



EarthGuard Fiber Matrix - The Smart Choice

Outperforms More Expensive Erosion Control Products

EarthGuard Fiber Matrix is one of the highest performing erosion control products available on the market and is unlike any other hydraulically applied erosion control product (HECP) available. It has the unique ability to control erosion and turbidity by physically treating soil, slowing aggregate breakdown and absorbing raindrop impact. With the advent of the new EPA Construction Site Stormwater Effluent Limitation Guidelines Program, it is important for erosion control contractors, SWPPP designers and land developers to use a cost-effective product to control turbidity.

EarthGuard is available in 50 lb. Bales or in Liquid Emulsion form.

50 lb. Bales

EarthGuard Fiber Matrix pre-packaged in 50 lb. bales consists of **EarthGuard** and 100% wood fiber. Contractors can simply load the product directly into a hydro-seeder and be assured that they have the full power of **EarthGuard** as specified. Application rates range from 1500-3000 lbs. per acre with typical material costs of \$750-\$1500 per acre.

Liquid Emulsion

EarthGuard in five (5) gallon containers can be mixed on site with any commercial hydro-mulch (wood, paper, straw or any combination) product. This allows the contractor the option of mixing custom rates to meet site-specific requirements. Application rates range from 4-10 gallons of **EarthGuard** mixed with 1500-3000 lbs. of hydro-mulch per acre with typical material costs of \$750-\$1500 per acre.

Both forms of **EarthGuard Fiber Matrix** offer supreme erosion control protection on soil stabilization and re-vegetation projects. This one-step application allows quick installation while offering immediate erosion and dust control protection.

University Testing

In recent tests conducted at the Texas Department of Transportation Erosion Control Test Facility (TTI), **EarthGuard Fiber Matrix** proved to be one of the highest performing erosion control and vegetative mediums evaluated. **EarthGuard Fiber Matrix** out-performed more expensive products such as Flexible Growth Mediums/Mechanical Bonded Fiber Matrix (FRM/MBFM), Bonded Fiber Matrix (BFM) and erosion control blankets. Not only does **EarthGuard Fiber Matrix** offer superior erosion control but does so at a fraction of the material and application costs of FRMs, BFMs and blankets.

Published TTI Results:

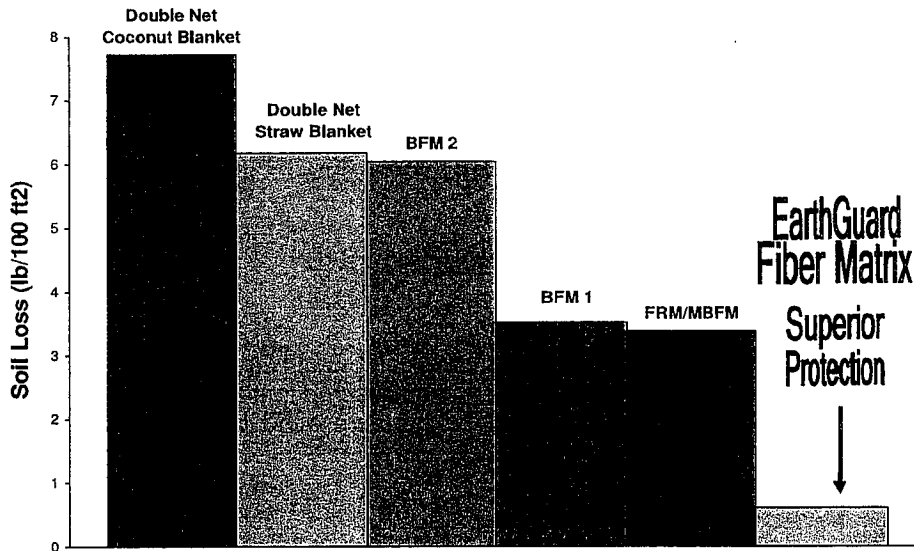
Clay Testing	Soil Loss Bare Soil Plot (%)	% Effective	Veg. Coverage vs. Bare Soil Plot (%)
EarthGuard FM 1	0.61	99.79	424.19
FRM / MBFM 2	3.38	98.86	102.31
BFM 1 3	3.52	98.81	92.95
BFM 2 4	6.04	97.97	103.77
Double Net Straw Blanket 5	6.17	97.92	53.74
Double Net Coconut Blanket 6	7.72	97.40	188.19

TTI Testing years: 1 - 2010, 2, 3, 4 - 2003, 5 - 2004, 6 - 2005
5.25 inches of total rainfall per 90 minute total test time on a 2:1 slope.

