The Monthly Dirt
A monthly newsletter on the California Construction General Permit

Wind erosion types, control methods, and practices.

What may start out as just a little dust cloud from a construction site, can turn into a major problem if left unchecked. The Dust Bowl is a prime example of major wind erosion— and it was disastrous. But lessons from history are so valuable – mistakes made in the past, teach us how to avoid those same mistakes today. And while construction sites may vary greatly from agriculture, lessons can still be gleaned from the Dust Bowl: protecting the soil from wind erosion, practicing proper dust control measures, and taking proactive steps to keep your construction site in compliance with CGP requirements. In this month's edition of **The Monthly Dirt**, we're going to focus on wind erosion and how to prevent it.

When it comes to wind erosion, there are three different ways in which erosion occurs – surface creep, saltation, and suspension. ***Surface Creep*** is where the force of the wind causes soil particles to creep along the soil's surface until they are stopped by other particles, are trapped in a sheltered location, or until the wind stops. These sediment particles are small enough to scuttle along the surface but too big to be lifted into the air. As they move along the ground, friction with other particles causes them to detach, further propagating erosion. ***Saltation*** originates from the Latin word *"saltare"* which literally means "to leap or to dance." Saltation is when sediment particles become airborne for a short period of time and bounce across the surface. As they bounce, they strike other particles, causing them to move. The higher the particles bounce, the more energy they derive from the wind – thus creating a snowball effect. ***Suspension*** is the final stage of wind erosion and refers to particles that become completely airborne – dust clouds, dust storms, dust haze, etc. Generally, suspension occurs with fine sediments like silt. Suspension can cause visibility issues, which is why California Regional Air Districts limit dust clouds crossing a project's perimeter at 20% opacity. *An air district inspector once explained that 20% is when you can barely see the cloud of dust.* That's not a lot of dust! Over 20% can result in fines from the air district and trouble with the Water Board.

At construction sites during the spring and summer months, attention turns from water erosion to wind erosion. When soils dry out, wind erosion sources are abundant. Think about all the places where grading is happening, where bare soil is exposed, where vegetation has been removed, where dirt is being stockpiled, where unpaved roads have constant traffic, and paved streets where track-out seems to accumulate from vehicles entering and exiting the project. Even just one of those areas could produce wind erosion, but most sites have all of the above. Which is why implementing dust

Historic Dust Bowl—suspension wind erosion on a grand scale. Circa 1934

suppression methods is so important. These methods need to be effective during working and off hours. For example, during the summer, areas surrounding the central California Delta experience Delta winds almost every evening (typically after the work day ends). These late evening winds can be problematic for projects which rely upon a water truck as their only dust suppressant method (since water trucks won't be running after hours).

When it comes to preventing wind erosion, there are a variety of dust control methods which can be implemented at construction sites...

Vegetation: vegetation is the most ideal option since it prevents wind erosion by locking the soil into place with the root systems, and provides a natural wind break. Vegetation increases infiltration, reduces runoff, and provides a natural filter for storm water. During construction, vegetation must be removed, but a big take-away lesson from the Dust Bowl should be to *not* disturb vegetation until absolutely necessary and to re-establish vegetation as soon as possible.

Water Trucks: Water trucks are used to wet down the soil in order to reduce dust from vehicle and foot traffic, as well as control wind erosion. Water creates a heavier surface and provides a binding of particles from the resulting "crusting" of the soil surface. However, over-watering can lead to other problems like water erosion, track-out, and turbid non-storm water runoff.

Hygroscopic Suppressants: hygroscopic suppressants are literally *water attracting substances*. The most common types of hygroscopic suppressants are calcium chloride and magnesium chloride. These salts work to suppress dust by drawing moisture from the air which keeps the road surface constantly damp. It is like having microscopic water trucks constantly wetting the road down. However, these salt-based products may dissolve in storm water causing runoff to have a high specific conductivity. Saline water can also harm vegetation and have a negative impact on the ecosystem of the receiving water. *Note: hygroscopic suppressants don't work in arid regions since they need humidity in order to absorb water and bind the soil.*

Polymers: polymers are comprised of chemical molecules which bind soil particles together through electrochemical forces. Anionic Polyacrylamide is typically used as a powerful soil binder for roadways and areas of disturbed soil on construction sites. And Polymer Flocculation is used to reduce turbidity in water. Polymers can be very effective and are usually long -lasting and easy to apply. However, polymers can also be very toxic to aquatic life and will most likely be regulated in the renewed Construction General Permit. Please refer to the proposed Attachment G, included in this newsletter, for possible future requirements and restrictions.

