Appendix C

Active Treatment Systems

C.1 Introduction

Temporary Active Treatment Systems (ATS) apply conventional water treatment technologies, in use for over a century, to stormwater quality. Neither the CGP nor the LTCGP requires the use of an ATS, but for waters and sites where the reliability of the stormwater quality is of concern, these systems may be used.

C.1.1 Overview

An ATS may be considered for a project under the following conditions:

- When necessary to meet water quality standards (WQS) of the receiving water.
- When necessary to meet the effluent limits of the CGP or LTCGP for turbidity and pH in stormwater.

Under the CGP and the LTCGP, an ATS is recommended for use at high risk work sites, including:

- Where space limits installation of properly-sized containment and detention facilities, such as a sediment trap (see SC-3 “Sediment Trap”) or sediment/desilting basin (see SC-2 “Sediment/Desilting Basin”).
- Where clay and/or highly erosive soils are present.
- Where the site has very steep slopes
- Where project work necessitates on-going and large amounts of disturbed soil area during the rainy season
- Where the project site is highly susceptible to stormwater run-on resulting in erosion and sediment-laden run-off.

An ATS uses a coagulant for the treatment of water with a sedimentation basin (or basins) for facilitating turbidity reduction. In addition, pH adjustment plus bag/cartridge/sand filters may be included. The exact configuration and sizing of the ATS will depend on the anticipated quantity and quality of the water to be treated, the amount of time needed for treatment, and receiving water requirements.

Coagulation can be used to destabilize suspended particles and remove them from suspension, which forms a byproduct referred to as floc or flocculant. There are many different coagulants for use; a coagulant may use different chemical properties and may be suited for different types of water conditions to be treated. Potential chemical residual (i.e., coagulant residual) in the treated effluent must be monitored and managed to attain applicable effluent limits prior to discharge.

An ATS is recommended to remove particles below 0.02 mm and may be warranted for locations that must meet strict turbidity requirements. Some receiving waters may be listed for other parameters of concern for which an ATS might be recommended; however, not all pollutants can be treated with readily available ATS technology.

C.1.2 CGP and LTCGP

An ATS, as covered by the CGP or the LTCGP, is used for the treatment of stormwater discharges generated from precipitation that falls on or runs through the construction area during a rain event. Other water generated from construction operations is considered non-stormwater.

In some cases, ATS designers may wish to include non-stormwater treatment as an aspect of, or supplement to, the ATS system. When doing so, any non-stormwater comingled with stormwater may both alter the performance values of the selected coagulant and place different or additional demands upon the other selected ATS components. These modifications of the system will need to be evaluated and if necessary coverage under a supplemental NPDES Permit, in addition to the CGP or LTCGP, may be required.

C.1.3 General Requirements

The following general requirements are applicable to projects that utilize an ATS:

1. Standard Specification Section 13-8 includes provisions for treating and discharging uncontaminated groundwater and accumulated stormwater from excavations or other areas with a temporary ATS.
2. Submit an ATS Plan to the RE within 20 days of contract approval. The ATS Plan must comply with Standard Specification Section 13-8.01C(2). At least 14 days prior to the planned operation of the ATS, the ATS Plan is required to be submitted electronically to the SWRCB and applicable RWQCB. Each element of the ATS Plan including but not limited to O&M Manual, Monitoring, Sampling & Reporting Plan including QA/QC, Health & Safety Plan, and Spill Prevention Plan must be assessed and evaluated to ensure compliance and functionality with the CGP or LTCGP operational requirements.
3. The design, installation, operation, and monitoring of the temporary ATS and monitoring of the treated effluent must comply with Attachment F of NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ, NPDES No. CAS000002).
4. For a project within the Lake Tahoe Hydrologic Unit, the design, installation, operation, and monitoring of the temporary ATS and monitoring of the treated effluent must comply with Attachment E of the NPDES General Permit for General Waste Discharge Requirements and National Pollutant Discharge Elimination System Permit for Storm Water Discharges Associated with Construction Activity in the Lake Tahoe Hydrologic Unit, counties of Alpine, El Dorado, and Placer, (Order No. R6T-2016-0010, and NPDES No. CAG616002).
5. For a project within the Lake Tahoe Hydrologic Unit, the discharger must perform toxicity testing that complies with Standard Specification Section 13-8.01D(2) if operating a temporary ATS in batch-treatment mode.
6. Training must be provided to each operator of the ATS.
7. The ATS must be designed for the site conditions and anticipated flow rate and must include (1) a treatment system, (2) a collection and conveyance system, and (3) a discharge method and location.
8. The ATS must be capable of capturing and treating within a 72-hour period a volume equal to the runoff from a 10-year, 24-hour rain event using a watershed coefficient of 1.0.
9. The control system must default to recirculation or shutoff during a power failure or catastrophic event.
10. The control system must control the amount of the coagulant to prevent overdosing. The coagulant must be mixed rapidly into the water to insure proper dispersion.
11. Pumps and piping must comply with Standard Specification Section 74-2.
12. Discharges may be made into a sanitary sewer system however; the effluent discharge must comply with the publicly-owned treatment works (POTW) requirements and must meet all criteria as set forth in any issued Batch Discharge Permit. The POTW Batch Discharge Permit should be secured

