The Monthly Dirt

Monthly Newsletter on the California Construction General Permit
By WGR Southwest, Inc.

Turbidity

February - March 2018

By now, most people who have had any experience in the last 10 years with a construction site permitted under the State Water Board's Construction General Permit are well aware of the number **250**. We are referring, of course, to the Numeric Action Level or NAL for turbidity. A reading of 250 or under … is like a sigh of relief; but when the average Nephelometric Turbidity Unit, or NTU, rises above 250, it means that the NAL has been exceeded and corrective action is required. In this edition of *The Monthly Dirt*, let's look at this familiar monitoring parameter and see what we can discover about the causes of turbidity, why it is such a concern when it comes to water quality, and what we can do to reduce it.

Turbidity and Solids. True or False? *Turbidity is the measurement of solids suspended in the water.* FALSE. It is actually the measurement of water clarity. OK, the question was a little misleading, suspended solids do affect turbidity; and, generally speaking, the more suspended solids, the higher the turbidity will be. But, turbidity is actually a measurement of the clearness of the water. A low number is clear; and a high number is cloudy. Turbidity is determined by shining a light through a sample and measuring the amount of light that was scattered (or, conversely, the amount of light that passed through the sample). The more particles that are present in the sample, the more the beam of light will be scattered. There is a laboratory test available for Total Suspended Solids (TSS) and it is the measurement of solids in a sample. But, the problem with this test (Standard Method 2540 D) is that it will only detect solids down to 2 microns in size. Colloidal clay suspensions have particles so small that they will pass right through the filter paper that the laboratory uses to capture, weigh, and quantify the solids. Presumably, that is why the State Water Board switched from using TSS to turbidity when the current version of the CGP was issued.

What Kind of Solids? Causes of elevated turbidity include suspended sediment such as silt or clay, inorganic materials, or organic matter such as algae, plankton and decaying material. Another potential contributor of turbidity is colored dissolved organic matter (CDOM), fluorescent dissolved organic matter (FDOM) and other dyes. CDOM is also known as humic stain. Humic stain refers to the tea color produced from decaying plants and leaves underwater due to the release of tannins and lignins. This discoloration is often found in slow moving water bodies that contain high amounts of decaying vegetation. CDOM can cause water to appear red or brown, depending on the type of plants or leaves present. These dissolved substances are typically too small to be counted in a suspended solids concentration, but they can still affect turbidity.[1] To test this, take a turbidity reading of clean drinking water and a reading of coffee. Although your coffee may not exceed the NAL, it will be higher in turbidity than the water.

Turbidity Influencers. Obviously, the biggest influencers of turbidity in discharges from a construction site are erosion and rain. The more soils exposed to rain without cover, the higher we can expect the turbidity to climb. But, there are other influencers that you may not have considered. Wind also causes erosion and can directly deposit sediment into a water body or blow it into gutters, swales, and catch basins where it stays until carried out by the next storm event. The time of the year can be an influencer. Fall time brings leaves, which decay into particles that can go into suspension or be a source of CDOM. Warm wet weather generates algae which also can elevate turbidity. But, other causes of turbidity include fast moving water and the pollutants it carries such as dust from tire wear, paint overspray, concrete washout, stucco curing, and slurries from saw cutting and grinding operations.

Why is Turbidity a Problem? Turbidity presents several problems to a water body. Elevated turbidity caused by suspended particles, which will eventually settle out in slower flows, can bury and kill benthic organisms or fish eggs. But settling solids are not the only problem related to high turbidity. The particles that stay in suspension cause other troublesome conditions such as blocking sunlight from reaching aquatic plants that rely on the sun for photosynthesis. Plants release dissolved oxygen into the

[1] Fondriest Environmental, Inc. "Turbidity, Total Suspended Solids and Water Clarity." Fundamentals of Environmental Measurements. 13 Jun. 2014. Web: http://www.fondriest.com/environmental-measurements/parameters/water-quality/turbidity-total-suspended-solids-water-clarity/ .

water body which is important for the health and survival of fish and other aquatic organisms. When these plants die, they not only no longer generate dissolved oxygen, but consume it through their decomposition. Furthermore, the decomposition releases more particles into the water further increasing the turbidity. Turbidity can also cause water to warm. Suspended particles will absorb more of the sun's energy than will clear water. Heat is then transferred by conduction to the water. Warmer water contains less dissolved oxygen than colder water and certain species of fish and organisms that depend upon higher dissolved oxygen concentrations will no longer be able to survive in the water body. Another water quality threat due to elevated turbidity is from "hitchhikers". Certain pesticides, heavy metals, oils and greases, and pathogens can cling to suspended sediment particles or "hide" among them. Because it is very difficult to treat water for pathogens and other pollutants when there are very heavy sediment loads, these hitchhiker pollutants tend to escape being caught in natural, low impact development, and other receiving water filtering systems.