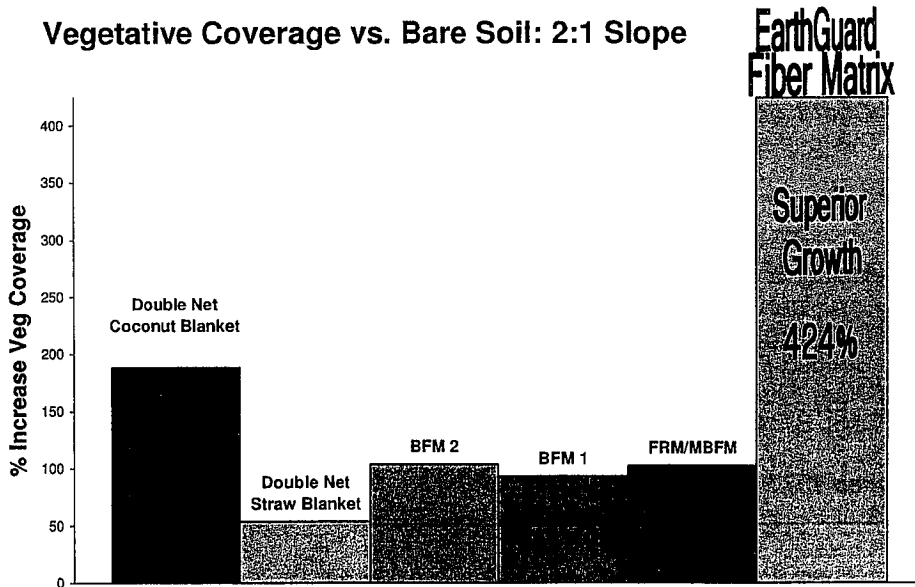




Soil Loss vs. Bare Soil: 2:1 Slope



Vegetative Coverage vs. Bare Soil: 2:1 Slope



EarthGuard Fiber Matrix is University Tested and Worksite Proven and should be in the plans for land owner who needs a highly effective and cost efficient erosion control and/or revegetation product.

To find out more about *EarthGuard Fiber Matrix* or to schedule a "Brown Bag" presentation, log onto www.EarthGuard.com or call us at 888.843.1029.



EarthGuard® Fiber Matrix

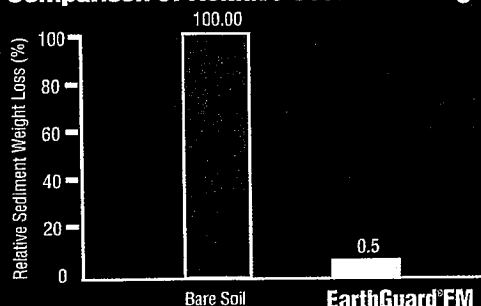
EarthGuard Fiber Matrix Erosion Control. University tested. Worksite proven.

EarthGuard® Fiber Matrix from Terra Novo is the economical solution more and more erosion specialists are turning to. It's the perfect short to mid-term erosion application comparable to the most expensive BMPs.

Check it out for yourself — EarthGuard® Fiber Matrix is simple to apply, safe to use and as effective as any comprehensive BFM system on the market. Call or visit us on the web to learn more about EarthGuard®.

