Description

Chemical stabilizers, also known as soil binders or soil palliatives, provide temporary soil stabilization. They are readily applicable to the surface of the soil, can stabilize areas that cannot establish vegetation, and provide effective protection from wind and stormwater erosion.

Categories of chemical stabilizers are as follows: water with surfactant, water-absorbing, organic non-petroleum, organic petroleum, synthetic polymer emulsion, concentrated liquid stabilizer and clay additive (Jones, 2017). Examples include calcium chloride, lignosulfonates, guar and polyacrylamide (PAM). In all cases, construction staff should follow local guidance regarding the suitability of individual products for specific applications.

Applicability

Construction staff can use chemical stabilizers in areas where other methods of stabilization are not effective due to site constraints, either alone or in combination with vegetative or perimeter practices to enhance erosion and sediment control.

Siting and Design Considerations

Construction staff should follow manufacturer recommendations for application procedures to prevent products from pooling and to ensure effective soil stabilization. Potential methods include spray-on treatment and mix-in applications. Where appropriate, construction staff should use proper personal protective equipment. Before selecting a chemical for soil stabilization, design engineers should consider environmental concerns, including toxicity and biodegradability. In most cases, local permitting authorities should provide guidance on product suitability, acceptability and use restrictions for environmentally sensitive areas. The latest EPA Construction General Permit also provide insights on the permitting requirements, use and storage of chemicals at construction sites covered under EPA’s permit.

Limitations

Chemical stabilization is usually more expensive than vegetative practices and generally creates environmental concerns. Cationic polymers can be highly toxic to aquatic organisms and require federal and local approval on a case-by-case basis (U.S. EPA, 2019). Chloride compounds are effective for stabilization but could limit vegetation establishment due to the toxicity of chloride to plants (MPCA, 2019). Glycerin-based stabilizers, lignosulfonates, molasses-based stabilizers and plant oil-based stabilizers can negatively impact aquatic life by increasing biological oxygen
demand as they degrade in receiving waters (Jones, 2017). Petroleum-based chemical stabilizers adversely affect plants and water resources (MPCA, 2019).

Effectiveness

The effectiveness of chemical stabilization methods varies significantly based on site conditions and the chemical type. For example, chloride-based compounds require humidity for effective performance, and organic petroleum products do not perform as well in high-traffic areas. For any project considering chemical stabilization, its effectiveness depends on the consideration of all possible environmental interactions and close communication with local regulating authorities and chemical manufacturers.

Cost Considerations

The cost of chemical stabilization can vary widely depending on the site, chemical, application technique and application rate. For larger sites, truck-mounted applicators may be more cost-effective despite having higher equipment costs. The cost of the chemicals themselves also varies considerably. Polyacrylamide, one of the more common soil palliatives, costs around $6 per pound. Therefore, when using a minimum suggested application rate of 20 pounds per acre (McLaughlin, 2015), the chemical cost is at least $120 per acre. Calcium chloride costs around $0.50 per pound (RSMeans, 2019) but requires an application rate of 1 to 3 tons per acre, resulting in a chemical cost of $1,000 to $3,000 per acre.

Additional Resources


References