Plant-Based Adhesives: plant-based dust suppressants work basically the same as chemical ones—they bind to the soil particles and keep them from becoming mobile. Only plant-based suppressants are natural glues made from things like guar, psyllium, and starches which tend to be all-natural, biodegradable, and less toxic to the environment. These plant-based binders tend to have a shorter life than their chemical counterparts, and generally need reapplication after several months.

Cover: covering exposed soil with mulch, compost blankets, gravel, or asphalt helps control dust. The way to stop any type of erosion is by having an effective soil cover. Blankets or erosion control mats work best for small areas, while spray on products will work better for larger areas. When using straw for wind erosion control, make sure to include a tackifier similar to the plant-based adhesives previously described.

Scarification: tilling or scarifying an exposed soil surface reduces the overall surface area exposure. When the wind passes over the tilled dirt clods, only the very tops are exposed, while the lower "valleys" in between clods have virtually no exposure, thereby reducing overall wind erosion surface area sometimes by 50% or more. Rough tillage helps prevent the first two stages of erosion from occurring (surface creep and saltation) and can reduce the effect of suspension as well. The hills and valleys found in rough tillage act as wind breaks which allow the jumping and scuttling particles to become trapped. The downside of scarification or rough tillage is that it is not a method that can be widely used on construction sites especially after final grading or when nearing completion.

Note: When choosing the binder for your site remember, "a soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and should not stain paved or painted surfaces. Soil binders should not pollute storm water when cured." *(CASQA EC-5)*

This spring, when winds occur, keep your site from becoming the next Dust Bowl by cover, wetting, and binding. **MD**

Soil scarification is helpful in reducing wind erosion.

Watch Ken Burn's documentary on The Dust Bowl to earn some PDHs...

Need a SWPPP or QSP Inspector? Call us for a free quote.

Please contact us if you have any questions ...

