BMPs specific to Water Board, Region 2
(Applicable to BAY, BG, LAS, LIV only)

California Water Service Company
Environmental Department

Standardized Best Management Practices for Drinking Water System Discharges

January 12, 2011

A Guide to Sediment-Removal, Dechlorination and Erosion-Prevention Best Management Practices in the San Francisco Bay Area

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Section 1 – Quick BMPs Reference

1.1 Best Management Practices (BMP) and Discharge Record Form (See Sections 4.1 and 4.2)

- A *Best Management Practices (BMP) and Discharge Record* form must be completed for all discharges, including unplanned events (i.e. water main breaks, leaks, overflows, fire hydrant shearing, and emergency flushing activities).

- The minimum parameters that should be measured in the field are total residual chlorine, pH, turbidity, temperature and ammonia (if chloramine is present).

1.2 Planned Well Discharges: New well development and well rehabs

Application	BMPs Recommended	Manual Sections
Consider Alternatives	Before deciding to discharge to a waterway, explore the feasibility of using the water for landscape irrigation or discharging to the local sanitary sewer system. Document the assessment of alternatives on a BMP and Discharge Record form.	2.4
Permits / Notification	Consult your Cal Water Environmental Project Manager to ensure that proper permits are obtained and that the proper local regulatory agency has been notified of the discharge	----
Notification	For flows greater than 250,000 gallons/day or total volume of 500,000 gallons, notification required to Regional Water Board and other interested parties. Contact Cal Water Environmental Project Manager to ensure proper notifications are made.	2.5
Dechlorination	Use Captor or Vita-D-Chlor to achieve less than 0.01 mg/L total residual chlorine. If super chlorination is done, all discharges must be dechlorinated to less than 0.01 mg/L total residual chlorine.	3.2 5.2
Sediment Filtration	Use baffled tanks piped together in series, filter fabric liner bags for insertion in tanks, a sand filter unit or bag and cartridge filter unit. In some cases, a flocculant may be helpful. Consult your Cal Water Environmental Project Manager.	3.1 5.1
Sediment Control	Use gravel bags and drain inlet filter bags (silt bags and/or cloth petromat). The gravel bags are used to set up a system of temporary portable dams to slow the water enough to settle out suspended materials. The drain inlet filter bags will capture any suspended materials entering the storm drain.	3.1 5.1
Erosion Control	Use gravel bags, rip-rap, filter cloth, straw wattles, tarps or other means to prevent erosion.	3.1
pH Adjustment	Use a weak acid or base to adjust the pH to more or less equal that of the receiving water. Consult your Cal Water Environmental Project Manager	3.3

	for the allowable pH discharge limits for your region.	
Temperature Adjustment	Control the flow rate of discharge from the tank while checking the temperature of the receiving water upstream and downstream every 30 to 60 minutes. Allow discharge to continue if the downstream temperature is no more than 5° F above or below the upstream temperature.	3.4
Removing VOCs or other Contaminants	Consult your Cal Water Environmental Project Manager.	3.5
Monitoring and Documentation	Complete a BMP and Discharge Record form to document the location, BMPs and water quality parameters. The minimal parameters that should be measured in the field include: total residual chlorine, pH, turbidity, temperature and ammonia (if chloramine is present). If receiving water monitoring is infeasible or not practicable, justification must be provided.	4.1 4.2

1.3 Planned Distribution System Flushing

Application	BMPs Recommended	Manual Sections
Consider Alternatives	Before deciding to discharge to a waterway, explore the feasibility of using the water for landscape irrigation or discharging to the local sanitary sewer system. Document the assessment of alternatives on a BMP and Discharge Record form	2.4
Permits / Notification	Consult your Cal Water Environmental Project Manager to ensure that proper permits are obtained and that the proper local regulatory agency has been notified of the discharge	----
Notification	For flows greater than 250,000 gallons/day or total volume of 500,000 gallons, notification required to Regional Water Board and other interested parties. Contact Cal Water Environmental Project Manager to ensure proper notifications are made.	2.5
Dechlorination	Use Captor or Vita-D-Chlor to achieve less than 0.01 mg/L total residual chlorine. If super chlorination is done, all discharges must be dechlorinated to less than 0.01 mg/L total residual chlorine.	3.2 5.2
Sediment Filtration	Remove pre-existing debris away from the flow path of the discharge. Utilize sediment traps such as gravel bags, filter cloth, straw wattles, gutter screens and the Singer Trash Catcher.	3.1 5.1
Sediment Control	Use gravel bags and drain inlet filter bags (silt bags and/or cloth petromat). The gravel bags are used to set up a system of temporary portable dams to slow the water enough to settle out suspended materials. The drain inlet filter bags will capture any suspended materials entering the storm drain.	3.1 5.1
Erosion Control	Use gravel bags, rip-rap, filter cloth, straw wattles, tarps or other means to prevent erosion.	3.1
Temperature Adjustment	Control the flow rate of discharge while checking the temperature of the receiving water upstream and downstream every 30 to 60 minutes. Allow discharge to continue if the downstream temperature is no more than 5° F above or below the upstream temperature.	3.4
Monitoring and Documentation	Complete a BMP and Discharge Record form to document the location, BMPs and water quality parameters. The minimal parameters that should be measured in the field include: total residual chlorine, pH, turbidity, temperature and ammonia (if chloramine is present). If receiving water monitoring is infeasible or not practicable, justification must be provided.	2.7 4.1 4.2

1.4 Planned Tank Draining

Application	BMPs Recommended	Manual Sections
Consider Alternatives	Before deciding to discharge to a waterway, explore the feasibility of using the water for landscape irrigation or discharging to the local sanitary sewer system. Document the assessment of alternatives on a BMP and Discharge Record form.	2.4
Permits / Notification	Consult your Cal Water Environmental Project Manager to ensure that proper permits are obtained and that the proper local regulatory agency has been notified of the discharge.	----
Notification	For flows greater than 250,000 gallons/day or total volume of 500,000 gallons, notification required to Regional Water Board and other interested parties. Contact Environmental Departments to ensure proper notification are made.	----
Preventing Overflows With SCADA	Supervisory control and data acquisition, or SCADA, systems allow Cal Water staff to monitor water pressures and levels in tanks, reservoirs, etc., and make adjustments to prevent unplanned discharges.	----
Dechlorination When Draining	Use Captor or Vita-D-Chlor to achieve less than 0.01 mg/L total residual chlorine. If super chlorination is done, all discharges must be dechlorinated to less than 0.01 mg/L total residual chlorine.	3.2 5.2
Sediment Filtration	Remove pre-existing debris away from the flow path of the discharge. Utilize sediment traps such as gravel bags, filter cloth, straw wattles, gutter screens and the Singer Trash Catcher.	3.1
Sediment Control	Use gravel bags and drain inlet filter bags (silt bags and/or cloth petromat). The gravel bags are used to set up a system of temporary portable dams to slow the water enough to settle out suspended materials. The drain inlet filter bags will capture any suspended materials entering the storm drain.	3.1
Erosion Control	Use gravel bags, rip-rap, filter cloth, straw wattles, tarps or other means to prevent erosion.	3.1
Monitoring and Documentation	Complete a BMP and Discharge Record form to document the location, BMPs and water quality parameters. The minimal parameters that should be measured in the field include total residual chlorine, pH, turbidity, temperature and ammonia (if chloramine is present). If receiving water monitoring is infeasible or not practicable, justification must be provided.	2.7 4.1 4.2

1.5 Unplanned Events: Main Leaks/Breaks, Tank Overflows, Damage to Pipelines by Construction Activities, Damage to Fire Hydrants by Vehicular Accidents, and Water Distribution Infrastructure Material or Equipment Failures

Application	BMPs Recommended	Manual Sections
Preventing Unplanned Discharges With SCADA	Supervisory control and data acquisition, or SCADA, systems allow Cal Water staff to monitor water pressures and levels in tanks, reservoirs, etc., and make adjustments to prevent some unplanned discharges.	----
Dechlorination	Use Captor or Vita-D-Chlor to achieve less than 0.01 mg/L total residual chlorine as soon as possible and when safe to do so. In some cases, it is advisable to permanently install equipment to dechlorinate if an unplanned event occurs. See Figures 20, 21, 27A, 27B, 28 and 32. In a situation where super chlorination must be done, any discharge must be dechlorinated to less than 0.01 mg/L total residual chlorine.	3.2 3.6 5.2
Dechlorination During a Tank Overflow	To prepare for the possibility of a tank overflow, install a dechlorinator as shown in Figures 27A, 27B and 28. Fill the dechlorinator with Vita-D-Chlor tablets and inspect at regular intervals to ensure proper dechlorination.	3.2 5.2
Sediment Filtration	Utilize sediment traps such as gravel bags, filter cloth, straw wattles, gutter screens and the Singer Trash Catcher, as soon as possible and when safe to do so. In some cases, it is advisable to permanently install equipment to protect storm drain inlets and prevent erosion if an unplanned event occurs. See Figures 1, 2, 9, 15-19.	3.1 3.6
Sediment Control	Use gravel bags and drain inlet filter bags (silt bags and/or cloth petromat). The gravel bags are used to set up a system of temporary portable dams to slow the water enough to settle out suspended materials. The drain inlet filter bags will capture any suspended materials entering the storm drain.	3.1 3.6
Erosion Control	Use gravel bags, rip-rap, filter cloth, straw wattles, tarps or other means to prevent erosion as soon as possible and when safe to do so.	3.1 3.6
Monitoring and Documentation	Complete a BMP and Discharge Record form to document the location, BMPs and water quality parameters. The minimal parameters that should be measured in the field include: total residual chlorine, pH, temperature and ammonia (if chloramine is present). Visually assess each discharge for turbidity immediately downstream of implemented BMPs to demonstrate effectiveness. Attempt to monitor all discharge events. (It is required to monitor at least 10% of all discharge events during the reporting year.)	2.7 4.1 4.2

	If receiving water monitoring is infeasible or not practicable, justification must be provided.	
Notification	Notify California Emergency Management Agency as soon as possible, but no later than 2-hours after becoming aware of (1) any aquatic impacts (e.g. fish kill) or reasonably suspected impacts resulting from the discharge, (2) discharges to environmentally sensitive waterbodies, or (3) when the discharge might endanger or compromise public health and safety. Contact Environmental Department to ensure proper notification. Report to Regional Water Board staff where chlorine residual is greater than 0.05 mg/l and total volume is 50,000 gallons or more.	2.5

Section 2 - General Information

2.1 Background Information

California Water Service Company (Cal Water), as a drinking water supplier, is naturally concerned with the quality of water. Drinking water system discharges include raw water, surface water, groundwater and potable water associated with drinking water storage, supply and distribution systems. These discharges may contain certain constituents that can potentially pose a threat to freshwater and/or saltwater aquatic life. For example, chlorine is widely used as a disinfectant in drinking water to protect humans from pathogens. However, chlorine at or above certain concentrations in the receiving water has been known to be toxic to aquatic life.