as part of the ATS planning process to ensure access and feasibility of discharging expected water quantities. This option is frequently utilized for short term or low volume discharges. The Department does not pay for obtaining the municipal batch discharge permit or for discharging the water.

13. Submit documentation for the delivery and removal of ATS components.
14. If observations and measurements confirm that a residual chemical or water quality standard is exceeded, submit the notice of discharge within 24 hours after exceeding the limits per the requirements of the CGP or the LTCGP.
15. Water discharged from a temporary ATS must comply with the Numeric Effluent Limits (NEL) for discharge effluents and the receiving waters.
16. If an NEL is exceeded, notify the RE and submit a Numeric Effluent Limitation Violation Report- ATS Discharge (CEM-2063[1]) within 6 hours. For a project in the Lake Tahoe Hydrologic Unit, the Numeric Effluent Limitation Violation Report- Lake Tahoe Hydrologic Unit – Lake Tahoe Hydrologic Unit (CEM-2063T[2]) must be submitted within 2 hours. The analytical results less than the method detection limits must be reported as less than the method detection limits. In compliance with the CGP or LTCGP, electronic filing of the exceedance report to the SWRCB and RWQCB shall occur within 24 hours of either obtaining the results or identifying the exceedance.
17. Calibrate the flow meter and devices for taking water quality measurements under the manufacturer's instructions as outlined in the ATS Plan.
18. Monitoring equipment must be interfaced with the control system of the ATS to provide shutoff or recirculation whenever effluent readings do not comply with the turbidity and pH limits.
19. Monitoring equipment for the ATS must record data at least once every 15 minutes and cumulative flow data daily. The recording system must have the capacity to record a minimum of 7 days of continuous data.

C.2 ATS Selection Criteria

In general, ATS selection is driven by the available area, and the soil type of the site. Each of these will drive the selection of an ATS that would reliably meet the requirements of the CGP or the LTCGP.

C.2.1 Risk Level

Generally, projects designated as Risk Level 1 under the CGP should implement typical Construction Site BMPs. Project designated as Risk Level 2 or 3 under the CGP should use the following factors to determine whether traditional BMPs are sufficient or an ATS is appropriate for use. The following factors should also be used for projects subject to the LTCGP.

C.2.2 Potential Storage Area and Peak Stormwater Flow

Project sites with enough potential storage area to detain the estimated quantity of stormwater from a rain event and allow sediment to settle out of suspension by gravity may be able to avoid using an ATS. These areas can be used for storage of water with enough detention (dwell) time to settle significant quantities of particles prior to discharge. The minimum detention time can be determined by dividing the available storage by the peak flow expected from a 5 year-24-hour storm. If the minimum detention time of a sedimentation basin can meet the minimum compliance requirements for sedimentation, an ATS is generally not required for turbidity removal. Other considerations that may influence minimum detention time and should be evaluated include, but are not limited to:

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[1] This form can be found at: http://www.dot.ca.gov/hq/construc/forms/CEM2063.pdf

[2] This form can be found at: http://forms.dot.ca.gov/v2Forms/servlet/FormRenderer?frmid=CEM2063T

- The time required to treat stormwater from successive rain events.
- The quantity of stormwater that may run-on into the project.
- Conditions caused by on-going construction activities.

The above listed conditions are examples that may trigger the need for an ATS.

Determine the area available for potential stormwater storage (A_p). This can include assigned stormwater treatment locations, existing storage areas, or space outside of the construction footprint which is available for use. Often, these areas will necessitate an engineered design and construction specific to the location used, plus a management understanding of detention time commitment and the need to use this dedicated space exclusively for stormwater detention and treatment.

C.2.3 Soil Type

The minimum detention time required for a construction site will depend on the predominant soil type. Fine soils, such as clay, will remain suspended for much longer times than coarser soils, such as sand. To determine the initial minimum detention time required, the composition of the soil within the construction site must be determined. Anticipating and estimating for changing soil conditions from construction activities that affect and change the soil dynamics (e.g., mixing of soil types, compaction, cut/fill areas) may complicate this calculation. Repetitive rain events will also affect the evaluation.