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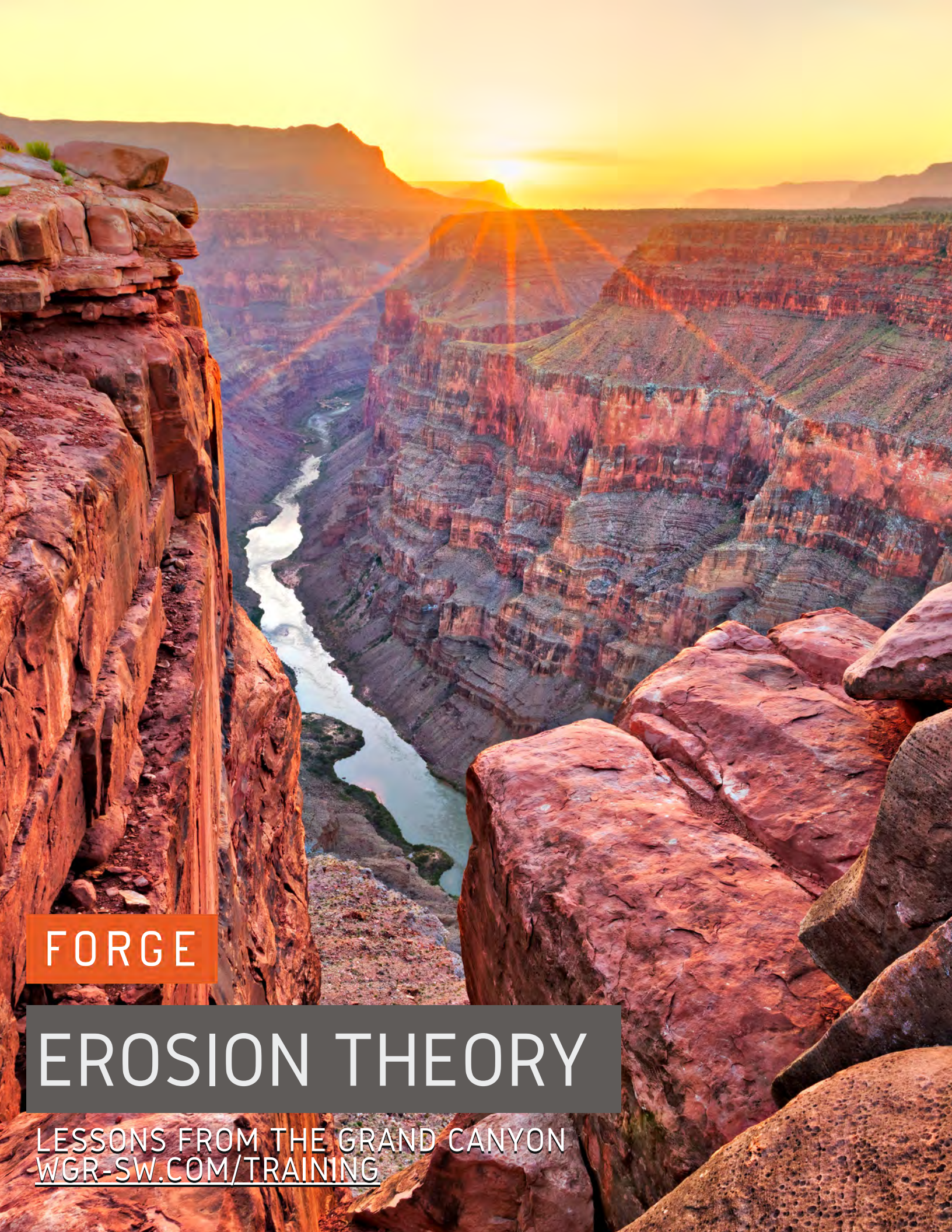

FORGE

EROSION THEORY

LESSONS FROM THE GRAND CANYON

WGR-SW.COM/TRAINING

CAN'T WAIT UNTIL JULY FOR OUR NEXT QSP/QSD TRAINING COURSE?

SIGN UP FOR ENVIROTECH'S QSP/QSD TRAINING!

STORMWATERMANAGEMENT.BIZ/TRAINING-COURSES

WE HIGHLY RECOMMEND THIS CLASS (THE INSTRUCTORS ARE AMAZING!)


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BMP OUTLET'S ECONOMY
SPILL KIT
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AVAILABLE IN
UNIVERSAL
AND
OIL ONLY
(1 PAIR)
SAFETY GLASSES
(2)
ABSORBENT SOCKS
(2 PAIRS)
NITRILE GLOVES
(6)
SPILL PADS
(1)
DISPOSABLE BAG
(1)
HIGH VISIBILITY
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BMP
Economy Spill Kit
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DRAFT ATTACHMENT G

REQUIREMENTS FOR THE USE OF PASSIVE TREATMENT TECHNOLOGIES

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES (GENERAL PERMIT)

A. GENERAL PASSIVE TREATMENT TECHNOLOGIES PROVISIONS

1. The discharger choosing to implement Passive Treatment Technologies (passive treatment) on their site shall comply with all requirements in this Attachment and this General Permit.

2. The discharger shall not use chemical treatment as a standalone Best Management Practice (BMP) for site erosion and sediment controls and shall maximize the use of non-chemical BMPs for site erosion and sediment controls.

3. Passive treatment is the application of anionic and/or non-ionic coagulants and flocculants from natural and synthetic chemicals and/or products (products) to reduce turbidity in site runoff, but do not rely on enclosed computerized systems with pumps, filters, and real-time controls. Passive treatment may include pumps where they are necessary to move water around the site or in the application of the flocculant (e.g., a truck pump for applying hydromulch). Pumping may be integral to properly dosing the water with treatment chemicals in some cases.[1]

4. The discharger shall assign a Qualified SWPPP Developer (QSD) knowledgeable in the principles and practices of passive treatment to oversee the product application and dosing, plan development, implementation, and installation. The discharger's QSD must be present on-site during all applications of the passive treatment.