In a similar way, sediment and debris (also considered pollutants) can be picked up in the flow path of a potable drinking water discharge to varying degrees, and can impact aquatic life in receiving waters. Sediment and debris can clog storm drains and cause impairments in a water body. Despite these potential impacts from drinking water system discharges, these types of discharges generally pose a minimal, often insignificant, threat to water quality and aquatic life. For this reason, Cal Water is sometimes allowed to discharge to municipal separate storm sewer systems (MS4) under waivers or exemptions. At other times, a NPDES permit may be required. To ensure the required standards are met, Cal Water implements Best Management Practices (BMPs) to minimize, or reduce, to the maximum extent practicable (MEP), the introduction of pollutants.

2.2 Purpose and Scope of the Best Management Practices Manual

The purpose of this manual is to provide Cal Water Districts with information and descriptions of erosion prevention, sediment removal, and dechlorination practices. Use of these practices will reduce or eliminate, to the MEP, the amount of sediment and pollutants entering our water resources.

2.3 Regulations

Expansion of the National Pollutant Discharge Elimination System (NPDES) Phase I and Phase II, Storm Water Regulations, requires stormwater, or MS4, plans from thousands of municipalities nationwide, and a renewed focus on the total maximum daily load provisions (TMDL) in the Clean Water Act brings unprecedented attention and increased resources to stormwater and wastewater control issues.

Drinking water system discharges are typically directed to flood channels, storm drains, creeks, streams, rivers, or other receiving waters. In some cases, these receiving waters may be considered “Waters of the State” and/or “Waters of the U.S.”. Pursuant to state law, California Porter-Cologne Water Quality Control Act, Chapter 2, Section 13050, these types of discharges are categorized as wastes because the water is being discharged for the purpose of disposal.

Since these discharges generally flow into Waters of the State and/or Waters of the U.S., there are State, regional, and occasionally, local requirements that have to be met. In California, the State Water Resources Control Board grants the Regional Water Quality Control Boards (RWQCBs) the authority to regulate the discharges. Each RWQCB has a Basin Plan that establishes goals and limitations for the water quality of water bodies within its region. The RWQCBs refer to these Basin Plans for guidance when creating general permits, such as a General Permit for Discharges with Low Threat to Water Quality, or user specific permits for a unique individual discharge.

The San Francisco Bay RWQCB established Order No. R2-2009-0074, the Municipal Regional Stormwater NPDES Permit in October 2009. Provision C.15 of this permit specifically discusses the types of non-stormwater discharges that are exempt from the permit requirements if BMPs are implemented and monitoring is performed to prevent adverse impacts on Waters of the State.

2.4 Considering Alternatives to Discharging to Waterways

When preparing for a planned discharge, Cal Water Districts should first explore the feasibility of using the water for landscape irrigation or discharging to the local sanitary sewer system rather than discharging to a storm drain system or directly to a waterway. The discharge of dechlorinated potable water to storm drain systems and waterways must be the final option considered and used only when the other options are not possible.

2.5 Agency Notifications

Planned Discharges:

It is imperative that a scheduled water discharge event be comprehensively discussed in advance with a Cal Water Environmental Project Manager. (see Appendix B)
The following information should be provided by the District to the Environmental Project Manager prior to the discharge event:

- Type of discharge event (new well development or well rehabilitation, distribution system flushing, tank cleaning project, etc.)
- Planned date(s) of the discharge.
- Location of the event.
- Potential contaminants (sediment, chlorine, VOCs, etc).
- Estimated discharge flow rate, volume and duration.
- Location of nearest storm drain or drainage swale.
- Name of the receiving water.

The Environmental Project Manager will then contact the RWQCB to inform them of the planned discharge and if necessary, to obtain a NPDES permit.

The San Francisco Bay RWQCB requires notification at least one week in advance of any planned discharge of 250,000 gallons per day or more, or a total volume or 500,000 gallons or more. The notification must include:

- Project name
- Type of discharge(s)

- Name(s) of receiving water(s)
- Date of discharge(s)
- Expected time of discharge (in military time)
- Estimated volume (gallons)
- Estimated flow rate (gallons per day)
- Monitoring plan of the discharges and receiving water(s) If receiving water monitoring is infeasible or is not practicable, justification must be provided.

The Project Manager will also coordinate with the Cal Water District and Engineering Department to specify the BMPs and treatment systems needed to meet RWQCB requirements. In cases where the RWQCB does not require a NPDES permit, Cal Water will still implement BMPs to reduce or eliminate, to the MEP, the amount of sediment and pollutants entering the receiving water. Other agencies that may need to be notified (depending on the location and complexity of the discharge) include:

- Regional Flood Control District
- City or County Department of Public Works
- County Department of Health Services
- Regional Vector Control Agency (if a release could result in ponded water that has the potential to cause or lead to vector nuisances).
- Non-Governmental Organizations (NGO)
- Other agencies (NGO) that manage, regulate, or conduct activities in the release location

The decision to notify these agencies will be made jointly by the District and the Environmental Project Manager.

Unplanned Discharges:

Unplanned discharges are the result of accidents or incidents that cannot be scheduled or planned for in advance. They include the following:

(1) Water main breaks
(2) Leaks
(3) Overflows
(4) Fire hydrant shearing, and
(5) Emergency flushing activities.

When an unplanned discharge occurs, Cal Water must notify:

(1) The California Emergency Management Agency by telephone (*800-852-7550)* as soon as possible, but no later than two hours after becoming aware of:
    - Any aquatic impacts (e.g., a fish kill) or reasonably suspected impacts resulting from the discharge,
    - Discharges to environmentally sensitive waterbodies, or
    - When the discharge might endanger or compromise public health and safety.

(2) The San Francisco Bay RWQCB by telephone or by email as soon as possible, but no later than 24 hours after becoming aware of an unplanned discharge, where:

- The total chlorine residual is greater than 0.05 mg/L, and
- The total volume is 50,000 gallons or more.

This notification must be followed up with a written report to the RWQCB within five working days. The written report must document the discharge and any corrective actions taken.

Cal Water recognizes the BMPs are most effective when implemented before a release occurs. If an unplanned or emergency situation occurs, it is critical that BMPs be implemented as soon as possible while making every effort to ensure that such actions and mitigation measures do not compromise public or worker safety. After the initial response and/or repairs have been completed, additional consideration should be given to augmenting the BMPs as necessary.

2.6 BMP Equipment and Supplies Kept on Vehicles

Cal Water Districts must equip leak trucks and other vehicles with all equipment and supplies necessary to carry out the BMPs described in this manual.

2.7 Discharge Benchmarks

Per Provision C.15.b.iii of the San Francisco Bay RWQCB's Municipal Regional Stormwater NPDES Permit, the following benchmarks will be used to evaluate the effectiveness of the BMPs for all planned discharges:

- Total chlorine residual: 0.05 mg/L using the ExTech CL 200 handheld meter
- pH: Between 6.5 and 8.5 units
- Turbidity: Maximum of 50 NTU downstream of BMPs or limit the increase above the background level as follows:

Receiving Water Background	Allowable Increase
Dry creek	50 NTU
< 50 NTU	5 NTU
50-100 NTU	10 NTU
> 100 NTU	10% of background

Notes:

1. If receiving water monitoring is infeasible or not practicable, justification must be provided on the BMP and Discharge Record form.

2. Unplanned discharges: Attempt to monitor all discharge events. It is required to monitor at the minimum 10% of all discharge events for pH and chlorine residual and ammonia (if chloraminated water), and visually assess the discharge for turbidity immediately downstream of the implemented BMPs to demonstrate the effectiveness.

3. After implementing the BMPs, adhere to the requirements above for total chlorine

residual, pH and turbidity. If these parameters are outside the acceptable ranges, add or modify BMPs to achieve improved performance.

2.8 Safety Priorities

One of the primary concerns when dealing with planned and unplanned drinking water system discharges is safety, including both worker and public safety. Safety precautions and planning are undertaken to ensure that operators and the general public are not endangered by any activities.

Worker and Public Safety:

a) Operators should wear appropriate personal protective equipment (PPE).
   1. Rubber gloves and apron should be used for prolonged or repeated contact to any chemicals.
   2. Safety glasses or chemical goggles to avoid eye contact. NO contact lenses.
   3. A mist respirator is recommended where excessive mist might be generated.
   4. Steel toe safety boots.
   5. See MSDS for further chemical handling information (Appendix C).
   6. Consult Cal Water's Safety Manual and/or your supervisor for detailed safety precautions.
   7. Contact the Cal Water Environmental Department for further guidance (Appendix B).

b) Traffic control
   8. Operators should wear the appropriate reflective traffic vest and hard hat.
   9. Area barricades and caution tape.

c) Identify site contamination concerns.