Controlling Turbidity. The best way to control turbidity is to stop erosion. We have seen many examples of construction sites having runoff with turbidity values far above the NALs. But, the moment an effective soil cover is applied, such as a sprayed-on hydraulic mulch, the turbidity values drop dramatically. Sediment controls are also very important in helping control turbidity in that they tend to slow the flow and allow particles the opportunity to settle out. However, there will be sites where, despite the use of robust erosion and sediment controls, turbidity still exceeds 250 NTUs. Such is the case with projects that have colloidal clays, or in situations where control measures were installed too late resulting in impounded water with high turbidity. Under these circumstances, it may be necessary to utilize an active treatment system as described in Attachment F of the CGP. It is a common misconception that colloidal clay particles will not settle out because they are so small that gravity doesn't have an effect on them. It is true that these particles are tiny (<2 microns), but the reason they stay suspended is that they carry negative electrical charges which cause them to repel from each other. Imagine billions of negatively charged particles bouncing off each other – essentially self-agitating the water and keeping the particles in suspension. Since the problem is electrochemical, the solution is also electrochemical. Active treatment systems utilize a chemical (flocculant) which has a positive charge and attracts the tiny negatively charged particles to itself. This forms bigger particles that can now precipitate out of the water or be caught in sand filters.

Controlling turbidity can be complicated. Each site has unique characteristics and soil conditions. But, in general, the best approach is to proactively install erosion and sediment control measures to keep particles from becoming detached and to capture the ones that do detach. *MD*

Upcoming Training

- ✓ QSP/QSD Training in Lodi, CA, Apr. 10-12, 2018
  - o Sign up at www.gotswppp.com
- ✓ New On-line PDH Opportunity Coming:
  - Erosion Theory & the Grand Canyon
  - o Available on www.pduweek.org in May 2018

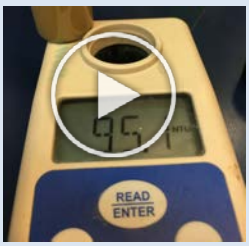
(For more information about these classes, please email jteravskis@wgr-sw.com)

Turbidity Curtains

There are some projects where silt and the water body interface and it is impossible to keep them apart, such as work along a levee or a structure within a water body. These projects typically require other environmental permits such as the California Department of Fish and Wildlife's Lake or Streambed Alteration Agreement, the California Water Board's 401 Water Quality Certification, and the US Army Corps of Engineer's 404 Permit. When working under these conditions where turbidity is going to be unavoidable, the use of a barrier between the project and the water body is necessary. Turbidity barriers, also known as floating curtains, silt barriers, or silt curtains are floating barriers designed to contain and control the dispersion of floating silt or turbidity. They are installed in the water and extend from the surface to about 1 foot above the bottom. The curtains come in different styles, such as permeable and impermeable. Selection of the type of curtain used will be dependent upon the type of water body, whether it is tidal or non-tidal, wave and wind conditions, and the velocity of the current. When using or specifying turbidity curtains, make sure that the appropriate environmental permits are in place and that the type and location of the turbidity curtains have been specified in each of the permits.

Can Turbidity Meters Have Erroneous Readings?

Watch the video!



Please contact us if you have any questions ...

The Monthly Dirt Newsletter Editor:
John Teravskis, QSP/QSD, CPESC, QISP, ToR
jteravskis@wgr-sw.com
(209) 334-5363 ext. 110 or (209) 649-0877

Technical Questions about Environmental Compliance?
Call ...
Mike Lewis, QSP, CESSWI (Northern California)
mlewis@wgr-sw.com, (209) 334-5363 ext. 116

Gray Martz, QSP/QSD, PG (Southern California)
jgmartz@wgr-sw.com, (562) 799-8510 ext. 1002

WHAT IS AN ACTIVE TREATMENT SYSTEM? WHEN IS IT NEEDED?