C.2.4 Settling Velocity and Required Settling Area

A calculation of the maximum area for potential treatment must be made. Initially calculate the peak stormwater flow from the site based upon disturbed soil area and the rainfall intensity from a 5 year – 24-hour rain event using the Rational Equation (though this peak flow does not need to be the design flow of a potential ATS). Next, determine the predominant soil type within the construction area. Conservative estimates will use the minimum particle diameter of each soil type (sand, silt, or clay) in conjunction with Stokes Law to determine the settling velocity of the sediment.

Other methods or models may be substituted for Stokes Law if more information is readily available for project soils. Dividing the peak stormwater flow by the settling velocity will determine the minimum area required (A_r) for settling without active treatment. Note that these calculations should take into consideration the changing soil conditions and dynamics based on the phase and stage of the project, scope of soil work being performed, and other issues related to scheduled soil work.

C.2.5 Determine Appropriate Device

Comparing the minimum area required (A_r) to the potential area available (A_p) will determine whether an ATS may be necessary. If the area available is significantly larger (>20 percent) than the area required, evaluate BMPs based upon site characteristics. If the area required is significantly larger than the area available (>20 percent), then an ATS must be considered. If the area available and the area required are similar, only RL 3 sites should consider ATS as they require more reliability than RL 2 sites. If the design can be refined, such as increasing potential storage area or improving the accuracy of the settling velocity calculation, re-evaluate the site. If no other options are available, an ATS is recommended.

The CGP contains direction for implementation of ATS. Risk level 2 projects do not have NELs for pH and turbidity, unless an ATS is used. Therefore, careful evaluation is necessary before selection; check with the District/Regional Design Stormwater Coordinator.

C.3 Factors Affecting Preliminary Design

C.3.1 Pollution Prevention/Sediment Mitigation

Actions to reduce the quantity of sediment in stormwater directed to storage should be implemented in the work area regardless of the decision to use an ATS. With an ATS these measures can lead to more efficient treatment and operational cost savings. Closing off or stabilizing unused portions of the site will reduce the quantity of stormwater that could be impacted by construction activities. Focused consideration should be given to evaluating and installing run-on control and bypass controls means to reduce and minimize the amount of stormwater that would require treatment. Minimizing sheet flow and concentrated flows from up-slope areas and/or drainages coming into the project is critical to reducing not only the quantity of water requiring treatment but also the causative effects of scouring or transport of sediment in run-on water.

To prevent significant sediment loading to an ATS all applicable Construction Site BMPs, especially those that provide erosion and sediment control at the source and within conveyances, should be implemented. If stormwater run-on cannot be prevented from entering the project, installation of lined drainage ditches, bypass piping, or other means, should be considered to direct flows away from disturbed soil areas and steep slopes. This can minimize treatment requirements for run-on. The use of plastic cover is often a significant and beneficial implementation control to prevent direct contact of stormwater with disturbed soil. With plastic cover, the clean run-off can be re-routed, preventing it from entering the ATS collection system.

To minimize stormwater treatment, evaluate and design for the temporary redirection and bypass of roadway runoff to prevent contact with project disturbed soil areas when feasible. If project plans call for the abandonment or removal of existing storm drain conveyances, outfalls, inlets, or lined drainages consider scheduling the work after the rainy season. Considering staging and phasing of project work, evaluate adjustments to the schedule to minimize the removal of existing constructed storm drain systems until the next dry season approaches.

C.3.2 Collection System/Discharge Piping

Collection piping is required to convey the water generated onsite to the treatment system (i.e., the ATS and its component systems). The size and quantity of piping will be determined by the layout and terrain of the disturbed construction area. It may be necessary to include pumps to move large quantities of water across the site. It is also possible for the site to implement multiple ATS systems. Discharge piping and pumps are required to convey treated effluent to the appropriate discharge location. Proper sizing is required to prevent flow backup or sedimentation within the pipe. Some considerations when designing for and installing collection systems include the following:

- Can the stormwater draining toward the ATS collection system be directed through a lined drainage ditch or conveyance piping by which scour will not create additional sediment?
- Can the stormwater draining toward the ATS collection system be filtered by perimeter barriers such as filter lined drainage rock, silt fence, gravel bag check dams, etc., before entering the conveyance?
- Can the conveyance sump (where the pumps are placed) be designed large enough to ensure enough area to handle the run-on water?
- Can the conveyance sumps be designed and situated to prevent direct intake of silt, sediment, or soils? Can filters, screens, or protective barriers be installed that surround the sumps and/or pumps to minimize the up-take of transported heavier fines, particulates or floating materials, vegetative detritus, etc.?
- Can the conveyance pump be so situated by which it can be easily accessed or withdrawn for maintenance or replaced if needed?

- Can the pumps and conveyance piping and/or hose leading to the ATS system from the conveyance sump-pumps be designed to maximize speed of conveyance thereby preventing the sump-pump locations from flooding during peak runoff?