Section 3 - Specific Best Management Practices (BMPs)

3.1 BMPs for Erosion & Sediment Control

Purpose	These guidelines describe BMPs that will minimize erosion and the transport of sediment to storm drains or receiving waters during drinking water system discharges. Such discharges may potentially contain small amounts of sediment. They also have the potential to erode, suspend and transport sediments as they pass over barren soil or along street gutters.
Quick Checklist	1. Evaluate discharge volume and character. Compare with discharge point and conveyance to determine appropriate BMP use. 2. Complete a BMP and Discharge Record form to document the location, BMPs and water quality parameters. 3. Ensure worker safety, public safety, and private property protections. 4. Where feasible, remove loose debris, such as trash and dirt, from flow path. 5. Place erosion and sediment control devices in flow path. 6. Implement diffusers or flow control devices for high pressure flows. 7. Monitor flow and control devices. 8. Clean up and dispose of sediment and control materials appropriately.
Field Adaptation	First, assess the flow rate of the discharge, the point of discharge and the path of the discharge. A discharge point and alluvial (earth) drainage conveyance is the worst-case scenario while a concrete paved storm water channel is the best-case scenario. Whenever possible, it may be appropriate to route water discharges to paved surfaces to prevent soil erosion. Sediment Removal: 1. Protecting the Storm Drain Inlet • Remove pre-existing debris and debris generated during the project away from the flow path of the discharge water. • Utilize sediment traps such as gravel bags, filter cloth, straw wattles and gutter screens and the Singer Trash Catcher - Cal Water Part No. 90-001 (see Figures 1 through 12). 2. Sediment filtration tanks and equipment • Multiple baffled tanks piped together in series • Poly filter fabric liner bags for insertion in tanks • Sand filter unit (see Figure 13) • Bag and cartridge filter unit (see Figure 14) • Injection of Aqua-Clear PFD, Natural Site Solutions' chitosan based

	flocculant, or other cationic polymer. • Suppliers/operators include Clear Creek Systems, Baker Tanks and Rain for Rent. Erosion Control: 1. If water is being discharged at a high flow rate, discharge directly to a paved surface. 2. If discharging to an unpaved surface, use energy dissipaters such as rip-rap, sand or gravel bags, plastic tarps, and geo-textile barriers (see Figures 15 through 19). 3. Natural vegetation also aids in preventing erosion. Reduce the flow rate of the discharge whenever possible.

Storm Drain Inlet Protection

Figure 1 – Straw wattle

Figure 2 – Straw wattle

Figure 3 – Gutter screen

Figure 4 – Singer Trash Catcher folded for storage, Cal Water Part No. 90-001

Figure 5 – Singer Trash Catcher ready for use Cal Water Part No. 90-001

Figure 6 – Straw wattle

Figure 7 – Geomembrane

Figure 8 – Silt bag

Figure 9 – Straw wattle with silt bag

Figure 10 – Synthetic wattle

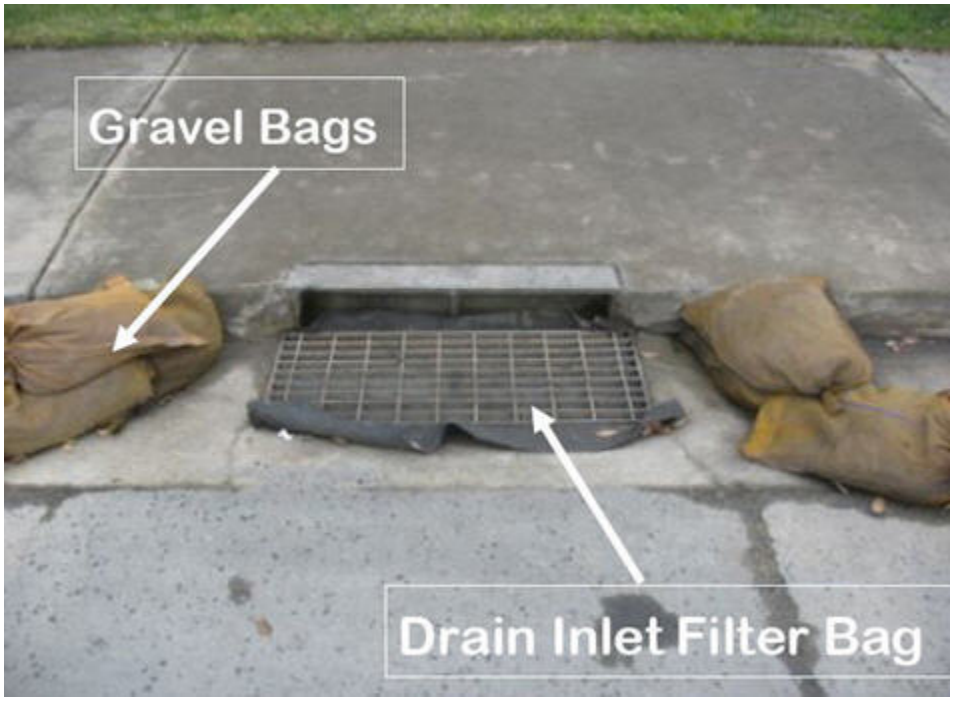


Figure 11 – Gravel bags and drain inlet filter bag placement

Figure 12 – Storm drain inlet protection

Sediment Filtration Equipment

Figure 13 – Sand filter

Figure 14 – Dual bag and cartridge filter

Erosion Control Devices

Figure 15 – Silt fence

Figure 16 -- Rip-rap and sand or gravel bags positioned below an outfall

Figure 17 -- Sand or gravel bags positioned below an outfall

Figure 18 -- Sand or gravel bags positioned below an outfall

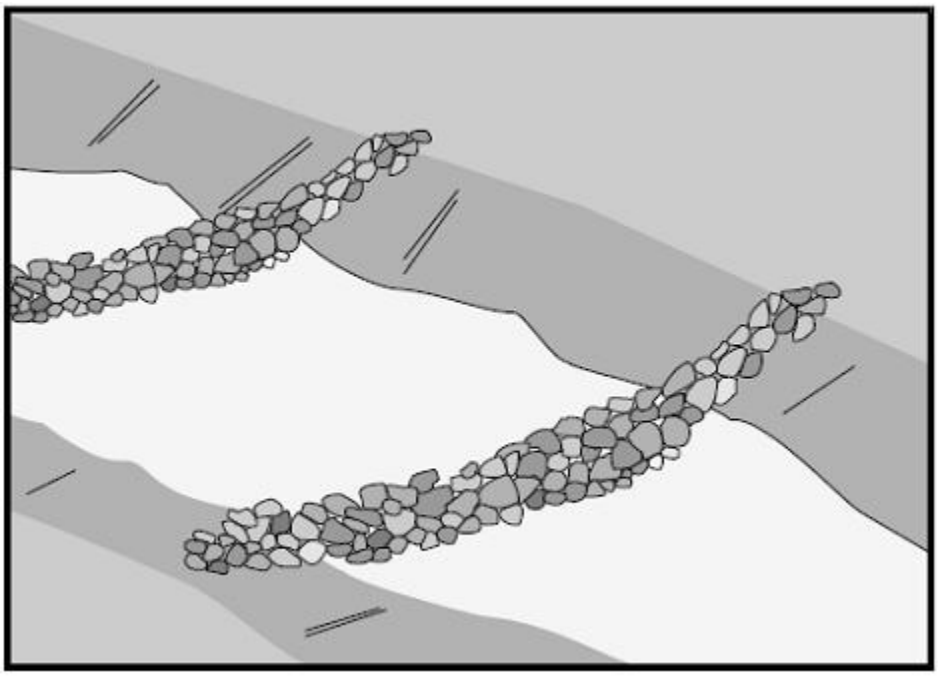


Figure 19 -- Rip-rap, sand or gravel bags, plastic tarps or geo-textile barriers, spaced intermittently in a ditch or swale

3.2 BMPs for Dechlorination

Purpose	These guidelines describe BMPs for dechlorination of drinking water system discharges to the storm drains or receiving waters.
Quick Checklist	1. Evaluate work area and determine appropriate BMP implementation. 2. Ensure worker safety, public safety, and protection of private property. 3. Implement other BMPs for erosion and sediment control as necessary. 4. Evaluate total chlorine residual level and determine if passive non-chemical methods of dechlorination are feasible. If not, set up dechlorination control devices to reduce the total chlorine residual level to less than 0.01 mg/L. (See Sec. 5.2 SOP for Dechlorination and Chlorine Testing for NPDES Compliance) 5. In cases where water has been super chlorinated, operators must take extra care to prevent it from reaching a State water (any creek, stream or gully, whether dry or flowing) before it has been dechlorinated. Pay particular attention when dechlorinating super chlorinated water as a longer period of time may be required to eliminate all chlorine. 6. Measure initial total chlorine residual level. 7. Monitor control devices and total chlorine level as required. Use additional control measures, if necessary, to reduce chlorine levels. Cleanup and dispose of control materials appropriately.
Materials	The following materials and equipment can be used, either alone or in conjunction for dechlorination: • Undiluted Captor 30% calcium thiosulfate liquid * • Vita-D-Chlor ascorbic acid (vitamin C) * • Dechlorination Equipment (see Figures 20 - 33) ** Always use personal protective equipment when handling chemicals.*
Measuring Total Chlorine Residual	Field method approved for total residual chlorine includes: • Extech CL 200 Total Chlorine Meter * (see Figure 34) ** Other meters, including all Hach field units, do not provide the accuracy required to test for total chlorine in wastewater.*
Chemical Handling	Dechlorination agents are stable chemicals with low toxicities. However, these types of chemicals can react with other chemicals and cause a potentially hazardous situation. Inhalation of chemicals can cause irritation of the respiratory tract. Exposure to chemicals is negligible when the chemical is in tablet or liquid form. Personal protective equipment is necessary when handling solid or liquid chlorine. Dechlorination equipment and materials (new or used) should be stored in secondary containment in vehicles to prevent the chemical from being deposited directly onto vehicles, tools or other surfaces. Plastic containers that can completely contain the diffuser and dechlorination agent constitute adequate secondary containment. Refer to specific chemical Material Safety Data Sheet (MSDS) for safe use and handling instructions and appropriate personal protection equipment required.