Wendell Sawyer, President
wdsawyer@ats-env.com

Vernon Slater, Project Scientist
vslater@ats-env.com

What is an Active Treatment System?

An ATS is a temporary water treatment plant, operating in either flow through or batch mode. They are designed to correct pH and prevent the uncontrolled release of sediment laden stormwater from a construction site during wet seasons until it is in compliance with effluent limits.

When is an Active Treatment System really required?

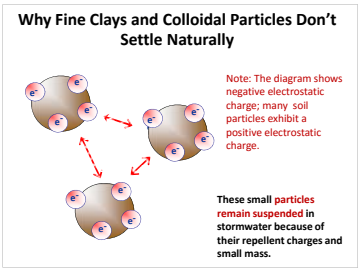
- When discharges cause an exceedance of water quality standards for turbidity and/or pH.
- When traditional Best Management Practices cannot effectively control the accelerated release of fine sediment in stormwater runoff.
- When site soils are made up of clays and/or colloidal clays.
- When the site exhibits highly erosive soil characteristics and terrain with long steep slopes.
- When site size limits construction of adequately sized holding basins.
- For more information see Attachment-F of the California Construction General Permit.

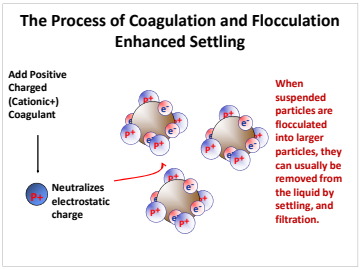
How does an Active Treatment System clean?

Negatively charged particulate matter with very small mass, can stay in suspension indefinitely without treatment. Particles of small mass and naturally repelling charges present challenging settling and filtration issues.

The addition of cationic (positively charged) coagulants, destabilizes the electrostatic charge and allows the small particles to bind together into larger aggregates called floc.

Chemically flocculated material will gravity settle and is more easily separated from the water through the use of clarifiers and mechanical filtration devices.





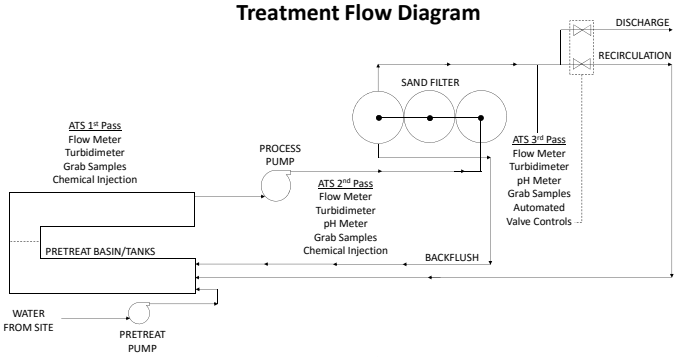
30 seconds after pretreatment. Coagulants can achieve within minutes what would normally take hours or years to accomplish with settling alone.

Poor quality stormwater runoff negatively impacts the environment and project budgets. A mess like this can cost up to $10.00 per gallon of discharged water in fines levied by a California Regional Water Quality Control Board.

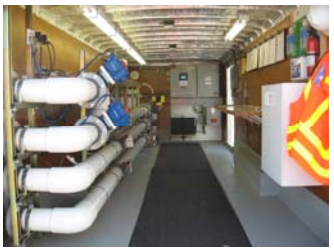
Active Treatment System design considerations include:

- Site characteristics: Acreage, Location, Historical Rainfall, Soil Types
- Expected water volumes and flow rates
- Expected turbidities from benchscale testing
- Contact time for suspended solids to fall out
- Tank or basin sizing (storage, pre-treat, backflush)
- Best Management Practices (BMPs)

Treatment Flow Diagram



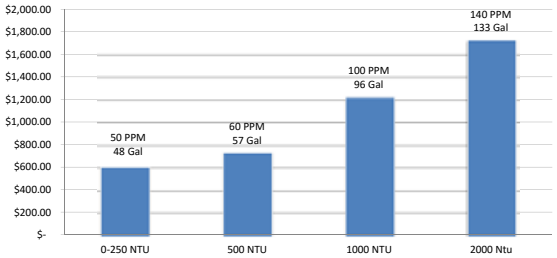
ATS Control Unit



Budgeting for Chemical Treatment

- Mobilization/Demobilization
- Monthly Rental
- System Operations
- Consumables

Estimated Polymer Cost to Treat 1,000,000 Gallons



What have we learned about reducing costs?