C.3.3 Storage/Pre-Sedimentation

If it is necessary to store large quantities of water onsite during significant rain events, locations such as swales, basins, and other areas conducive for storage may be used to retain water prior to treatment. These locations provide an additional benefit of settling out some sediment before treatment with an ATS. Design of these storage locations should be in accordance with criteria for those BMPs.

Systems with a high sediment loading may necessitate pretreatment. Pretreatment typically consists of a pre-sedimentation basin such as a weir tank for the removal of easily settleable sediment loads. Pretreatment can improve coagulant usage and effectiveness, as well as reduce the quantity of flocculant sludge, thus minimizing costs. Systems with pre-sedimentation and storage can be sized to smaller peak flows as large storms can be stored and treated over longer durations. The trade-off will depend on both the amount of storage and design capacity of the system. Additional considerations related to storage and pre-sedimentation may include:

- Can existing long term excavations, or existing curbed and/or walled in areas be used for temporary storage?
- Can a retention basin be constructed and excavated deep enough (or have above ground walls constructed) to minimize the footprint of the required area needed for holding the estimated maximum quantity of collected stormwater prior to conveyance to the ATS? Are there natural, pre-existing areas in the construction work area where stormwater can be collected for holding prior to conveyance? Can the holding areas be lined to minimize the up-take of resident loose sediment or soils?

C.3.4 Treatment Components

Different components may be used within the ATS. These components interact with each other and need to be considered individually and as an integrated treatment system. Recirculation piping will be necessary to meet turbidity and pH discharge requirements. Table C-1 and C-2 summarize many of the components available for integration into a temporary ATS and associated materials.

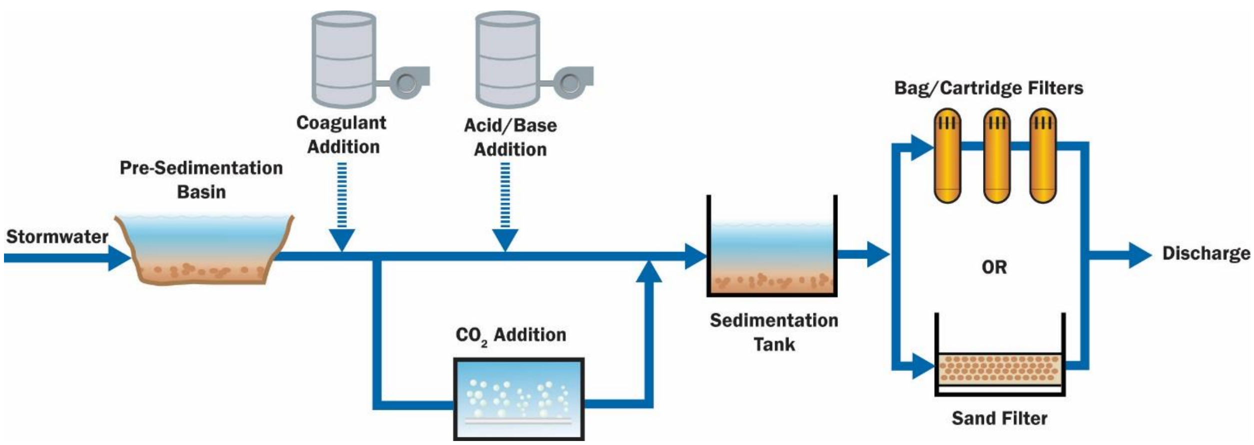

Figure C-1. Potential Treatment Schematic

Table C-1. Potential ATS Components

Component	Use
Coagulant Dosing Equipment	Chemical for forming floc and removing turbidity
pH Adjustment Dosing Equipment	Chemical for adjusting pH within proper range
Sedimentation Tank (or Basin)	Gravity particulate removal and sludge removal/collection
Bag/Cartridge/Media Filters	Filters for particle removal

C.3.4.1 Coagulation and Flocculation

Different coagulants are available for use within an ATS system. The choice of a coagulant is an important consideration to achieve turbidity removal requirements. The anticipated water quality of the site based on existing soil/sediment conditions and scheduled contractor work will define which coagulants may be effective at forming floc and improving water quality. Coagulant dosing rates and usage will vary depending on the water quality, flow volumes, and coagulant selection. If evaluation and assessment of the performance values and parameters of a coagulant in relationship to the known and expected project conditions is required to achieve treated effluent quality values.

Some coagulants that have been used on past projects include Chitosan, Ferric Chloride, and Alum. Use of other coagulants/polymers may be more difficult for the RWQCB to approve due to uncertainties about potential effects on water quality. Regardless of the coagulant choice, monitoring of residual chemical in the discharge would likely be required.