Dechlorination Equipment

Figure 20 – Diffuser made from bucket (Dechlorination tablets inside)

Figure 21 – Diffuser close up

Figure 22 -- Diffusers with dechlor tablet feed, mounted on hydrant

Figure 23 – Diffuser with dechlor tablet feed, attached to hose

Figure 24 – Testing to ensure complete dechlorination

Figure 25 – Uni-directional flushing station

Figure 26 – Vacuum injection for dechlorination

Figure 26A: Spray can dechlorination setup used by Willows

Figure 26B: Dechlorination pump setup equipment used by Willows

Figure 27A – Tank overflow dechlorinator with Vita-D-Chlor tablets

Figure 27B – Close-up view

Figure 28 - Tank overflow dechlorinator with Vita-D-Chlor tablets

Figure 29 -- VITA-D-CHLOR Bazooka
(See Appendix D for details)

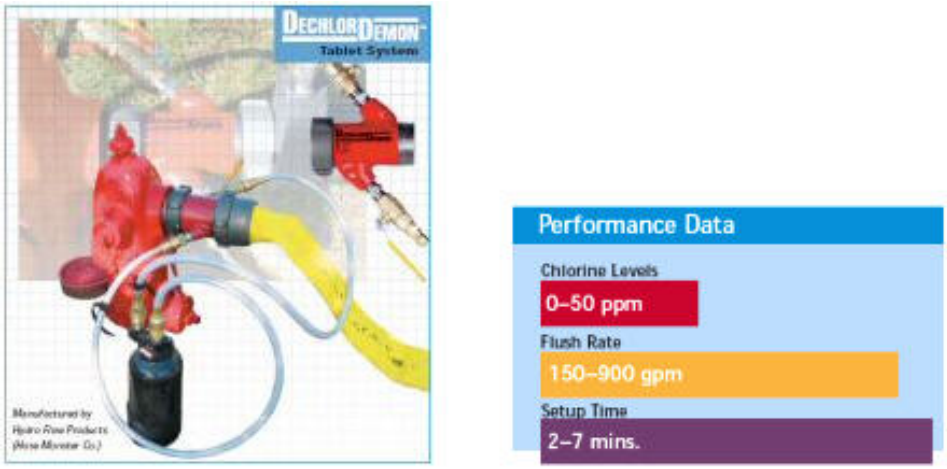


Figure 30 -- VITA-D-CHLOR Dechlor Demon (Hose Monster)

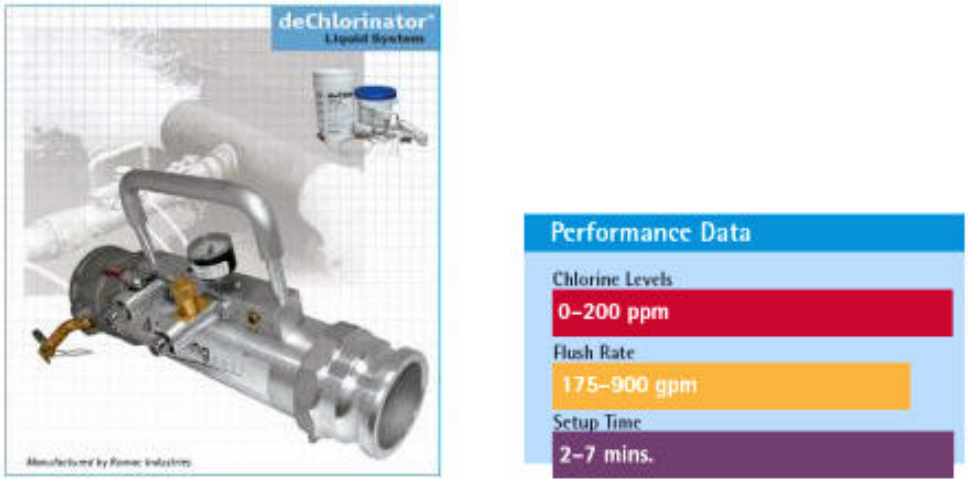


Figure 31 -- VITA-D-CHLOR deChlorinator

Figure 32 -- VITA-D-CHLOR
Taby Mat & Sock

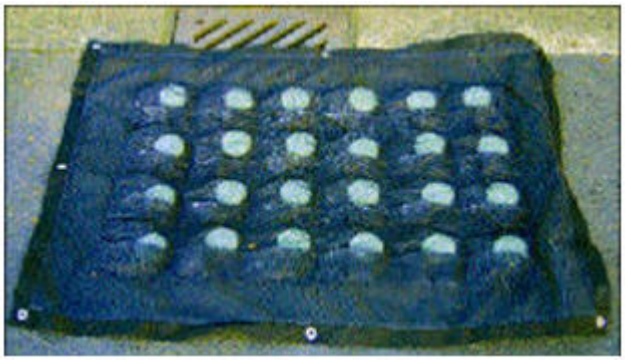


Figure 33 – VITA-D-CHLOR Dechlorination Mat

Figure 34 -- ExTech CL 200
Total Chlorine Meter

3.3 BMPs for pH adjustment

Purpose	These guidelines describe BMPs for pH adjustment of drinking water system discharges to the storm drains or receiving waters.
Quick Checklist	1. Identify and analyze contaminants/constituents in the water. 2. Determine what on-site storage and treatment options are available. 3. Evaluate all options and select best approach based on cost, time constraints, regulatory agency requirements, etc. 4. Whichever option is selected, ensure that all treatment activities comply with NPDES permit requirements and local laws and ordinances.
On-Site Treatment Option	Discharges should be directed into a tank where the pH will be adjusted to more or less equal that of the receiving water. Perform a bucket test or titration to determine the proper dose before beginning to neutralize. Check with your Cal Water Environmental Project Manager for the allowable pH discharge limits for your area.
Materials	The following materials and equipment are used for pH adjustment: • pH Meter • Steel or poly tank • Sodium Hydroxide or Calcium Carbonate (soda ash) to increase the pH • Muriatic Acid to decrease the pH

3.4 BMPs for Temperature adjustment

Purpose	These guidelines describe BMPs for temperature adjustment of drinking water system discharges to the storm drains or receiving waters.
Quick Checklist	1. Identify and analyze contaminants/constituents in the water. 2. Determine what on-site storage and treatment options are available. 3. Evaluate all options and select best approach based on cost, time constraints, regulatory agency requirements, etc. 4. Whichever option is selected, ensure that all treatment activities comply with NPDES permit requirements and local laws and ordinances.
On-Site Treatment Option	Discharges should be directed into a tank. A slow discharge from the tank will take place while the temperature of the receiving water 200 feet downstream from the outfall is frequently measured (every 30 to 60 minutes). The discharge can continue if the downstream water temperature is no more than 5° F above or below the upstream water temperature, but must cease if the difference in water temperatures at the downstream location is found to be more than 5° F above or below the upstream temperature.
Materials	The equipment used for temperature adjustment is: • HORIBA Water Quality Analyzer/Meter, or • Digital thermometer

3.5 BMPs for VOC, SOC, and Metals Control

Purpose	These guidelines describe types of on-site treatment options available for drinking water system discharges that cannot be directly discharged to the storm drain system or surface waters due to volatile organic compounds, semi-volatile organic compounds, or metals contained in the water.
Quick Checklist	1. Identify and analyze contaminants/constituents in the water. 2. Determine what on-site storage and treatment options are available. 3. Evaluate all options and select best approach based on cost, time constraints, regulatory agency requirements, etc. 4. Whichever option is selected, ensure that a NPDES permit is in place and all treatment activities comply with state and local laws, regulations, and ordinances.
On-Site Treatment Option	Various types of on-site storage and treatment can be preformed either by Cal Water (if appropriate) or by a contractor that utilizes portable storage tanks and treatment units on-site. In some cases, storage and/or treatment units and equipment may require specific regulatory agency permits. Examples of on-site treatment options available include: • Biochemical oxygen demand (BOD) reduction • Oil separation/removal • Metals precipitation • VOC removal
Limitations	Successful on-site storage and treatment of water discharges to remove contaminants depends on numerous conditions and may not always be a viable option. Factors related to on-site treatment include: • Storage capacity on-site • Complexity of treatment process • Cost of treatment • Time requirement to obtain permits, storage and treatment equipment or start up and complete the treatment process • Location restrictions (lack of space or proximity to residential areas) • Management of residual treatment solids. If on-site treatment is not an option, off-site disposal is another alternative. Possible off-site disposal options include: disposal at a sanitary sewer connection; or disposal at an off-site industrial waste or treatment facility.

3.6 BMPs for Unplanned Discharges

Purpose	Such events cannot be scheduled or planned for in advanced. However, Cal Water can minimize the effects of these occurrences by ensuring that a fully equipped leak crew is available, and in some cases, by permanently installing equipment.
Preventing Unplanned Discharges With SCADA	Supervisory control and data acquisition, or SCADA, systems allow Cal Water staff to monitor water pressures and levels in tanks, reservoirs, etc., and make adjustments to prevent some unplanned discharges.
Quick Checklist	1. In some cases, it may be advisable to permanently install dechlorination equipment and storm drain inlet protection or erosion control devices at locations where distribution equipment is prone to failure or where a discharge can flow to a sensitive receiving water. 2. If an unplanned discharge occurs, notify your Superintendent of the event. 3. Isolate the affected section of the distribution system. 4. If necessary, employ standard traffic management operating procedures to protect vehicular and pedestrian traffic, e.g. area barricades and caution tape. 5. Perform a site survey to evaluate the impacts of the uncontrolled discharge and to determine if public health or the environment has been endangered. 6. Visually observe the receiving water body and take pictures of the outfall and document erosion and observed environmental impacts of the discharge. If necessary obtain samples of the receiving water body for chlorine residual, turbidity (upstream and downstream of outfall, and pH. 7. As soon as possible, begin clean-up operations of the affected flow path by removing sediment or silt and repair any eroded areas. 8. Implement erosion and sediment control BMPs (see Sec. 3.1 BMPs for Erosion & Sediment Control). 9. Employ dechlorination of the controlled discharge (see Sec. 3.2 BMPs for Dechlorination). 10. Proceed to dewater any excavated soils or haul them to an appropriate location for dewatering. 11. If water-main flushing or super chlorination is done prior to placing the affected service on line, refer to Section 1.2 Quick BMPs Reference for Distribution System Flushing and Sec. 3.2 BMPs for Dechlorination.
Materials	It is recommended that all field trucks be equipped with dechlorination equipment, gravel bags or straw wattles, filter cloth, and gutter screen or the Singer Trash Catcher.
Monitoring and Documentation	Once a discharge situation has been stabilized, complete a BMP and Discharge Record form to document the location, BMPs and water quality parameters. The minimal parameters that should be measured in the field include: total residual chlorine, pH, temperature and ammonia (if chloramine is present).Visually assess each discharge for turbidity immediately down stream of implemented BMPs to demonstrate effectiveness.