5. The discharger shall ensure products stored at the site are, at minimum, in leak-proof containers with secondary containment kept under a storm-resistant shelter. The discharger shall follow the product's Safety Data Sheet protocols for handling and storage.

6. The discharger shall ensure the use of the passive treatment precludes the accidental discharge of passive treatment products during storage, application, and after being applied.

[1] U.S. EPA. Federal Register V 77. No 1. Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category. Web. January 3, 2012. <https://www.govinfo.gov/content/pkg/FR-2012-01-03/pdf/2011-33661.pdf>. [as of October 19, 2020].

7. The discharger using passive treatment shall comply with the sampling, monitoring, and reporting requirements found in the General Order and the applicable requirements in the Risk Level and Linear Underground and Overhead Project Type Attachments A, C, D, and E.

8. The discharger shall maintain a copy of the site-specific Passive Treatment Plan in the Stormwater Pollution Prevention Plan (SWPPP). This document shall be kept updated in SMARTS and on-site in compliance with the record retention requirements in the Special Provisions section of this General Permit.

B. PASSIVE TREATMENT DESIGN REQUIREMENTS

1. The discharger's QSD or California licensed Professional Engineer shall design the discharge location(s) from the area treated with passive treatment products (treatment zone) to dissipate energy from concentrated flows.

2. Stormwater treated with passive treatment products in a treatment zone prior to being discharged from the construction site shall pass through a sediment control BMP (including, but not limited to, a sediment basin or trap) or filtration system (including, but not limited to, sand filter or geotextile bag) to settle or remove flocculants prior to discharge from the site.

C. PASSIVE TREATMENT CHEMICAL SPECIFICATIONS

1. The use of cationic chemicals for passive treatment is not authorized by this General Permit. Cationic chemicals are only authorized for use in active treatment systems complying with the criteria in Attachment F of this General Permit.

2. Application of liquid or powdered treatment products to ponded or running water in conjunction with use of a pump are only authorized as active treatment systems complying with the criteria in Attachment F of this General Permit.

3. Passive treatment technologies consisting of polyacrylamides must be[2]:

[2] Michigan Department of Environmental Quality, Water Resources Division, Technical Guidance for the Use of Polyacrylamide Products for Soil Erosion and Sedimentation Control (SESC). Web. November 2014. <https://www.michigan.gov/documents/deq/wb-stormwater-TechnicalGuidancePAMs_197048_7.pdf>. [as of October 19, 2020].

a. Food grade (National Sanitary Foundation/American National Standards Institute) products, or contain less than 0.05 percent residual monomer by volume,[3] and/or;

b. Anionic or non-ionic flocculant in form.

4. The use of emulsion-based polymers or any other polymer that is premixed in a substance other than water is not authorized by this General Permit. The emulsion-based polymers may contain surfactants and petroleum distillates that can be toxic to aquatic life.

D. TOXICOLOGY REQUIREMENTS

1. The discharger shall only use passive treatment products with Safety Data Sheets containing current acute and chronic toxicological test data and ecological information for aquatic organisms provided by the manufacturer or a third-party organization. The Safety Data Sheets shall indicate the safety of the passive treatment product(s) based on expected release rates, toxicity reports, the anticipated concentration (calculated from product release rate) and intended use at the site.

2. The concentration of passive treatment chemical(s) or product(s) in the site's discharge shall not exceed the most stringent LC_{50} concentration (the concentration of polymer that is lethal to fifty (50) percent of the test animals during the observation period) for the most sensitive species specified in the Safety Data Sheets toxicity reporting for the specific passive treatment product(s) applied at the site. The Regional Water Boards may use site-specific information to require additional sampling and monitoring[4] to confirm this requirement is being met and to ensure there are no adverse impacts to waters of the United States.

