private within the state or under its jurisdiction, except those waters which are entirely confined and retained completely upon the property of the person.

Background

The Land Application of Additives for Erosion Control has been updated and has been reviewed by the Standards Oversight Council and has gone through the WDNR review process.

CREATED:

Jan C. Kucher, P.E. Water Resources Engineer
On behalf of the Storm Water Liaison Team

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Date

APPROVED:

Mary Anne Lowndes, Chief
Runoff Management Section

12-16-15
Date

Runoff Management Policy Management Team approved on 12-11-2015.