	Attempt to monitor the discharge. The requirement is to monitor at least 10% of all discharge events during the reporting year. If receiving water monitoring is infeasible or not practicable, justification must be provided.
Notification	Notify California Emergency Management Agency as soon as possible, but no later than 2-hours after becoming aware of (1) any aquatic impacts (e.g. fish kill) or reasonably suspected impacts resulting from the discharge, (2) discharges to environmentally sensitive waterbodies, or (3) when the discharge might endanger or compromise public health and safety. Contact Environmental Department to ensure proper notification. Report to Regional Water Board staff where chlorine residual is greater than 0.05 mg/l and total volume is 50,000 gallons or more.

3.7 BMPs for Cal Water Facilities

ACTIVITY	BEST MANAGEMENT PRACTICES
General	Do not dump any liquids or other material outside. Materials that are no longer contained in a pipe, tank, or other container are considered to be threatened discharges to stormwater unless they are actively being cleaned up. The direct flow of pollutants as well as threatened discharges to storm drains, gutters or waterways are illegal.
Contracts, Contractors & Leases of Property	All service contracts and property leases must stipulate that contractors and lessees comply with applicable stormwater BMPs in the conduct of their services or occupancy.
Preventing Unplanned Discharges With SCADA	Supervisory control and data acquisition, or SCADA, systems allow Cal Water staff to monitor water pressures and levels in tanks, reservoirs, etc., and make adjustments to prevent unplanned discharges.
Dewatering	Do not discharge water collected from any secondary containment structure to a storm drain unless the water is determined to be free of contamination (no visible sheen, floatables, sediments, turbidity, color or odor). Water removed from secondary containment structures that is determined to have only sediments or solids may be filtered or allowed to settle and then the clean water can be discharged to storm drainage. The must be done under supervision and a record must be made of all events.
Employee & Contractor Training	Ensure that all applicable employees and contractors are give initial and annually updated training on Best Management Practices.
Good Housekeeping	Keep all outdoor work areas neat and tidy. Sweep around work areas after each shift and properly dispose of all wastes. Do not handle, use, transfer or pour any materials near a storm drain inlet or drainage ditch.
Discharge Reporting	All employees are to be alert for any signs of illicit discharges (anything except rainwater that is allowed to flow into any storm drain inlet or drainage ditch). This includes dry weather flow, pipes or hoses emptying into storm drains, and threatened discharges. Report any suspicious discharges to the Superintendent promptly and notify the Cal Water Environmental Department by calling (408) 367-8324 if a chemical spill enters a storm drain or water body.
Spill Clean-up	Refer to Cal Water's Emergency Response Plans and Hazardous Materials Business Plans for locations of spill kits and actions to take. Ensure that Cal Water sites have adequate spill kits located where hazardous materials or supplies are used, stored, loaded, off-loaded and transferred. Clean up any chemical spills or leaks quickly and thoroughly. Use dry clean-up methods. NEVER hose down a spill.

	If a chemical spill threatens to enter a storm drain, place absorbents, earth or other impervious materials to block its entry.
Monitoring and Documentation	Once a discharge situation has been stabilized, complete a BMP and Discharge Record form to document the location, BMPs and water quality parameters. The minimal parameters that should be measured in the field include: total residual chlorine, pH, turbidity, temperature and ammonia (if chloramine is present). If receiving water monitoring is infeasible or not practicable, justification must be provided.

Section 4 - BMP Record and Reporting Form

4.1 Best Management Practices (BMP) and Discharge Record Form

On the next page is an example of the form.

To obtain the most recent version, go to Cal Water's Intranet, and look in the BMP folder inside the Environmental department section.

Or call the Cal Water Environmental staff at (408) 367-8506.

California Water Service Company

Best Management Practices (BMP) Discharge Record

District: _____

City: _____ Operator's Name: _____

Source address: _____ Discharge Date: _____ Time: _____

Alternatives to discharging to a waterway have been considered	Reason for Discharge (☑):		
Yes: ____ No: ____	❑ Blow-Off	❑ Tanks	❑ Flushing
	❑ Used GAC	❑ Other:	
	❑ Virgin GAC	_____	

(1) Conveyance System Entry Location

Hydrant or Blow-off number from map (if applicable)	Address (Intersection, etc.)	Discharges into (✓) (Check all that apply)						
		gutter/street	ditch	retention pond (sump)	SW catch basin	other	Lake, Stream, River, Irrigation Canal, etc.	Name of Surface Water Body (River, Stream, Lake, etc.)

Comments:

(2) BMPs

Identify the BMPs in place

Dechlorination Method used:

Type of BMPs used:

(3) Effluent Water Quality Data (Prior to storm drain)

Before Treatment (or if NO treatment done)					After Treatment (Treatment = Dechlorination or Sediment Removal)									
					0 to 30 Minutes				>30 Minutes once/hr					
Total Chlorine (mg/L)	Total Ammonia (mg/L) if chloraminated	pH	Turbidity (ntu)	Temperature (°C)	Total Chlorine (mg/L)	Total Ammonia (mg/L) if chloraminated	pH	Turbidity (ntu)	Total Chlorine (mg/L)	Total Ammonia (mg/L) if chloraminated	pH	Turbidity (ntu)	Volume Discharged (gal) (estimate)	Flow Rate of Discharge (gpm) (estimate)

Comments:

How long have you been discharging (min/hrs)?

Discharge Pipe Diameter:

CONSTITUENTS of CONCERN: eg. Chlorine, Sediment, Nitrate, Metals, VOCs, etc.

(4) Receiving Water Monitoring

RU (50 feet upstream from where discharge enters the waterbody)					RD (50 feet downstream from where discharge enters the waterbody)				
Total Residual Chlorine	Temperature (°C)	pH	Turbidity	Ammonia	Total Residual Chlorine	Temperature (°C)	pH	Turbidity	Ammonia

Is waterbody dry? Yes: ☐ No: ☐

If "Yes", mark "N/A" in each parameter box above.

Is it possible to access receiving water for monitoring/observations? Yes: ☐ No: ☐

If "No", explain:

(5) Receiving Water Visual Observations

	Floating or suspended matter	Discoloration	Nuisance bottom deposits	Impact to aquatic life	Visible films, sheens or coatings	Fungi, slimes or objectionable growth	Other (describe)
RU							
RD							

Rev. date: 2/24/11

4.2 BMP Form Instructions:

1) If you are planning a large discharge, it is a good idea to notify the City or County Public Works Department to let them know you will be discharging into their storm drain or watercourse.

2) Dechlorination
If chlorine is present, dechlorinate the water at the point of discharge. Ensure no detectable amount (less than 0.01 mg/L) of total chlorine enters the storm drain or water course. If chlorine is detectable at any time during discharge, adjust the dechlorinating chemical dosage rate and re-analyze for chlorine. Continue this process of adjusting the dosage and re-analyzing until chlorine is no longer detected in the discharge.

3) Reducing Turbidity
Preventing Erosion:
Ensure the discharge will not cause erosion. Sand bags or other devices can be used as energy dissipaters in order to minimize dirt erosion. Direct flow onto cement or vegetated area rather than onto dirt surface.

Protecting the Storm Drain Inlet:
Protect the storm water system inlet with filter fabric, sand bags, or other suitable practice. Refer to the Company's BMP Manual for guidance. When you collect the "Before Treatment" turbidity samples make sure you collect the sample before filter fabric and/or sandbags. Collect "After Treatment" turbidity samples after water passes the filter fabric and/or sandbags. Note: If filter fabric is used to protect the storm drain inlet, it may be impossible to collect samples of the water after it passes through the fabric. Please make a note in the comment section if this problem is encountered.

4) Collecting NPDES Water Quality Samples - FAQs

***Question**: What does start, middle, and end mean?*

Answer: "Start", "middle", and "end" refers to total amount of time you are discharging. If you plan to discharge 160 minutes, the "start" is between 0 to 40 min., the "middle" is between 41 to 80 min., the "end" is between 81 to 120 min. Don't worry about being exact.

***Question**: What are the minimal parameters that I have to measure and record during a discharge?*

Answer: The minimal parameters that must be measured and recorded include total residual chlorine, pH, turbidity, temperature and if chloramine is present, ammonia.

***Question**: Should I collect samples at the start, middle and end for a short discharge?*

Answer: No

Long Discharges (2.5 hours or more) - fill out "Before Treatment" and all of "After Treatment"
Medium Discharges (1-2 hours)- Fill out "Before Treatment" and "start" and "end" under "After Treatment"
Short Discharges (1 hour or less) - fill out "Before Treatment" and "end" under "After Treatment"

***Question**: What is the difference between "Before Treatment" and "After Treatment"?*

Answer: "Before Treatment" means collect a sample of the discharge as it leaves the blow-off or fire hydrant. The goal is to collect a sample before dechlorination and sediment removal. "After Treatment" means collect samples at a point in the gutter after dechlorination and after the water has passed by the sandbags, filter fabric, or other sediment removal device.

***Question**: What are acceptable discharge limits?*

Answer: pH must be in the range of 6.5 to 8.5 (pH limits may differ in some areas – check with your Cal Water Environmental Project Manager). Chlorine must be less than 0.01 mg/L

5) Making Observations - FAQs
Before you start to discharge, observe the condition of the gutter and the storm drain inlet. If trash or dirt are observed in the gutter and/or on the storm drain inlet, remove and properly dispose of it.

***Question**: Why do we make observations of the gutter/storm drain inlet before and after the discharge?*

Answer: By recording the condition of the gutter/drain inlet before and after the discharge we can better evaluate if our discharge created pollution.
Example: If the gutter was stained orange before the discharge we know we did not cause the stain. If the gutter was not stained until after our discharge, then we know that our discharge water contains something (Fe, etc.) that stains the gutter.

Question: What if we cannot physically access an area to monitor and observe a receiving water during a discharge?

Answer: If receiving water monitoring is infeasible or not practicable, you must provide the justification in the margin or on the back of the form.

6) Document all field measurements and observations. Keep original. Make a copy and send to the Environmental Department.

Section 5 – Standard Operating Procedures for Discharges

The Standard Operating Procedures (SOPs) provide guidelines to Cal Water employees on discharging water and reducing the impact to the environment. The following SOPs will be updated and improved on a regular basis as improvements are made to reduce pollutants from our discharges.