Results from Caltrans Study of EarthGuard FM

Comparison of Relative Sediment Weight



The data from this series of tests appear to support the use of EarthGuard® Fiber Matrix (EGFM) to reduce soil erosion and off-site delivery of sediment from steep slopes. A 99.5% reduction in sediment delivery/weight is a high level of performance comparable to the best performing best management practices such as some rolled erosion control products (RECPs) and bonded fiber matrices (BFMs). The EarthGuard® Fiber Matrix manufacturer, Terra Novo, Inc. claims an installed cost of \$0.025-\$0.06 per square foot compared to \$0.085-\$0.15 for BFMs and RECPs.



EarthGuard®
Fiber Matrix



Terra Novo
(888) 843 1029

LOCAL DISTRIBUTOR

www.earthguard.com

EarthGuard® Fiber Matrix Erosion Control

EarthGuard® is a soil stabilizing emulsion specifically formulated to reduce erosion and sediment runoff. It is non-toxic, 100% biodegradable, and conforms to the State of California Department of Transportation Standard Specifications Section 07-382 E A05-30-06 for "Polymer Stabilized Fiber Matrix (PSFM)." **EarthGuard® FM** is a one-step spray application, combining **EarthGuard®** and wood/cellulose fiber. It is applied as an aqueous slurry by itself or in combination with seed. **EarthGuard® FM** is chemically engineered to be effective at low rates while absorbing the impact of raindrops, and providing immediate dust control, erosion control, and soil stabilization until permanent vegetation is established or construction has resumed. **EarthGuard® FM's** versatility allows it to be highly effective in many applications: erosion control, slope stabilization, dust abatement, landscape design, storm water runoff, fire burn rehabilitation, land development, and golf course construction.

APPLICATION RATES AND METHODS

EarthGuard® FM application rates depend upon field conditions and desired benefits. The following charts can be used as general rate guidelines for seasonal erosion control (loamy soils that are balanced in organic matter and nutrients). Slope should be "track-walked" with flow interruptors every 25 feet.

FULL SEASONAL CONTROL

For areas with less than 20" of annual rainfall

Slope	6:1	5:1	4:1	3:1	2:1	1.5:1	1:1
Gals/Acre	4	5	6	7	8	9	10
(lbs) Mulch/Acre	1,500	1,500	1,500	1,800	2,000	2,500	3,000

For areas with greater than 20" of annual rainfall

Slope	≤5:1	4:1	≥3:1
Gals/Acre	6	8	10
(lbs) Mulch/Acre	2,000	2,500	3,000

LONG TERM EROSION CONTROL OF PERMANENT SLOPES INCLUDING SEED

During the fall and winter months, follow the above charts for **EarthGuard®** and mulch rates. Add seed mixes as recommended to achieve long-term erosion control. This can be applied via a one-step hydroseeding process. However, some may prefer a two-step application (hydroseed and fertilizer first, and then **EarthGuard®** and mulch over the top). Consider increasing mulch rates to a minimum of 2,000 lbs. per acre when seeding.

If slopes are ready for permanent landscape (plants, trees, etc.), use the **EarthGuard®** rates from the above charts without adding mulch. Apply the mixture to all exposed soil after planting is completed. This will provide temporary erosion control while the plants establish their root mass.

FOR PARTIAL SEASON OR EXTENDED PROTECTION, CONTACT TERRA NOVO FOR RECOMMENDATIONS

WINTER PROTECTION FOR PADS

Use 3-4 gallons of **EarthGuard®** and 1,500 lbs. of mulch per acre. Pads should be "roughened" prior to application.

STORM-BY-STORM PROTECTION

For temporary protection of slopes and flat areas that are still in progress, apply **EarthGuard®** at 3-5 gallons per acre prior to a storm event. After the rain has stopped and the ground is dry enough, proceed with grading.

DUST CONTROL

On grading jobs, haul roads, etc. add 2 quarts of **EarthGuard®** to each 1,000 gallons of water. Apply with a water truck as normal. Number of passes can be reduced up to 75%.

If the desired result is more of a "Dust Cap" (longer lasting effect yet still temporary) usually 8-10 gallons per acre will be required.