E. PASSIVE TREATMENT APPLICATION, MONITORING, AND REPORTING

1. The discharger shall ensure passive treatment product(s) are used as follows:

a. The distance between the treatment zone and the receiving water(s) is at least 30 feet and shall be at a distance sufficient to ensure that breach or spill

[3] The U.S. EPA. Support Document for the Third Six-Year Review of Drinking Water Regulations for Acrylamide and Epichlorohydrin. Web. December 2016. <https://www.epa.gov/sites/production/files/2016-12/documents/810r16019.pdf>. [as of October 19, 2020].

[4] Aquatic toxicity testing and applicable reporting, recordkeeping, and corrective action requirements; and/or residual chemical testing and applicable reporting, recordkeeping, and corrective action requirements.

from the containment will not discharge treated effluent to the receiving water. Discharging passive treatment products directly to a receiving water is prohibited.

b. Passive treatment application rates, dosing, and methods used in treatment zones shall be determined based on the QSD's and manufacturer's guidance to ensure that coverage will be adequate to provide erosion control and/or sediment control without having an excess amount in runoff.

c. Passive treatment re-application rates, dosing, and methods used in treatment zones shall occur based on the QSD's and manufacturer's recommended frequency and on-site conditions such as soil type, precipitation, and slope to avoid the discharge of excess product from the re-stabilized areas.

d. Bonded-fiber matrices, hydromulch, or spray-tackifiers containing anionic or nonionic polyacrylamides shall be applied at least 48 hours prior to any precipitation event or according to the manufacturer's guidance, whichever is longer, to allow for ample cure time and prevent passive treatment chemicals from being transported by runoff.

e. The discharger shall ensure the QSD or a Qualified SWPPP Practitioner (QSP) trained by the QSD inspects the treatment zone surface condition weekly and before and after any precipitation event.

2. Passive Treatment Plan

a. The QSD-prepared Passive Treatment Plan shall provide appropriate application rates, dosing, mixing, settling, and final filtration. The Passive Treatment Plan shall include[5]:

i. A list of other erosion and sediment control BMPs implemented in treatment zones. Passive treatment shall not be used as a standalone BMP;

ii. Manufacturer product details (e.g., function, physical form, product name, expiration date and any other identifiers), specifications, and Safety Data Sheet containing current acute and chronic toxicological and ecological information;

[5] Toronto and Region Conservation. Canada Anionic Polyacrylamide Application Guide for Urban Construction in Ontario. Web. June 2013. <https://sustainabletechnologies.ca/app/uploads/2013/02/Polymer-Guide-Final_NewFormat.pdf>. [as of October 19, 2020].

iii. The design details and drawings for maintenance and removal procedures for the products applied on-site;

iv. Contact information (name, position, email, phone number) of the QSD who is providing the oversight of the passive treatment implementation for the discharger; QSP; and other site personnel who are trained to assist the discharger with the passive treatment implementation;

v. Training documentation for the site personnel who are trained to assist the discharger demonstrating training has been completed on the application, dosing, and use of the specific Passive Treatment technologies, chemical(s) and/or product(s);

vi. Operation and maintenance manuals for all equipment;

vii. Inspection and maintenance requirements for treatment zones;

viii. Monitoring, sampling & reporting plan, including quality assurance/quality control (QA/QC);

ix. Health and safety procedures;

x. Spill prevention and response procedures;

xi. Calculated and re-calculated quantities of passive treatment products used (Section 3.b and 4.b below);

xii. Site-specific performance testing results and the associated dosage/application rate(s) (see Sections 3.a and 4.a below);

xiii. Site map of:

a) Site area location(s) where the product(s) is used (treatment zone);

b) Treatment zone effluent discharge location(s);

c) Site location(s) where product(s) will be stored;

d) Locations of product(s) recovery BMP(s), including but not limited to, ponds, chemical and/or product recovery BMPs etc.;

xiv. Treatment zone soil type(s);

xv. Application date(s);

xvi. Application method(s);

xvii. Weather condition(s) during application; and,

xviii. Any other site-specific conditions or observations relevant to the functioning of the product.

b. The Passive Treatment Plan shall be electronically certified and submitted in SMARTS as part of the SWPPP 14 days prior to passive treatment use. A copy shall be available on-site during active construction. The Passive Treatment Plan shall be updated in accordance with the SWPPP update schedule specified in the Special Provisions Section of this General Permit.