- Best Management Practices (BMP's) are a must.
- Controlling turbidity prior to Active Treatment is crucial.
- Instituting green technology such as Active Treatment is relatively inexpensive compared to potential fines.

Active Treatment Systems, Inc.
WATER SOLUTIONS FOR THE ENVIRONMENT

6301 Angelo Court, Suite 9
Loomis, CA 95650
916-652-9745

20 Jetty Dr., Unit A
Newport Beach, CA 92625
949-478-0945

ats-env.com

DIRT TIME

EROSION CONTROL BMP SUMMIT | APRIL 3RD-6TH 2018 @ SHASTA COLLEGE EROSION CONTROL FACILITY

This two day workshop is intended to de-mystify the BMP selection process, the SWPPP, while learning about the importance of drainage, infiltration, rooting depth, grading for erosion control, and some steep slope applications. The instructor will be John McCullah with special guest presenter, Craig Benson.

More than ever before your BMPs must be effective. According to the CGP (CA General Permit) the efficacy of the BMPs outlined in your SWPPP will be evaluated by inspections before, during, and after a storm event. The main learning points taken from theses events will be How to SELECT, INSTALL, and INSPECT BMPs.

A Trade show sponsored by IECA will be on site with EC equipment, products, suppliers and the latest in erosion control BMP practices. Just a walk away is the Shasta College Erosion Control Training Facility where we will spend the second day watching and participating in BMP implementation. Check out this BMP video: https://youtu.be/vsWqLbNytBo

Cost is $300.00 per person. Beverages and lunch are provided for two days. Group rates will be offered for four or more registrants.

30% Discount to Agencies or Companies with groups of 5 or more.

10% Discount to IECA Members.
10% discount for early registration

You will receive a certificate of attendance for continuing education. Scholarships will be available to small business involved in erosion control.

Shasta College is an equal opportunity educator and employer

REGISTER AT WWW.WATCHYOURDIRT.COM OR CALL 530-247-1600

North Far North Regional Consortium

Shasta College

Sacramento Watersheds Action Group

California Community Colleges
Doing What MATTERS™
FOR JOBS AND THE ECONOMY

Quick QSP Quips

Required Inspections

Risk 1, 2 & 3 – Traditional Projects:

- Weekly BMP inspections
- Pre-storm (within 48 hours before)
- Post-storm (within 48 hours after)
- During storms (every 24 hours)
- Quarterly for non-storm water flows

Risk 2 & 3 – Traditional Projects:

- Daily inspect immediate access roads for sediment and track out

LUP Types 1, 2 & 3 Projects:

- Daily visual BMP inspections and ensure that photographs of the site are taken before, during, and after storm events are taken during inspections, and submitted through the State Water Board's SMARTS website once every three rain events.

LUP Types 2 & 3 Projects:

- Pre-storm (within 48 hours before)
- Post-storm (within 48 hours after)
- During storms (every 24 hours)

Risk 3 & LUP Type 3 Projects:

- *If triggered*, receiving water or bioassessment observations

RAIN EVENT ACTION PLANS

- Required of Risk 2 & 3 traditional projects only. LUPs are not required to prepare REAPs.
- Are triggered by a 50% or greater possibility of rain per the NOAA weather forecast at www.srh.noaa.gov
- Must be prepared within 48 hours of the predicted storm event.
- Must be implemented and a paper copy on-site within 24 hours of the predicted storm event.
- Must be prepared by a QSP.

Sampling Requirements

Risk 1 – Traditional Projects:

- Only for non-visible pollutants if triggered

Risk 2 & 3 – Traditional Projects:

- Discharge monitoring (pH and turbidity) at least 3 times per day when there is a discharge
- Non-visible pollutants *if triggered*.

Risk 3 – Traditional Projects:

- Upstream and downstream receiving water testing *if triggered*.
- Bioassessment *if triggered*.

LUP Type 1 Projects:

- Only for non-visible pollutants if triggered

LUP Types 2 & 3 Projects:

- Discharge monitoring (pH and turbidity) at least 3 times per day when there is a discharge
- Non-visible pollutants *if triggered*.