APPLICATION & MIXING GUIDELINES

Spray all mixtures at a minimum rate of 3,000 gallons of water/acre (higher rates may be required) evenly over the area to be treated. Be careful not to spray too fast, creating puddles or run-off — they damage the soil structure before **EarthGuard®** products can work. Application should be sprayed from

multiple directions and angles to insure complete and proper coverage. Do not disturb treated areas after **EarthGuard®** products are applied. Mulch manufacturers recommend all hydraulic applications using fiber mulch to have a 24-hour window without rain.

Some situations with sandy – sandy loam soils, very little organic matter in the soil, poorly compacted slopes, heavy rainfall locations (over 20 inches per year), very intense rain storms (2-3 inches at a time), high wind exposure, etc. may require increasing the **EarthGuard®** and/or mulch by 1.25 – 1.50 times. When SWPPPs, BMPs or other plans are being written, contact Terra Novo, Inc., or your local dealer for more specific rate recommendations.

Many types of equipment can be used to apply **EarthGuard®** (hydroseeders, water trucks, spray rigs, aerial applicators, and irrigation systems). When mixing, fill the vessel 1/3 full of water prior to adding any **EarthGuard®**. As the tank continues to fill and agitators are running, slowly add the recommended amount of **EarthGuard®**. If the tank doesn't have agitators, it is important to add the **EarthGuard®** directly to the fill water flow. Mix or circulate the tank for a minimum of 10 minutes prior to application. A hydroseeder is required for applications of **EarthGuard® FM**.

EarthGuard® can be stored for 6 months. Always thoroughly mix before using. Always close or seal containers after use. Store in a dry, insulated location to avoid moisture and freezing. Frozen product, once thawed, can and should be completely remixed.



For technical services or to locate your nearest **EarthGuard®** dealer, call 1-888-843-1029.
Terra Novo, Inc., P.O. Box 81916, Bakersfield, CA 93380 www.earthguard.com

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ITEM T-908 SOIL STABILIZATION

DESCRIPTION

908-1.1 This work consists of furnishing, placing, and maintaining soil stabilization material where shown on the Plans.

MATERIALS

908-2.1 **MULCH.** Virgin/recycled wood fiber, recycled paper (wood cellulose), or an acceptable blend containing up to 50% recycled paper, with the following characteristics:

- a. Contains no growth or germination inhibiting factors.
- b. Will remain in uniform suspension in water under agitation and will blend with grass seed, fertilizer and other additives to form a homogeneous slurry, when required.
- c. Will form a uniform, blotter-like ground cover on application, having moisture absorption and percolation properties and the ability to cover and hold grass seed in contact with soil.
- d. Will not form a hard crust upon drying.
- e. Dyed a suitable color to facilitate inspection of its placement.

Ship the mulch in packages of uniform weight (plus or minus 5%) bearing the name of the manufacturer and the air-dry weight content.

Use a commercial tackifier on all slopes 4:1 or steeper Use the amount recommended by the manufacturer.

908-2.2 **ROLLED MATTING.** Use materials that conform to one of the following standards:

- a. **Unbleached single jute yarn.** Use yarn that is loosely twisted and not varying in thickness more than one-half its normal diameter. Furnish jute mesh in rolled strips conforming to the following requirements.
 - (1) Width: 45 to 48 inches, \pm 1 inch.
 - (2) 78 warp-ends per width of cloth (minimum).
 - (3) 41 weft-ends per yard (minimum).
 - (4) Weight: 1.22 pounds per linear yard, \pm 5%
- b. **Knitted Straw Matting.** Commercially manufactured erosion control blanket. Use netting which is biodegradable. Straw shall be from oats, wheat, rye, rice, or other approved grain crops that are free from noxious weeds, mold, or other objectionable material. May contain coconut or other natural fiber to reinforce the straw. Follow the manufacturer's published recommendations.

908-2.3 **STAPLES.** U-shaped staples for anchoring matting, approximately 6 inches long and 1 inch wide. Machine-made: No. 11 gage or heavier steel wire. Hand-made: 12-inch lengths of No. 9 gage or heavier steel.