Equipment such as a chemical feed pump, a rapid mixer (static or mechanical), and sufficient sedimentation will be necessary to properly dose any coagulant. A streaming current detector should be used to monitor and adjust coagulant dose.

A Coagulant-Handling Work Plan is required as part of the ATS Plan and should be prepared for any coagulant used to ensure protection from potentially toxic effects on both human and wildlife due to exposure from high concentrations of residue coagulant. At a minimum, the Coagulant-Handling Plan should include coagulant storage, monitoring, and disposal during the lifespan of the ATS.

When operating the ATS in a Batch Treatment Mode, the CGP requires acute toxicity testing and has specific criteria for testing methodology, laboratory analysis, and quality assurance. All toxicity testing data performed during ATS operation is required to be electronically uploaded to the State Water Boards Storm Water Multi-application and Reporting Tracking System (SMARTS).

Table C-2. Potential ATS Chemicals

pH Decrease	Hydrochloric Acid (HCl)	Low Dose	Safety Concerns	
	Sulfuric Acid (H_2SO_4)	Low Dose	Safety Concerns	
	Carbon Dioxide (CO_2)	Inert, Self-Buffering	Mechanically Intensive, Requires Diffuser/Basin	
pH Increase	Sodium Hydroxide (NaOH)	Low Dose	Safety Concerns	
Coagulant	Alum	Lower Cost	Drops pH, Can Require High Dose	
	Ferric (Chloride/Sulfate)	Lower Cost	Drops pH, Can Require High Dose	
	Chitosan	Low Dose	May Not Work Well for Certain Soils	$2,500 per Tote

C.3.4.2 pH Adjustment

For certain systems, pH adjustment may be necessary to maintain receiving water integrity. Certain site conditions may adversely affect pH and certain coagulant choices can alter pH and should be considered. There are multiple methods for pH adjustment depending on the water quality of the site and each method has inherent strengths and weaknesses dependent upon the condition under which it is used. Each option considered for use should be evaluated for its potential affect upon other aspects and components of the treatment system, both from a physical and chemical perspective. The nature of pH adjustment can not only be highly corrosive to the ATS equipment, but may also present a heightened risk to occupational health of the ATS operator or maintenance technician.

Carbon Dioxide (CO_2) can be used to lower the pH. CO_2 gas is bubbled through water forming carbonic acid (H_2CO_3) and thereby reducing pH. Carbon dioxide is mechanically more intensive, but the gas is much safer to store onsite. The CO_2 system requires a bubble diffuser and a separate basin for proper implementation.

Strong acids and bases may also be used; dosing generally occurs alongside coagulant addition. Dosing rates will vary depending on water quality, receiving water quality, and acid/base selection. Strong acids/bases have safety concerns associated with storage and dosing. In addition, acid/base selection is important to prevent possible interactions with other treatment components. Strong acids (e.g., hydrochloric acid, sulfuric acid) and bases (e.g., sodium hydroxide) would provide rapid pH response for most waters; an advantage to all the acids and bases listed in the table below is that the corresponding counter-ions (e.g., sulfate, chloride, sodium) are not expected to react with constituents in the treatment system. In contrast, some acids (e.g., citric acid) introduce counter ions (citrate) that can have undesirable side-effects, such as promoting bacterial growth or inhibiting floc formation.

Table C-3. Suggested pH Adjustment Chemicals

Acids	Bases
Carbon Dioxide (CO_2) – Bubble Carbon Dioxide will form carbonic acid and drop pH	Sodium Hydroxide (NaOH)
Sulfuric Acid (H_2SO_4) – strong acid	
Hydrochloric Acid (HCl)	

C.3.4.3 Sedimentation Tanks

Sedimentation tanks are required to settle floc formed from coagulation. Sedimentation tanks must provide sufficient area and retention time to allow adequate settling of solids. Sedimentation tanks as opposed to weir tanks are recommended for use with high sediment loads. Weir tanks may be used for systems that have minimal influent sediment loading. Higher sediment loads will quickly fill weir tanks and would require sludge removal at higher frequencies compared to sedimentation tanks. Calculating accurate coagulant dosing rates based on site conditions should allow more accurate estimates of sedimentation tank(s) loading of settled floc and therefore lead to selection of the right size tanks. It is important to provide sufficient area for the settling of solids because accumulated floc increases treatment times and therefore reduces the amount of water that can be treated during rain events. In some cases, it may be more desirable to over-estimate the required area.

Figure C-2. Sedimentation Tank

C.3.4.4 Bag/Cartridge/Media Filter

Bag, cartridge, or media filters provide additional particle removal prior to discharge. Bag and cartridge filters pass water through mesh filters reducing particle sizes to a predetermined size. Media filters use sand or other granular media to remove particles. Bag and cartridge filters are removed, changed out and discarded. Media filters use treated water to backwash the filter and remove particles.