3. The Passive Treatment Chemicals Performance Testing,[6] Dosing, Mixing, and Settling for use in Sediment Control BMPs

a. The discharger shall ensure stormwater is treated and sediment from the site is tested by the manufacturer or by another qualified third-party identified by the manufacturer[7] prior to a product being applied at the site. The testing should demonstrate that the selected formulation is the most effective product for removing suspended sediment.

b. The discharger shall hire a QSD and work with the product manufacturer to calculate the appropriate standard passive treatment product quantity per unit flow rate value using the following factors:

i. The specific chemical(s) or product(s) formulation being used;

ii. The amount of chemical/product applied;

iii. The flow rate of water through the system;

iv. The soil type and site topography; and,

v. The physical structure of the system.

c. This calculated value shall be included in the Passive Treatment Plan and be re-calculated as site conditions change.

[6] Toronto and Region Conservation. Canada Anionic Polyacrylamide Application Guide for Urban Construction in Ontario. Web. June 2013. <https://sustainabletechnologies.ca/app/uploads/2013/02/Polymer-Guide-Final_NewFormat.pdf>. [as of October 19, 2020].

[7] For example, a QSD authorized by the manufacturer to conduct a site-specific jar test (using ASTM D2035-08 (2003) using protocols specified by the manufacturer.

d. The discharger shall hire a QSD to ensure that the mixing and reaction time recommended by the manufacturer is followed during passive treatment application.

e. The discharger shall ensure that the settling area for the passive treatment product-sediment laden stormwater is sized to hold the sediment and allows the reasonable cleanout frequency specified by the QSD. A settling basin-BMP shall be implemented upon any evidence that previously settled sediment is being re-suspended.

4. The Passive Treatment Chemicals Performance Testing[8], Dosing, Mixing, and Settling for use in Erosion Control BMPs

a. The discharger shall ensure passive treatment products used are tested by the manufacturer or by another qualified third party, based on direction received from the manufacturer[9] prior to a product being applied at the construction site to select the most effective product for reducing the amount of suspended sediment in the site's runoff. The testing shall demonstrate that the selected formulation can remove solids to a concentration suitable for discharge to receiving waters without causing negative aquatic impacts.

b. The discharger shall hire a QSD to work with the product manufacturer to calculate the appropriate standard passive treatment product quantity per unit flow rate value using the following factors:

i. The specific chemical(s) or product(s) formulation being used;

ii. The amount of chemical/product applied;

iii. The flow rate of water through the system;

iv. The soil type and site topography; and,

v. The physical structure of the system.

c. This calculated value shall be included in the Passive Treatment Plan and be re-calculated as site conditions change.

[8] Toronto and Region Conservation. Canada Anionic Polyacrylamide Application Guide for Urban Construction in Ontario. Web. June 2013. <https://sustainabletechnologies.ca/app/uploads/2013/02/Polymer-Guide-Final_NewFormat.pdf>. [as of October 19, 2020].

[9] For example, a QSD authorized by the manufacturer to conduct a site-specific jar test (using ASTM D2035-08 (2003) using protocols specified by the manufacturer.

5. Personnel Training and Expectations

   a. The discharger shall ensure the QSD using passive treatment products possesses fundamental knowledge of:

      i. The specific chemicals or products being used including application rates, dosing, and manufacturer specifications;

      ii. Construction site stormwater discharge locations;

      iii. Coagulation and flocculation basics:

         a) Chemistry and physical processes;

         b) Coagulation and flocculation selection;

         c) Aquatic Safety/Toxicity of coagulants/flocculants;

         d) Monitoring, sampling, and analysis;

         e) Proper handling and safety;

         f) Reporting and record keeping; and,

         g) Emergency response.

      iv. Water quality testing procedures and methods;

      v. Factors that affect stormwater treatment chemistry including but not limited to:

         a) Turbidity;

         b) pH;

         c) Temperature;

         d) Coagulation;

         e) Flocculation;

         f) Filtration;

      vi. Data collection and tracking; and

      vii. Treatment dosage rate calculations and optimization.