908-2.4 Hydraulic Erosion Control Product (HECP). The HECP upon application to the soil surface will create a three-dimensional fiber matrix forming a continuous, porous, absorbent and flexible erosion resistant blanket that allows for rapid germination and accelerated plant growth. Provide an HECP that conforms to either HECP-1 or HECP-2 as follows:

a. HECP-1 consisting of thermally processed or pasteurized non toxic organic defibrated fibers, dispersible interlocking natural or synthetic fibers and a cross-linked hydro-colloidal tackifier. HECP-1 is not composed of paper, cellulose fiber, or blend of paper, cellulose, and other materials. Provide an HECP-1 that is a flexible erosion control matrix and forms a strongly lofted but porous fiber mat that contains air pockets and moisture absorbing chambers that allow for the proper germination of seeds while reducing the energy of raindrops and decreases the volume of sediment loss, or.

b. HECP-2 certified by the manufacturer to provide an equivalent level of performance to that of an HECP-1 meeting the material requirements described under "a." above, In addition, provide evidence that the HECP-2 has been shown to be at least 99% effective by testing at any of the following laboratories:

(1) San Diego State University Soil Erosion Research Laboratory, San Diego, CA

(2) Utah Water Research Laboratory at Utah State University, Logan, Utah

(3) USDA-Agricultural Research Service National Soil Erosion Research Laboratory (NSERL) at Purdue University, West Lafayette, Indiana.

(4) Texas DOT/Texas Transportation Institute (TTI) Hydraulics and Erosion Control Laboratory at Texas A & M, College Station, Texas.

Provide Flexterra FGM as manufactured by Profile Products LLC, Flex Guard as manufactured by Mat, Inc., Earth Guard Fiber Matrix as manufactured by Terra Novo, Inc., or an approved equal. Deliver materials and products in UV and weather resistant factory labeled packages. Store and handle in compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures, and construction operations. Ensure that all components of the HECP are pre-packaged by the manufacturer to assure material performance.

CONSTRUCTION REQUIREMENTS

908-3.1 SURFACE PREPARATION. Smooth the surface and backfill all gullies and potholes before application. Remove all sticks and other foreign matter that prevents contact of the mulch, HECP, or matting and the soil. Ensure that surfaces receiving an application of HECP are geotechnically stable and constructed to divert runoff away from the face of any slopes. Do not proceed with HECP installation until satisfactory conditions are established. Ensure that the surface is moist at the time of placement. If area is to be seeded, soil preparation shall conform to Section 901-3.1.

908-3.2 APPLICATION.

a. Mulch and Matting. Apply soil stabilization material at the rate specified in the Special Provisions. If seeding is specified, complete the application of mulch or matting within 24 hours after seed is placed. Staple matting every 5 feet at overlapped joints and edges or as recommended by the manufacturer. Do not use vehicles or equipment which cause rutting or displacement of the subgrade or topsoil.

b. Hydraulic Erosion Control Product (HECP).

(1) HECP-1. Apply at a rate of 3500 lbs per acre (dry weight basis) in compliance with manufacturer's instructions and recommendations using an approved mechanically agitated, hydraulic seeding/mulching machine with a fan-type nozzle (50-degree tip). Apply from opposing directions to reduce the "shadow effect" and to achieve best soil coverage. Do not apply HECP-1 in channels, swales, or other areas where concentrated flows are anticipated, unless installed in conjunction with a temporary erosion control blanket or non-degradable turf reinforcement mat. Slope interruption devices or water diversion techniques are recommended when slope lengths

661 587-5792

exceed 100 feet and/or slopes are steeper than 3H:1V. Where surfaces are to be seeded, apply HECP-1 in a two-step process unless a single step process is recommended by the manufacturer and approved by the Engineer. The single step process involves mixing all components in a single tank load. In step one of a two step process, mix and apply any seed and soil amendments with a small amount of HECP-1 for visual metering. In step two, mix and apply HECP-1 over freshly seeded surfaces. Do not leave seeded surfaces unprotected, especially if precipitation is imminent. Mix HECP-1 in the hydraulic application machine by filling the tank to middle of agitator shaft or 1/3 tank full of water. Turn on the pump to wet or purge lines. Begin agitating and keep adding water slowly while adding the HECP-1 at a steady rate. Consult the manufacturer's application and loading charts to determine the number of bags to be added. Mix at a rate of 50 lbs HECP-1 per 125 gallons of water. Contact the equipment manufacturer to determine optimum loading and mixing rates. All HECP-1 should be loaded when the tank is approximately ¾ full. Where fertilizer is applied with HECP-1, add it when the tank is nearly full. Before application, mix the slurry for at least 10 minutes after adding the last amount of HECP-1. This is imperative to fully activate the bonding additives and to attain proper viscosity. Turn off the recirculation valve and reduce the agitator speed to minimize the potential for air entrainment within the slurry.