It may be necessary to reduce turbidity to approximately 25 NTU or below prior to filtration to prevent excessive buildup on the filter. For bag and cartridge filters, higher turbidity levels passed to the filters will cause increased frequency of change-out and likely increase operational costs. For sand filters, more frequent backwashing will be required which will cause greater work, more chemical usage, and more clean water for backwashing. When backwashing is required the on-going affect upon the treatment process must be calculated into the required treatment rate. When backwashing occurs, less influent is treated in that time.

Figure C-3. Bag/Cartridge Filters

C.3.4.5 Power Sources

An uninterruptible power supply and standby electric generator is recommended for any ATS system. Storms can routinely interrupt power supply systems; thus, it is necessary to provide a backup in such circumstances. An audible or observable alarm should be an aspect of the ATS design to notify personnel in the event of a power outage. Consequences from a non-operable ATS during a critical time may lead to project site flooding and potentially to a discharge with exceedances.

C.3.4.6 SCADA Monitoring Equipment

Supervisory Control and Data Acquisition (SCADA) systems are standard technology used to monitor and control all monitoring and mechanical systems within an ATS. These systems can record and store all relevant data to the project. Remote operation of an ATS is possible through SCADA systems, but connection stability must be maintained to ensure proper operation.

ATS effluent discharges should meet the requirements of the CGP or LTCGP. Monitoring equipment must be installed. These include, but are not limited to, turbidimeter, pH meters, and flow meters. These meters must be calibrated as recommended by the manufacturer or regulator. The frequency of calibration and a documented process to retrieve and verify data should be specified to the contractor and may be required by the RWQCB. In addition, some water quality analysis will be need to be conducted by outside labs for analysis such as total suspended solids (TSS), settleable solids (SS), or residual chemicals. Validate and maintain the sensors in the in-line ATS system that communicate values to the SCADA system regularly. If these sensors are not functioning properly, the SCADA data may be of limited value. Note: the CGP requires that all field recorded monitoring data including but not limited to turbidity, pH, residual chemical, flow rate, and volume be electronically uploaded every 30 days minimum to the State Water Board.

C.4 Active Treatment System Sizing

The size of the treatment system will be dependent on the acreage of the active disturbed soil area. The system is required to be sized such that the runoff from a 10-year 24-hour rain event would be captured and treated within 72 hours. Storms that are greater than the design event may cause the ATS to exceed the CGP restrictions. In these circumstances, the RWQCB will still expect the contractor to make efforts for meeting the CGP or other requirements.

C.4.1 Construction Area

The area of the basin will be defined by the contributing drainage area of the disturbed construction site. The contributing drainage areas will be defined by the designer depending on the orientation of the construction site. For long or flat construction sites, it may be necessary to subdivide the site and set up separate ATS locations. The conveyance systems required to funnel stormwater to a central ATS location may be prohibitive for certain site orientations.

If multiple receiving waters are present in the site, each receiving water basin may require a separate ATS to maintain watershed integrity. For some receiving waters, BMPs may be sufficient to meet turbidity goals.

C.4.1.1 Flowrate

Peak flowrate can be calculated for each area by the Rational Formula:

$$Q = C \times I \times A \qquad \text{(Eqn. 1)}$$

Q = Peak Runoff Rate, Cubic Feet per Second

C = Dimensionless Runoff Coefficient (use 1.0)

I = Rainfall intensity, Inches per Hour (10-year, 24-hour)

A = Basin Area, Acres

The rainfall intensity will vary by project location.

Per the Standard Specification Section 13-8, the designer shall use a runoff coefficient value of 1.0.

Basin area is the total contributing drainage area to the BMP or ATS.

C.4.1.2 Sedimentation Residence Time

Hydraulic Retention Time should be between 2 and 4 hours to allow sufficient floc settlement to meet turbidity requirements.

$$HRT = V/Q \qquad \text{(Eqn. 2)}$$

HRT = Hydraulic Retention Time, Hours

V = Volume of Sedimentation Basin, Gallons

Q = Flowrate, Gallons per Hour

C.5 Maintenance and Inspection

The ATS requires regular maintenance to ensure it is properly functioning and to prevent leaks. Repair or replace any component of the dewatering equipment that is not functioning properly or as required by the operations and maintenance outlined in the ATS Plan. The detail in the ATS Plan should be of significant nature to clarify most aspects of ATS function and servicing. Each piece of equipment to be used in the ATS needs to be fully described including its purpose and its inter-relationship to the other equipment. Inclusion of manufacturer specification sheets in the ATS Plan is of high value and should be considered. Descriptions of how to assess the ATS components for performance values is instrumental in trouble-shooting deficient operation. A section within the ATS Plan on maintenance scenarios and trouble-shooting examples for commonly known conditions or operational failures is highly recommended. Trouble-shooting questions could include the following:

- Is increased time required because the holding tank is reduced in capacity due to accumulated floc?
- Is increased time required because not enough coagulant is being dosed which could be caused by a degraded sensor?

