CHEMICAL STABILIZATION

(a.k.a. tackifiers, soil binders, polymers, soil stabilizers)

Chemical stabilization is an umbrella term that includes a variety of substances – ranging from natural to synthetic – that can be applied to increase the cohesion of soil surfaces by binding soil particles to one another, and/or to mulch. They are often applied for protection from both water and wind erosion on construction sites. Chemical stabilization can be particularly useful in areas where soil stabilizing vegetation has been difficult to establish.

While they can provide some erosion protection when used alone, soil stabilizers work most effectively when applied to keep soil in place during seed establishment, often as part of a hydroseeding or hydromulch mix. When added to these hydraulically applied products, they help to establish more long term or permanent vegetative stabilization. Because chemical soil stabilizers allow water to infiltrate while keeping soil, mulch and seed in place, they promote moisture retention and improved vegetation establishment. Some chemical stabilizers can also help to improve the consistency of hydraulic mixes, making them easier to apply.

Chemical soil stabilizers are often categorized as follows:

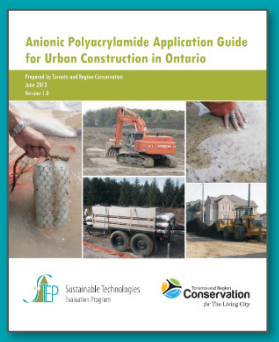
- Plant-based short term (e.g. guar, psyllium, starch), and long term (e.g. pitch and rosin emulsions)
- Synthetic petroleum-derived polymers (e.g. anionic polyacrylamide, polyacrylate)
- Cementitious binders (e.g. gypsum)

Figure B1-17: Application of hydroseed containing tackifier (left) and granular anionic polyacrylamide (right)

Application

- Use in and/or within 30 m of a natural water feature is subject to CA approval. Toxicity data as described under ‘Design and Installation’ must be available upon request.
- Best used in conjunction with seeding, such as within a hydroseeding or hydromulching mix in order to establish a more lasting stabilization.
- When used with seed, suitable for any areas requiring erosion protection, including slopes, interceptor swales and any other areas not subject to vehicle traffic.
- Only applied on bare/unseeded soil if the following criteria apply:
  - Regular reapplication at the supplier’s recommended frequency can be maintained.
  - The area is receiving only non-concentrated sheet flows
  - The area will not be subject to vehicle traffic or other earth disturbing activities
  - Stabilization is only needed on a short term basis

- Local policies on the use of chemical stabilization may differ from the information provided herein. Confirm local policies prior to including chemical stabilization on ESC plans.



For specific and detailed guidance on using anionic polyacrylamide on construction sites, see Toronto and Region Conservation Authority's *Anionic Polyacrylamide Application Guide for Urban Construction in Ontario* (TRCA, 2013).

The Guide is available in the Sustainable Technologies Evaluation Program Resource Library at:

sustainabletechnologies.ca

Design and Installation

- If the product is being mixed and applied by a third party, ensure that they are following the requirements listed herein.
- Chitosan and other cationic polymers (e.g. cationic polyacrylamide) should not be applied as soil stabilizers on construction sites due to their toxicity to aquatic organisms.
- Application rates vary according to the method of application and the specific type of chemical stabilizer. Ensure the product is applied at the manufacturer's recommended application rate.
- Ensure product labelling and/or packaging is available for the chemical stabilizer, which specifies the following:
  - product expiry date
  - use instructions, including application rates and mixing methods (if applicable)
  - recommended re-application frequency and other maintenance requirements
  - safe handling, storage and disposal information
- Any applications of anionic PAM-based products should meet the criteria detailed in *Anionic Polyacrylamide Application Guide for Urban Construction in Ontario* (TRCA, 2013).

Prioritizing ***Sustainability***

Always consider biodegradability when choosing a stabilizer.

Biodegradable products are the sustainable choice because they can **break down**, **safely** and relatively **quickly**, through **biological processes**.

- The chemical stabilizer must be safe at the expected application rate and based on the intended use. Evidence of this should be available in the product's Material Safety Data Sheet (MSDS) and/or toxicity reports. As a minimum, acute and chronic toxicity data, based on testing by an accredited third party, should be available for the following aquatic organisms: fathead minnow (Pimephales promelas), rainbow trout (Oncorhynchus mykiss) and water flea (Daphnia magna). The LC-50 concentrations (the concentration of polymer that is lethal to 50% of the sample population) listed in toxicity reports must exceed the maximum anticipated release rate of the product based on the way it's being used.

- Certain chemical stabilizer products, such as anionic PAM based products, are available in different formulations designed to bind different soil types. Where this type of product is being used, ensure that the formulation selected is effective for the specific soil on site. This is often done by submitting a soil sample to the supplier for testing. Chemical stabilizers that are ineffective at binding to soil will be easily washed away during a rainfall event, and could end up in undesired locations such as natural features.
- Prior to application of a chemical stabilizer, alone or as part of a hydraulic mix, the soil surface should be prepared by removing large rocks or other deleterious materials and filling in any rills or gullies
- When using a chemical stabilizer in conjunction with seeding, the top few inches of soil should be de-compacted to ensure good germination.
- Consider the drying time for the selected chemical stabilizer and ensure that there will be an opportunity for the application to dry before the next rainfall event.
- Avoid hydraulic application of chemical stabilizers during windy conditions in order to avoid having the product end up in unintended areas.
- Chemical stabilizers should not be applied to frozen soil or during freezing or rainy conditions.

Figure B1-18: Soil surface stabilized with anionic PAM

Inspection and Maintenance

- Inspect chemically stabilized areas weekly, and before and after significant rainfall (see definition in Section 10.1.2) or snowmelt events, and keep a record of the inspection. Beyond this routine inspection, additional inspections of seeded areas may be needed when the seed is newly planted as well as during periods of drought.
- Where the stabilizer has been applied in conjunction with seed, refer to guidance on inspection and maintenance of seeding on p B1-21.
- Confirm that the chemical stabilizer has been applied evenly with coverage of at least 80%.
- If the stabilizer has failed to adsorb to the soil particles, it can be easily washed away during a rainfall event and migrate downslope from the intended treatment area. If this is observed it may mean the stabilizer is ineffective for the soil type, and that a different formulation should be applied.
- Ensure vehicles and equipment are not driving over areas that have been treated. To prevent damage, chemically stabilized areas can be fenced off, particularly if it is a busy and heavily used area.
- Look for any evidence of erosion on chemically stabilized areas (rilling). Where erosion is occurring, determine whether a second application is needed, if the area should be reinforced with additional erosion control measures (e.g. blankets, mats), or if flows are too concentrated and should be re-routed around the treated area.
- Regrade and re-apply stabilizer in areas that have been subject to erosion or where the initial application was deficient.
- Re-apply at the frequency recommended by the product supplier/manufacturer to ensure area remains stabilized. If stabilizer was applied with seed, re-application of chemical stabilizer is needed (at the recommended frequency) only until vegetation is well established.

- Any repair or maintenance needs identified should be repaired within 48 hours or sooner if natural receptors are at imminent and foreseeable risk of adverse impact.
- Consider planning and budgeting for long-term as re-application may be required over time.