(2) HECP-2. Apply in accordance with manufacturer's instructions, at a rate specified by the manufacturer.

908-3.3 MAINTENANCE. Reshape and reseed any damaged areas and repair the mulch, HECP, or matting as required.

Maintain the mulch, HECP, or matting until all work on the project is complete and accepted.

METHOD OF MEASUREMENT

908-4.1 By the square yard, according to Subsection GCP-90-02, acceptably placed. Water, maintenance, and repair are subsidiary.

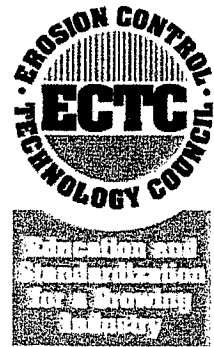
BASIS OF PAYMENT

908-5.1 At the contract unit price per unit of measure for the pay items listed below that appear on the bid schedule.

Payment will be made under:

Item T-908a	Mulching - per square yard
Item T-908b	Rolled Matting - per square yard
Item T-908n	Hydraulic Erosion Control Product (HECP) - per square yard





STANDARD SPECIFICATION FOR HYDRAULIC EROSION CONTROL PRODUCTS (HECPs)

v. 2.3

August 12, 2010

PART 1 GENERAL

1.01 SUMMARY

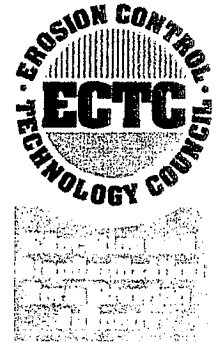
- A. This section specifies a Hydraulic Erosion Control Product (HECP). A HECP is a manufactured, temporary, degradable, pre-packaged fibrous material that is mixed with water and hydraulically applied as a slurry designed to reduce soil erosion and assist in the establishment and growth of vegetation. The HECP will achieve maximum performance after a sufficient curing period, which will vary based upon site specific conditions. The HECP forms a protective layer which controls erosion and allows for enhanced seed germination and accelerated plant growth.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions.
- B. Certifications: Submit a letter from manufacturer certifying that the HECP meets or exceeds all performance properties and packaging requirements found in this specification.

1.03 PACKAGING, DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in ultra violet (UV) and weather resistant factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect product from damage due to climatic conditions and construction operations.



PART 2 PRODUCTS

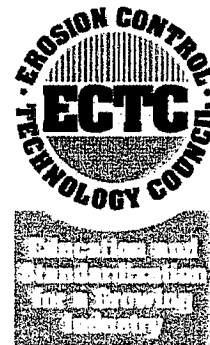
2.01 PERFORMANCE REQUIREMENTS

- A. The HECP to be used shall meet the performance standards of Type _____ as specified in Table 1.

Table 1: Performance Chart for Standard HECPs

Hydraulic Erosion Control ¹							
Type ²	Term	Functional	Typical Application	Typical Maximum Slope	Maximum Uninterrupted	Maximum	Minimum
		Longevity ³	Rates	Gradient	Slope Length	C Factor ^{4,5}	Vegetation
			lb/acre (kg/ha)	(H:V)	(ft)	(3:1 test)	Establishment ⁶
1	Ultra Short Term	1 mo	1500 – 2500 (1700 – 2800)	≤ 4:1	20	0.75	150 %
2	Short Term	2 mo	2000 – 3000 (2250 – 3400)	≤ 3:1	25	0.5	150 %
3	Moderate Term	3 mo	2000 – 3500 (2250 – 3900)	≤ 2:1	50	0.15	200 %
4	Extended Term	6 mo	2500 – 4000 (2800 – 4500)	≤ 1:1	75	0.1	300 %
5	Long Term	12 mo	3000 – 4500 (3400 – 5100)	≤ 0.5:1	100	0.02	400 %