LUP Type 3 Projects:

- Upstream and downstream receiving water testing *if triggered*.
- Bioassessment *if triggered*.

Non-visible sampling – All Risk and Type Levels:

- Triggered by a breach, malfunction, leakage, or spill observed during a visual inspection.
- Collected during the first 2 hours of discharge.
- Two samples one at the affected discharge point and another at an unaffected area

Qualifying Rain Events

A qualifying rain event is "any event that produces 0.5 inches or more precipitation with a 48 hour or greater period between rain events." *In other words, it is a period of rain that is "bookended" by dry weather that is at least 48 hours long.*

Sampling Exemptions

1. It is not a "qualifying rain event".
2. During dangerous weather conditions such as flooding and electrical storms.
3. Outside of scheduled site business hours.

Remember to document if any of these exemptions are applicable to your project.

Numeric Action Levels

Prepare a NAL exceedance report within 10 days if either of the following is true about your project's daily average:

pH is <6.5 or >8.5
Turbidity is >250 NTU

- ✓ NALs are daily averages of monitoring data from all discharge points for the entire day.
- ✓ pH must be averaged logarithmically. Averaging tool is at www.wgr-sw.com/pH
- ✓ NAL exceedance reports must be uploaded onto SMARTS.

Rules of Engagement for Sampling

The following are helpful guidelines that have been extracted from the permit to assist you in knowing when to sample:

1. If there is no discharge, then no sample is required.
2. Collect a minimum of 3 samples per day for the entire site.
3. Each day, collect at least one sample from each point of discharge.

Best Management Practices

- ❑ Risk 1 mandatory BMPs are found in Attachment C.
- ❑ Risk 2 mandatory BMPs are found in Attachment D.
- ❑ Risk 3 mandatory BMPs are found in Attachment E.
- ❑ LUP mandatory BMPs are found in Attachment A.
- ❑ The QSP must use a checklist for inspections and include a description of the BMPs evaluated and the deficiencies noted.
- ❑ Corrective action must begin within **72 hours** of identification and be completed as soon as possible.
- ❑ Inactive areas of soil disturbance that are not scheduled to be disturbed for at least 14 days must have effective soil cover.
- ❑ Projects must establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.
- ❑ Risk Levels 2 & 3 and LUP Types 2 & 3 projects must apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with the table shown at the right.

Slope Percentage	Sheet flow length not to exceed
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

Questions? Call the QSP Help Hotline:
(209) 649-0877 or email at
jteravskis@wgr-sw.com

COME SEE OUR SHOWROOM!
11780 N. HWY 99, Lodi CA 95220

PRODUCT SPOTLIGHT

Designed for portability and durability the waterproof T-100 turbidity meter is ideal for monitoring turbidity in chemical, food and industrial applications. The microprocessor-based T-100 turbidity meter uses an infrared LED light source and delivers unprecedented repeatability and accuracy while offering resolution as low as 0.01 NTU. This lightweight meter is a valuable analytical tool for field-testing and quality control.

Product Specifications:
- Range: 0 to 1000 NTU
- Resolution: Down to 0.01 NTU
- Accuracy: +/- 2% below 500 NTU; +/- 3% above 500 NTU.
- Repeatability: +/- 0.01 NTU, or 1%
- Comes with four calibration standards, collection bottle, lint-free cloth, silicone oil, batteries, and hard carrying case.

BMP
bmpoutlet.com

BMP Outlet is a supply house for affordable erosion control products, drain inlet protection, sorbents, spill containment, and field instruments.

We have a large inventory of many different types of product, and can order whatever you need for your project.

Elima-Drip Pads

Eliminate drips underneath your vehicles and equipment with Elima-Drip drip containment pads. Elima-Drip pads are weighted absorbent pouches contained in heavy-duty vinyl sleeves, which protect the spill pads from accidental movement. The 50”x20” pad is capable of containing up to 50 ounces of oil, and the 30”x20” pad can contain up to 29 ounces. Best of all, these pads are reusable! Simply replace the pouch inside the vinyl sleeve.

Product Specifications:
Outside Material: Heavy-duty vinyl sleeve
Spill Containment Media: Absorbent pads
Dimensions: 50″x20″ or 30″x20″

$48.00 (30”x20”)
$58.00 (50”x20”)

Check out our website!
shop.bmpoutlet.com

BMP Outlet • sales@bmpoutlet.com • (916) 918-0408