5.1 SOP for Sediment Filtration and Treatment for NPDES Compliance – Well Drilling & Rehabs

California Water Service Company

POLICY AND PROCEDURE MANUAL

Subject:	Department:		Number:
Sediment Filtration and Treatment for NPDES Compliance – Well Drilling & Rehabs	**Environmental** ( ) Complete Revision ( ) Partial Revision (X) New	Supersedes: **N/A**	XIII.G Page: 40

Purpose: All California Water Service Company water districts located in California will utilize sediment filtration and treatment equipment and methods to manage NPDES permitted discharges from well rehabilitation and new well development projects in order to comply with all California Regional Water Quality Control Board requirements.

Scope: To manage water well discharges produced by California Water Service Company in accordance with California State Water Resources Control Board and Regional Water Quality Control Board regulatory requirements.

1.0 Definitions:

1.1 NPDES: National Pollutant Discharge Elimination System, overseen in California by the State Water Resources Control Board and administered by the RWQCBs. The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

1.2 NPDES Permit: Required for any discharge that has potential to discharge pollutants into a surface water body. A municipality or company planning such a discharge must apply to the local RWQCB for a permit, monitor the discharge to comply with the permit's effluent and receiving water limitations, and report all findings upon completion of the project. A violation of permit limitations may result in significant civil or criminal penalties.

1.3 RWQCB: There are nine Regional Water Quality Control Boards in California charged with managing water quality throughout the state. One RWQCB may have more stringent requirements for discharges than another depending on the water quality issues prevalent in its territory.

1.4 Sediment: Particles resulting from the excavation of sand, silt, clay, gravel or other similar materials that can contribute to increased turbidity and suspended, dissolved or settleable solids in discharged water.

1.5 Surface Water Body: Creek, stream, slough, river, pond, lake, channel, irrigation ditch, estuary, bay or ocean. When a discharge flows into a surface water body, it is known as a "Receiving Water" in NPDES permit language.

2.0 Applicable Documents:

2.1 Title III, Standards and Enforcement, Sections 310, 302, 304 & 307 of the Federal Water Pollution Control Act (Clean Water Act).
2.2 Water Quality Control Plan (Basin Plan) for each respective RWQCB.
2.3 NPDES General Order (Permit) for Discharges with Low Threat to Water Quality, or equivalent, for each respective RWQCB.
2.4 Dechlorination and Chlorine Testing for NPDES Compliance
2.5 ENV-006 Management of Used & Waste Oil

3.0 Safety Requirements:

3.1 At a minimum, when sampling from or handling water or sediment that is suspected of containing contaminants, the following personal protective equipment must be worn: eye protection and gloves compatible with the material used.

4.0 Notes:

4.1 This SOP is written as a living document and should serve as a guideline only. It will be updated as Cal Water gains more experience in the practice of sediment filtration and treatment to meet NPDES requirements or as new equipment and techniques are introduced by vendors and service contractors.
4.2 Vendors and filtration service contractors recommend a minimum 2 week advance notice to reserve filtration and treatment equipment when a project is being planned. Shorter notice may trigger substitution of other equipment for the types described below, or postponement of the discharge.

5.0 Sediment Filtration and Treatment for New Well Development Discharges:

5.1 There are three separate phases of discharges following the drilling of a new well: the swab and pump developments with high sediment content and flow rates averaging 500 GPM, and the production yield test with low sediment content and flow rates up to 3,000 GPM. The extent of filtration and treatment required will depend on where the discharge will be directed:

5.1.1 For well development and production yield test discharges that can be applied to land with no possibility of contacting a surface water body (e.g., onto Cal Water's property or adjacent property with prior approval of the landowner):

5.1.1.1 No filtration required.

5.1.1.2 If the discharge will contain contaminants (i.e., metals, oils or VOCs) at levels above acceptable limits, treatment may be required to remove these contaminants.

5.1.2 For the well and pump development portions of a discharge that will flow to a sanitary sewer system:

5.1.2.1 Cities or wastewater plant operators vary widely on what they consider acceptable discharges to their sanitary sewer systems. Contact them well ahead of the planned discharge to determine what limitations or requirements they may have (i.e., acceptable flow rate and pH, chemical or sediment treatment, etc.).

5.1.2.2 Drilling mud and cuttings accumulated in an earthen pit or steel tanks during drilling should be hauled off site for proper disposal before well development begins.

5.1.2.3 Batch treatment of well development wastewater can be used to regulate the discharge flow rate to meet the maximum allowable flow rate into the sewer system.

5.1.2.4 Running the wastewater through two or more 21,000 gallon closed top tanks connected in series (first tank should be baffled) before allowing it to flow to the sewer should facilitate settling of most sediment to meet the sanitary sewer limits. Development water should not pass through an earthen pit. Piping/hoses should be configured so that the water flows directly from the well to the tanks, and enters the tanks through the lower inlets and exits at the upper outlets to help facilitate settling of sediment.

5.1.2.5 Due to the high flow rates during production yield testing, such discharges cannot generally be directed to the sanitary sewer system and must flow to a surface water body.

5.1.3 For all discharges that will flow to a surface water body, filtration and treatment must be done to meet NPDES requirements.

5.1.3.1 Each RWQCB establishes its own NPDES requirements for discharges to surface water bodies. The Cal Water Environmental Department will apply for a NPDES permit and help to determine which numerical discharge limits apply for turbidity, total dissolved solids, total suspended solids, etc.

5.1.3.2 Drilling mud and cuttings accumulated in an earthen pit or steel tanks during drilling should be hauled off site for proper disposal before well development begins.

5.1.3.3 In general, a filtration system as shown in Figure 1 will remove sufficient sediment to meet the NPDES numerical limits; however, special circumstances such as discharging into an extremely clear surface water body may require additional equipment or measures (see Sec. 7.0).

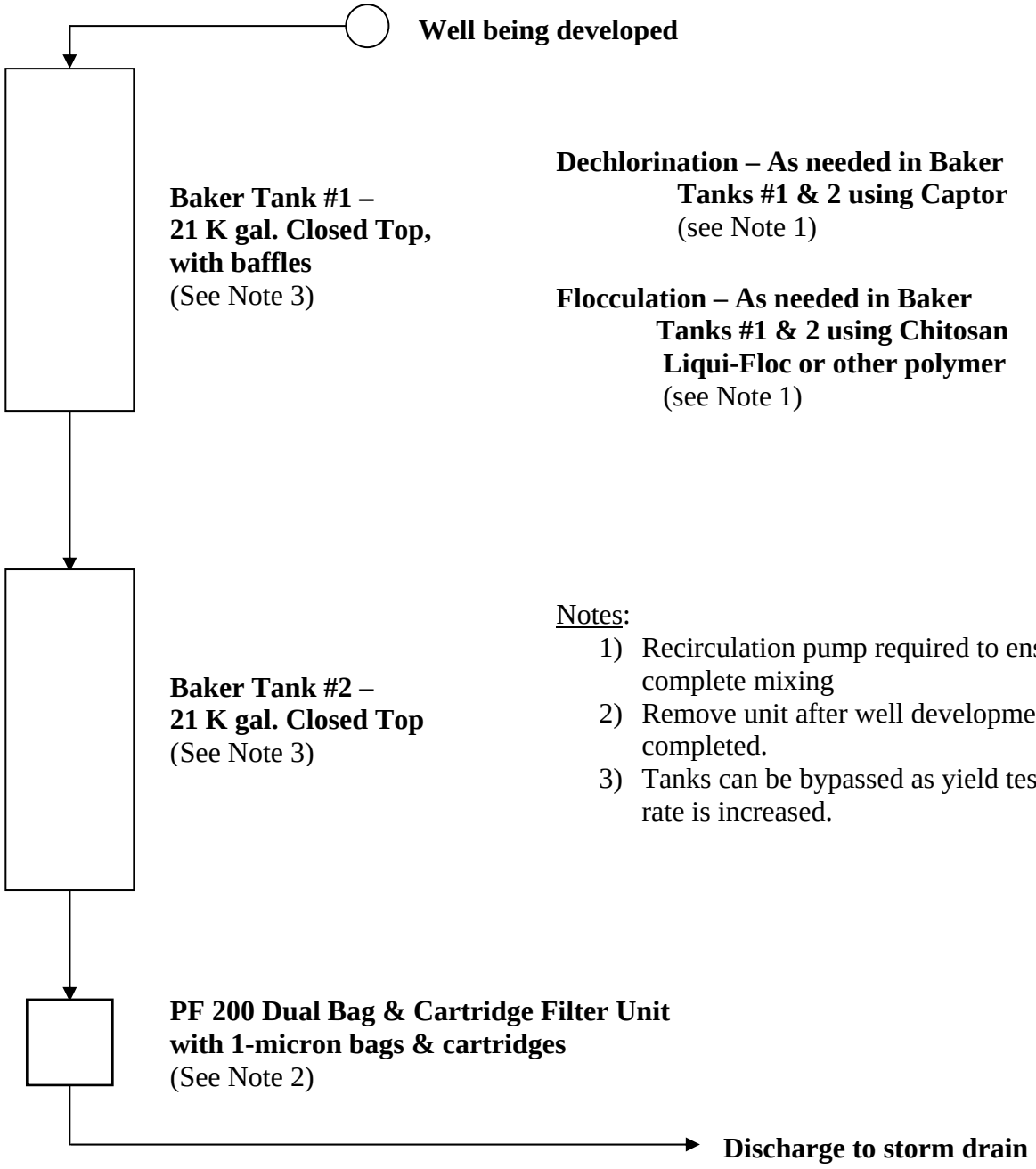
5.1.3.4 Development water should not pass through an earthen pit. Piping/hoses should be configured so that the water flows directly from the well to the tanks, and enters the tanks through the lower inlets and exits at the upper outlets to help facilitate settling of sediment.

5.1.3.5 If the discharge will a high or low pH (allowable pH is generally between 6.5 and 8.5 - check actual NPDES permit limits), it should be neutralized using a weak acid or base, not a strong acid or base. Perform a bucket test or titration to determine the proper dose before beginning to neutralize.