1. This table is for general guidelines only. Refer to manufacturer for application rates, instructions, gradients, maximum continuous slope lengths and other site specific recommendations.
2. These categories are independent of rolled erosion control products (RECPs) categories, despite the identical names.
3. A manufacturer's estimated time period, based upon field observations, that a material can be anticipated to provide erosion control as influenced by its composition and site-specific conditions.
4. "C" Factor calculated as ratio of soil loss from HECP protected slope (tested at specified or greater gradient, h:v) to ratio of soil loss from unprotected (control) plot based on in large-scale testing.
5. Acceptable large-scale test methods may include ASTM D 6459, or other independent testing deemed acceptable by the engineer.
6. Minimum vegetation establishment is calculated as outlined in ASTM D 7322 being a percentage by dividing the plant mass per area of the protected plot by the plant mass per area of the control plot.



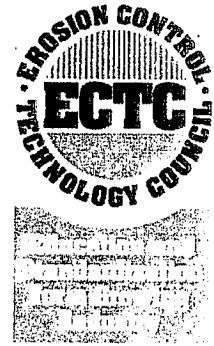
PART 3 EXECUTION

3.01 SUBSTRATE AND SEEDBED PREPARATION

- A. Examine substrates and conditions where HECP will be applied. Apply HECP to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope. Repair any pre-existing rills or gullies and roughen slope if possible by track-walking or using some other imprinting device. If necessary to reduce slope length in accordance with **Table 1**, install Sediment Retention Fiber Rolls (SRFRs) or other slope interruption devices perpendicular to the water flow. Do not proceed with installation until satisfactory conditions are established.

3.02 APPLICATION

- A. Strictly comply with manufacturer's application instructions, machinery requirements and other recommendations. For optimum pumping and application performance use approved hydraulic seeding/mulching machines with an appropriate nozzle tip. Apply HECP from opposing directions to achieve best soil coverage reducing the "shadow effect."
- B. Fill the tank of the hydraulic machine approximately 1/3 full with water. Continue to add water slowly while adding HECP at a steady rate. Utilize the HECP manufacturer's recommended water-to-HECP ratio. Confirm loading rates with equipment manufacturer. All HECP and supplemental materials should be loaded into the tank before it is approximately 3/4 full. Finish filling the tank with water to the desired level. Uniform slurries may require agitation or mixing for a minimum of 10 minutes after all of the water and HECP are in the tank.
- C. Mix and apply HECP over the prepared substrate. Best performance is achieved when HECP is applied to unsaturated soils or substrates and allowed to undergo an appropriate curing period.
- D. Use an appropriate nozzle tip to ensure uniform soil surface coverage. Hose applications may be required for certain sites and locations. Application rates of HECP shall follow minimum rates found in **Table 1**, and meet manufacturer's specific guidelines for proper performance.



- E. HECP is not intended to be applied in channels, swales or other areas where concentrated flows are anticipated, unless installed in conjunction with Rolled Erosion Control Products (RECPs).
- F. After application, thoroughly flush the tank, pumps and hoses to remove all HECP material. Wash all material from the exterior of the machine and remove any slurry spills. Once dry, HECP will be more difficult to remove from equipment.

3.03 PROTECTION

Areas treated with HECP shall be protected from foot and vehicle traffic, grazing and other disturbances. Any damaged area shall be repaired utilizing the exact blend and application procedure as specified above.

4.01 PAYMENT

HECP will be paid for by the unit area treated. The price shall include; full compensation furnishing all labor, materials, tools, equipment, and incidentals, for doing all HECP work, complete in place, as shown on the plans, and as specified in these Standard Specifications and as directed by the Engineer.