The inclusion of set procedural steps for bringing on-line each piece of equipment of the ATS system and determinants of how to balance the system is invaluable when attempting to maximize operation or solve a functional problem. These aspects of an ATS Plan, if not considered in the planning stage and left out of the ATS Plan, could lead to failures of the system and on-going repeat deficiencies.

Remove sediment from the storage or treatment cells as necessary to ensure the cells maintain their required water storage and treatment capability. Sediments removed from the uncontaminated areas during maintenance of the treatment system may be dried, distributed uniformly, and stabilized at a location within the project limits where authorized. Generally accumulated floc from treatment, and any associated captured sediment in the system, is disposed of at a landfill permitted to receive such a waste stream.

If observations and measurements determine that the water quality limits are exceeded, immediately stop the discharge, notify the ATS designer, and start corrective measures to change, repair, or replace the equipment and procedures used to treat the water. If a situation occurs in which the operational perimeters of the ATS are exceeded or the criteria for allowed discharges values are compromised, the information must be retained for recordkeeping and reporting purposes. All corrective actions taken including time periods of non-compliance, and/or time periods to institute corrective actions, should be recorded. Record the quantity of discharge that may have been non-compliant. All test reports and records may be included in the report to the RWQCB. If a piece of equipment failed, broke, or an operation process was not followed this information should be noted to allow assessment of reasons for failure and corrective measures to be implemented to prevent a reoccurrence.

After the designer inspects and authorizes your corrective measures, resume treatment and discharge activities under the startup-phase sampling requirements before resuming regular-phase sampling. Ensure that all required recordkeeping and reporting is completed including submittal of Monthly Monitoring Reports and Exceedance Reports, if applicable.

While the ATS is in operation, at a minimum the following must be monitored:

- Influent and effluent turbidity and pH
- Residual chemical
- Effluent flow rate and volume

If treatment is on-going with dosing and injection of chemicals, the retention of recordkeeping data of the monitored pH and turbidity values is critical for the time periods and is required by the CGP. Uploading and saving of the data regularly as an aspect of the SCADA system, with on-going back-up and downloading to retain the monitored information, is recommended. Use of a standard time-period to backup data, such as every 72 hours, is recommended. The ability to perform both assessment and determination of compliance with instantaneous maximum discharge limitations, in addition to daily 24-hour averaging for turbidity values, is only feasible if the monitoring data is captured and available for evaluation.

Field ATS operator visual monitoring of the system readouts is standard operating procedure with physical documentation on daily logs that validate the data read-outs. The retention of data for on-going pH monitoring and discharge is an aspect of the CGP compliance process of recordkeeping. Without this data, the ability to validate adherence to Permit criteria is limited and not easily defensible with the RWQCB.

If the ATS discharges treated effluent, prepare a daily inspection report including monitoring information and submit within 24 hours, or as required. The ATS Plan should describe the information to include in the reports. Prepare a template form to clarify the required report information in advance. Adjust the template accordingly to accommodate changing conditions, when required. The daily inspection report will at a minimum include:

- Discharge volumes
- Water quality monitoring records
- Quantities (generally in gallons) of dosed coagulants in addition to pH chemical adjustment additives
- Significant repair or maintenance performed on the ATS including but not limited to clean-out of tanks or treatment vessels, maintenance or replacement of sensors or electronic monitoring equipment or components, replacement of pipes, pumps, injection devices, etc. It is important to document the process of ATS upkeep to demonstrate due diligence in maximizing the system's operation effectiveness and efficiency. This will be important if the system has an accidental upset, failure, or improper discharge.
- Discharge point information that includes:
  - Date and time
  - Weather conditions, including wind direction and velocity
  - A notation describing if a rain event has been continuous is recommended. If the on-site rain gauge is accessible for measurement, including this information can assist in illustrating the demand for the ATS. NOAA weather report data can validate that the rain event exceeds the design capacity of the ATS therefore clarifying maximization of discharge limitations.
  - Presence or absence of water fowl or aquatic wildlife
  - Color and clarity of the effluent discharge
  - Erosion or ponding downstream of the discharge point
  - This is applicable if not discharging to a storm drain inlet or piped outfall
  - Photographs labeled with the time, date, and location

C.6 Other ATS Considerations

If an ATS will be utilized on a project site for multiple rainy seasons, there are critical elements to both maintaining the ATS and sustaining its operational lifetime including:

- Ensure the ATS designer is experienced in treatment processes and regulatory requirements, and that the assigned operator(s) of the system are required to have demonstrated experience, knowledge, and skills in ATS operation, maintenance, field testing, data recordkeeping, and reporting.
- Selection during planning of equipment and materials that will withstand weather and environmental degradation. For example, choose piping that is UV resistant and sufficiently flexible to withstand some movement, and choose the proper tank such as double lined or walled to minimize breakthrough and leaking.
- Design the ATS layout to minimize movement and or relocation during the lifetime of the project to minimize potential for breakage, misalignment, or disruption of functional operations. This extends to the pre-planning and construction of appropriate collection and conveyance systems based on the staging and phasing of the project. If a substantially sized collection basin is required to hold the stormwater prior to treatment, then the location must be determined beforehand. Commit space for ATS usage during the lifetime of the system and include space to allow access for maintenance and repair.
- If a substantial number of collection sump/pumps will be required to convey the stormwater from multiple locations throughout the project, then the locations, conveyance piping, and drainage ditches must be depicted on plans and must account for scheduled construction work to prevent conflict of alignment. This consideration is to prevent damage to collection apparatus and to ensure stoppage of non-compliant stormwater discharges during critical periods of forecasted rain.

- If a complex ATS is required, ensure that the ATS Plan is critically evaluated for all operational components including engineering, field work, and administrative controls. Securing all requisite water quality data relative to the anticipated treatment scope and planning will be instrumental to the ATS selection and successful operation. Resourcing available technical information from CASQA, or leading industry providers of such systems, will be helpful.
- Dependent upon the project location, site receiving water bodies, discharge locations, and outfalls storm drain systems may not be allowed to receive the ATS treated effluent. Occasionally a point of discharge will be found to be infeasible due to a sensitive receiving water body, local ecological system, or tidally influenced drainage. In this case, a different discharge option must be explored to allow ATS treated effluent disposal.
- Supplemental and extended piping and pumping layouts may be required to convey the effluent to an acceptable location or to facilitate a discharge to a POTW, when feasible. During the planning phase, the discharge limitations and the local conditions must be evaluated. Early confirmation that selected discharge options are acceptable is desirable.

C.7 Treatment Considerations for Non-Stormwater and Groundwater

Most often construction projects require the management and treatment of stormwater. At times, construction projects may be required to consider management and treatment of groundwater and other non-stormwater due to the complexity and scheduling of different types of work. General site factors to consider in determining the most appropriate management or treatment strategy for the project site include but are not limited to project duration, location, size, affected waterbodies or sources, differing drainages and discharge points (natural and manmade), and pertinent historical and environmental protection considerations. A determination of whether water treatment (of any type) should be done together or as a separate treatment process must be made. These issues must be assessed and understood to achieve a successful treatment plan.

Project excavation work or ground disturbing activities may necessitate managing and treating groundwater in addition to managing construction impacted stormwater runoff. Previous fuel leaks, VOC spills, past chemical discharges, or introduction of hazardous contaminants during the construction phase will likely need management and treatment consideration.

A dual use stormwater/non-stormwater treatment system, if feasible, may be designed to treat and discharge the different water sources. Alternatively, separate treatment systems may be designed. When determining which system is most appropriate, consider first the maximum quantity of stormwater verse the maximum quantity of non-stormwater (e.g., groundwater, co-mingled surface water) that must be managed or treated. Consider the complexity of the treatment science that must be applied to achieve permit discharge requirements and to meet receiving water criteria. Consider also available space on the project site. Is there enough room to accommodate the temporary holding and storage of separate water sources during the treatment process? Can the system be designed to work in tandem to treat both water sources at the same time based on different treatment requirements? Is there a demand for separate treatment trains?

Coverage under different NPDES Permits for specific water sources often dictate the approach and desired outcome of treatment including but not limited to sampling, analysis, monitoring, recordkeeping, and reporting. The differing water management and treatment needs may be combined however insightful planning is critical. For example, the treatment of brackish groundwater from structure dewatering verse extracted groundwater polluted by petroleum products is different when compared to each other and when compared to the CGP and/or LTCGP. While the treatment process will be different, the goal of treatment is the same, to achieve an acceptable discharge water quality.

On occasion a project specific NPDES Permit may be issued to address project conditions that require additional water treatment considerations. In most instances, when multiple water sources require management and treatment during project work, a comprehensive evaluation of treatment options will be required. The evaluation should focus on project needs to better understand if a single treatment system designed to operate in an alternative manner would work, or perhaps a duel treatment system designed to achieve separate water quality objectives may be most appropriate for the project. These example considerations are not exhaustive and professional expertise in the decision-making process of water treatment system choice and design is recommended.

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