5.1.3.6 Filter types and meshes will need to be selected to match each location's geology and type of drilling mud used. The type of filter(s) and filter mesh may be changed as the discharge progresses and the amount of sediment in the discharge decreases. The filter(s) may eventually be bypassed as the discharge progresses as long as NPDES limits are still being met.

5.1.3.7 If the discharge will contain contaminants (i.e., metals, oils or VOCs) at levels above acceptable limits, additional treatment equipment may be required to remove these contaminants.

Figure 1 – Sediment Filtration System for New Well Development



6.0 Sediment Filtration and Treatment for Well Rehabilitation Discharges:

6.1 Rehabs typically involve the removal of mineral or iron deposits from the well casing, perforations and aquifer formation by use of acids and bases (known as "adding the chemistry"), followed by physical brushing and swabbing.

6.2 There are three separate phases of discharges following a rehab: The swab and pump development phases with high sediment content and flow rates averaging 500 GPM, and chlorination, flushing and bacteria sampling of the well with low sediment content and flow rates up to 3,000 GPM. The extent of filtration required will depend on where the discharge will be directed:

6.2.1 Swab development and flushing/sampling discharges that can be applied to land with no possibility of contacting a surface water body (onto Cal Water's property or adjacent property with prior approval of the landowner).

6.2.1.1 The discharge should be neutralized to adjust the pH to between 6.5 and 8.5. Use a weak acid or base, not a strong acid or base and perform a bucket test or titration to determine the proper dose before beginning to neutralize.

6.2.1.2 There are two options for filtering out and retaining the large sediment particles for later disposal.

6.2.1.2.1 Open top container lined with a 150 micron nominal filter fabric (i.e., Baker Tanks model – 20 Yard Phase Separator, Rain for Rent model – Intermodal 25 Yard Rolloff Container or equivalent)

6.2.1.2.2 Two 21,000 gallon closed top tanks connected in series (first tank should be baffled). Piping/hoses should be configured so that the water enters the tanks through the lower inlets and exits at the upper outlets to help facilitate settling of sediment.

6.2.1.3 If any sheen of pump lubrication oil is observed in the air lifted water, oil absorbent pads or booms must be placed on the surface of the water in the tanks to adsorb the oil and eliminate the sheen. In extreme cases, oil skimmers or other treatment units may be required. Note: All absorbents and other materials saturated with oil must be managed as waste oil. See ENV-006 Management of Used & Waste Oil.

6.2.1.4 Flushing discharges for Bacti sampling that are applied to the land do not typically require sediment filtration.

6.2.2 The swab development portion of a discharge can sometimes be directed to the sanitary sewer system.

6.2.2.1 Cities or wastewater plant operators vary widely on what they consider acceptable discharges to their sanitary sewer systems. Contact them well ahead of the planned discharge to determine what limitations or requirements they may have (i.e., acceptable flow rate and pH, chemical or sediment treatment).

6.2.2.2 Batch treatment of swab development wastewater can be used to regulate the discharge flow rate to meet the maximum allowable flow rate in the sewer pipes.

6.2.2.3 There are two options for filtering out and retaining the large sediment particles for later disposal.

6.2.2.3.1 Open top container lined with a 150 micron nominal filter fabric (i.e., Baker Tanks model – 20 Yard Phase Separator, Rain for Rent model – Intermodal 25 Yard Rolloff Container or equivalent).

6.2.2.3.2 Two 21,000 gallon closed top tanks connected in series (first tank should be baffled). Piping/hoses should be configured so that the water enters the tanks through the lower inlets and exits at the upper outlets.

6.2.2.4 If any sheen of pump lubrication oil is observed in the air lifted water, oil absorbent pads or booms must be placed on the surface of the water in the tanks to adsorb the oil and eliminate the sheen. In extreme cases, oil skimmers or other treatment units may be required. Note: All absorbents and other materials saturated with oil must be managed as waste oil. See ENV-006 Management of Used & Waste Oil

6.2.2.5 Due to the high flow rates during production yield testing, such discharges cannot generally be directed to the sanitary sewer system and must flow to a surface body.

6.2.3 For all discharges that will flow to a surface water body, filtration equipment and treatment methods must be utilized to meet NPDES permit requirements.

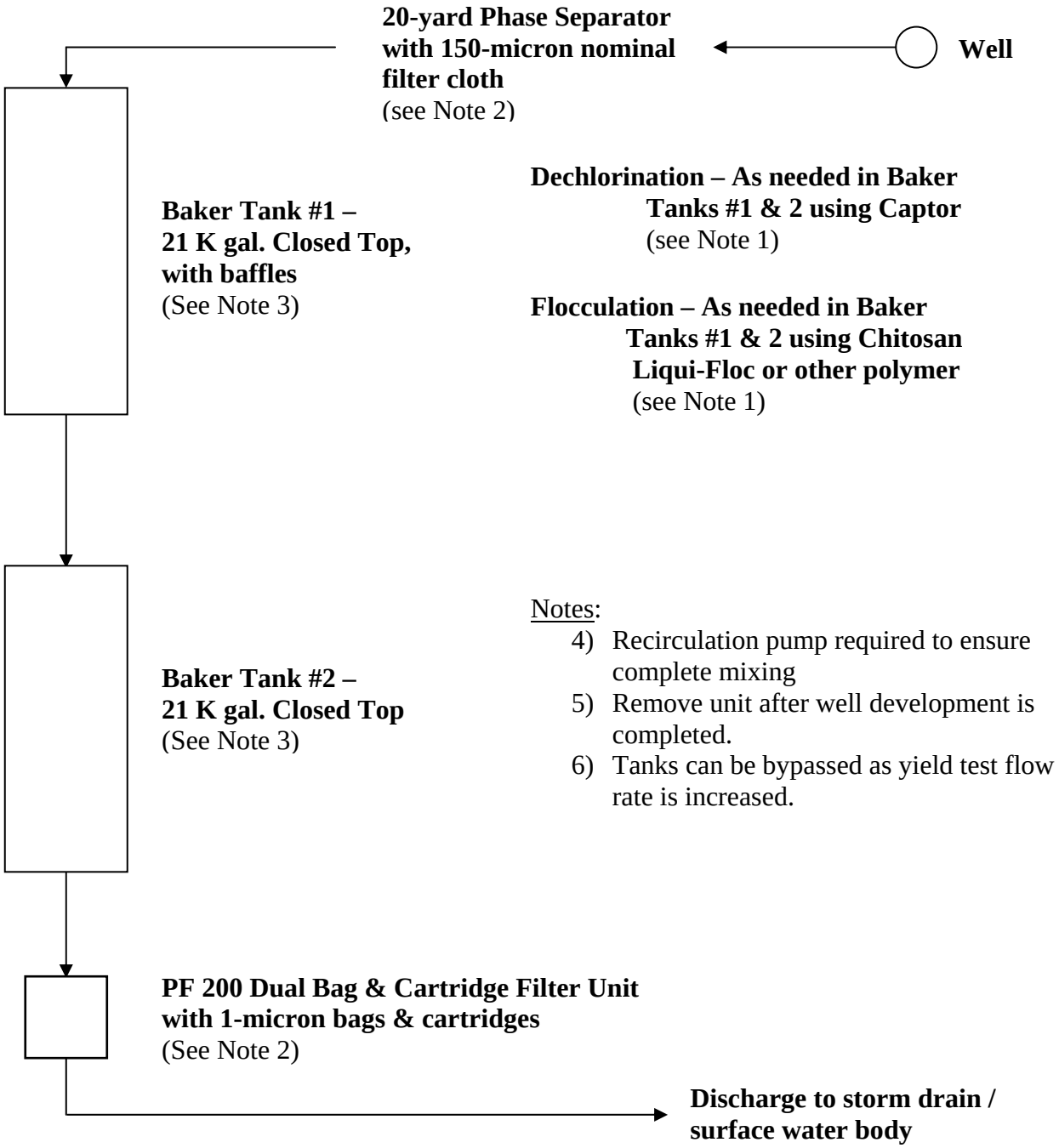
6.2.3.1 Each RWQCB establishes its own NPDES requirements for discharges to surface water bodies. The Cal Water Environmental Department will apply for a NPDES permit and help to determine which numerical discharge limits apply for turbidity, total dissolved solids, total suspended solids, etc.

6.2.3.2 In general, a filtration system as shown in Figure 2 will remove sediment to meet the NPDES numerical limits; however, special circumstances such as discharging into an extremely clear surface water body may require additional equipment or measures (see Sec. 7.0).

6.2.3.3 Filter types and meshes will need to be selected to match the size of debris being air lifted from the well. The type of filter(s) and filter mesh may be changed as the discharge progresses and the amount of sediment in the discharge decreases. The filter(s) may eventually be bypassed as the discharge progresses as long as NPDES limits are still being met.

6.2.3.4 If any sheen of pump lubrication oil is observed in the air lifted water, oil absorbent pads or booms must be placed on the surface of the water in the tanks to adsorb the oil and eliminate the sheen. In extreme cases, oil skimmers or other treatment units may be required. Note: All absorbents and other materials saturated with oil must be managed as waste oil. See ENV-006 Management of Used & Waste Oil.

Figure 2 – Sediment Filtration System for Well Rehabilitation



7.0 Use of a Flocculent to Enhance Sediment Settling and Filtration:

7.1 Chitosan and other flocculants are available from Clear Creek Systems, Baker Tanks, Rain for Rent or Baroid. They are usually injected in liquid form by a metering pump upstream of the settling tanks and filtration membranes to aid in sediment settling and separation.

7.2 Chitosan is a flocculent derived from a natural biopolymer in crab and shrimp shells. It is recommended in NPDES discharges in place of artificial polymer

based flocculants that can cause an undesired buildup of metals in surface water bodies.

7.3 Depending on the sediment characteristics, artificial polymer based flocculants may perform better than Chitosan. In such cases, consideration should be given to minimizing the impact of any metals present in the flocculant upon the Receiving Water.

7.4 Cal Water should notify the RWQCB engineer of plans to use any flocculent and receive approval before beginning.

7.5 The pH should be in the 6 – 8 range for effective flocculation.

7.6 A jar test should be done on the specific discharge water/sediment to determine the optimal flocculant and dosage before injecting.

7.7 All dechlorination should take place downstream of the flocculation.

8.0 Dechlorination for Discharges:

8.1 With the exception of discharges that are directed to land and make no contact with surface water bodies, all discharges must be dechlorinated per the SOP for Dechlorination and Chlorine Testing for NPDES Compliance.

9.0 Disposal:

9.1 Non-Hazardous Solids - Solids can be disposed at the local municipal, non-hazardous landfill, usually by the filtration equipment vendor as part of their service. If Cal Water is handling the disposal, the District should determine the percent of moisture content in the spoils that is accepted by the landfill management.

9.2 Hazardous Solids - If the solids are suspected to be hazardous, notify the Cal Water Environmental Department for assistance in determining the proper disposal measures to be taken.

9.3 Oil soaked sorbents – See ENV-006 Management of Used & Waste Oil or notify the Environmental Department for assistance in determining the proper disposal procedures to be followed.

10.0 Reporting and Record-keeping:

10.1 The Environmental Project Manager, District Operator or consultant will complete monitoring record forms on a daily basis while the discharge is occurring. These forms will be used in preparing a monitoring report for submittal to the RWQCB once the project is completed.

10.2 Keep all records for a minimum of 3 years.

5.2 SOP for Dechlorination and Chlorine Testing for NPDES Compliance

California Water Service Company
POLICY AND PROCEDURE MANUAL

Subject:	Department:		Number:
Dechlorination and Chlorine Testing for NPDES Compliance	**Environmental**		XIII.F
	( ) Complete Revision ( ) Partial Revision (**X**) New	Supersedes: **N/A**	Page: 53

Purpose: All of California Water Services Company districts located in California will dechlorinate all water discharged from wells, distribution system piping and storage tanks as it flows directly to surface waters or through conveyance systems leading to surface waters. The water will be tested for total chlorine residual content as stated in this procedure to comply with all NPDES regulatory requirements.

Scope: To manage all types of discharges at California Water Service Company in accordance with local, State and Federal regulatory requirements.

1.0 Definitions:

1.1 NPDES: National Pollutant Discharge Elimination System, overseen in California by the State Water Resources Control Board and administered by the RWQCBs. The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

1.2 RWQCB: There are nine Regional Water Quality Control Boards in California charged with managing water quality throughout the state. One RWQCB may have more stringent requirements for discharges than another depending on the water quality issues prevalent in its territory.

1.3 Total chlorine residual: The sum of free chlorine and combined chlorine in fresh water. RWQCBs are concerned about total, not free, chlorine entering surface water bodies.

1.4 Surface Water Body: Creek, stream, slough, river, pond, lake, channel, irrigation ditch, estuary, bay or ocean. When a discharge flows into a surface water body, it is known as a "Receiving Water" in NPDES permit language.

2.0 Applicable Documents:

2.1 Title III, Standards and Enforcement, Sections 310, 302, 304 & 307 of the Federal Water Pollution Control Act (Clean Water Act).

2.2 Water Quality Control Plan (Basin Plan) for each respective RWQCB.

2.3 NPDES General Order (Permit) for Discharges with Low Threat to Water Quality, or equivalent, for each respective RWQCB.

2.4 Cal Water Best Management Practices and Discharge Record form

3.0 Required Equipment:

3.1 ExTech Instruments CL 200 Chlorine Meter (http://www.extech.com/instrument/products/alpha/CL200Lab.html)

3.1.1 Available from W. W. Grainger, Lab Safety Supply, McMaster-Carr Supply and Fisher Scientific. In addition to the meter (about $150.00), it is recommend to buy the weighted sample cup base ($16.00) for easy operation.

3.1.2 Cal Water operators must closely follow the CL 200 User's Guide instructions for the Measurement Procedure (p. 4) and Considerations and Techniques (p. 6) to obtain accurate readings.

3.2 Captor (http://www.bestsulfurproducts.com/indust.htm) or Vita-D-Chlor (www.vita-d-chlor.com) dechlorination agents

3.3 Pollard LPD-250 diffuser (www.pollardwater.com) , Five-Star multi-directional hydrant diffuser (www.hydrantdiffuser.com) or equivalent (Optional)

3.4 H2O Neutralizer (www.h2oneutralizer.com) or equivalent (Optional)

In cases where water has been super chlorinated, operators must take extra care to prevent it from reaching a State water (any creek, stream or gully, whether dry or flowing) before it has been dechlorinated. Pay particular attention when dechlorinating super chlorinated water as a longer period of time may be required to eliminate all chlorine.

4.0 Safety Requirements:

4.1 Personal Protective Equipment must be worn when handling Captor, Vita-D-Chlor or other dechlorination agent products. Wear eye protection, latex or polypropylene gloves and any other safety equipment required by the Safety and Training Manager.

4.2 Read and understand the Material Safety Data Sheet (MSDS) for any dechlorination agent before beginning to work with it.

5.0 Description/Procedure:

5.1 Dechlorination using undiluted Captor 30% calcium thiosulfate liquid:

5.1.1 To dechlorinate main leaks or discharges from hoses:

5.1.1.1 In cases where water has been super chlorinated, operators must take extra care to prevent it from reaching a State water (any creek, stream or gully, whether dry or flowing) before it has been dechlorinated. Pay particular attention when dechlorinating super chlorinated water as a longer period of time may be required to eliminate all chlorine.

5.1.1.2 Install an adjustable petcock valve on the rectangular plastic 5-gallon Captor container.

5.1.1.3 Position the Captor container on its side on a street curb, truck tailgate or other location so that the liquid dripping from the petcock will drop into the stream of discharged water as it flows toward the storm drain inlet or drainage ditch.

5.1.1.4 Begin discharging the water while allowing Captor to drip at a rate of 6 to 12 drips per minute (for a 1 ppm chlorine content).

5.1.1.5 Sample the water just before it enters the storm drain inlet or drainage ditch and test for total chlorine residual content.

5.1.1.6 If the measurement shows that the total chlorine residual is below the NPDES limit for your region, proceed with the discharge. If the total chlorine residual measured is greater than the NPDES limit, stop the discharge and increase the flow rate of Captor before restarting.

5.1.1.7 Sample and retest as often as is necessary to confirm that the chlorine level remains under the NPDES limit.

5.1.2 <u>To dechlorinate when blowing off a well</u>:

5.1.2.1 Consult with your Environmental Project Manager for the NPDES total chlorine discharge limit established by your RWQCB.

5.1.2.2 In cases where water has been super chlorinated, operators must take extra care to prevent it from reaching a State water (any creek, stream or gully, whether dry or flowing) before it has been dechlorinated. Pay particular attention when dechlorinating super chlorinated water as a longer period of time may be required to eliminate all chlorine.

5.1.2.3 Collect a sample of the water to be discharged and test it for total chlorine residual content using an Extech CL 200 chlorine meter. *Do not use a Hach Pocket Colorimeter or Color Disc Kit since they can produce inaccurate total chlorine results at the low chlorine range being measured.*

5.1.2.4 Connect a piece of ¼ inch poly tubing from the Captor container directly to a fitting on the pump to inject the Captor when blowing off.

5.1.2.5 Sample the water just before it enters the storm drain inlet or drainage ditch and test for total chlorine residual content.

5.1.2.6 If the measurement shows that the total chlorine residual is below the NPDES limit for your region, proceed with the discharge. If the total chlorine residual measured is greater than the NPDES limit, stop the discharge and increase the flow rate of Captor before restarting.

5.1.2.7 Sample and retest as often as is necessary to confirm that the chlorine level remains under the NPDES limit.

5.1.3 To dechlorinate a tank of water:

5.1.3.1 Consult with your Environmental Project Manager for the NPDES total chlorine discharge limit established by your RWQCB.

5.1.3.2 In cases where water has been super chlorinated, operators must take extra care to prevent it from reaching a State water (any creek, stream or gully, whether dry or flowing) before it has been dechlorinated. Pay particular attention when dechlorinating super chlorinated water as a longer period of time may be required to eliminate all chlorine.

5.1.3.3 Collect a sample of the water to be discharged and test it for total chlorine residual content using an Extech CL 200 chlorine meter. *Do not use a Hach Pocket Colorimeter or Color Disc Kit since they can produce inaccurate total chlorine results at the low chlorine range being measured.*

5.1.3.4 Calculate the amount (in ounces) of Captor required using the table in Figure 1.

5.1.3.5 Add the Captor and mix by recirculation with a pump or by other means.

5.1.3.5 Sample the water and test for total chlorine residual content.

5.1.3.6 If the measurement shows that the total chlorine residual is below the NPDES limit for your region, proceed with the discharge. If the total chlorine residual measured is greater than the NPDES limit, add more Captor and remix.

5.1.3.7 Repeat steps 5.1.3.4 - 5.1.3.6 as needed.

5.2 Dechlorination using a diffuser and Vita-D-Chlor tablets:

5.2.1 Consult with your Environmental Project Manager for the NPDES total chlorine discharge limit established by your RWQCB.

5.2.2 In cases where water has been super chlorinated, operators must take extra care to prevent it from reaching a State water (any creek, stream or gully, whether dry or flowing) before it has been dechlorinated. Pay particular attention when dechlorinating super chlorinated water as a longer period of time may be required to eliminate all chlorine.

5.2.3 Attach a diffuser directly to a fire hydrant or indirectly via a hose, manifold or PVC pipe depending on the expected flow rate and traffic situation.

5.2.4 Fill the feed tube on the top of the diffuser with Vita-D-Chlor tablets.

5.2.5 Start the discharge and sample the water just before it enters the storm drain inlet or drainage ditch. Test for total chlorine residual content using an Extech CL 200 chlorine meter. *Do not use a Hach Pocket Colorimeter or Color Disc Kit since they can produce inaccurate total chlorine results at the low chlorine range being measured.*

5.2.6 If the measurement shows that the total chlorine residual is below the NPDES limit for your region, proceed with the discharge. If the total chlorine residual measured is greater than the NPDES limit, stop the discharge and make any necessary changes before restarting.

5.2.7 Periodically check the amount of Vita-D-Chlor tablets left in the diffuser's feed tube and refill as needed.

5.2.8 Sample and retest as often as is necessary to confirm that the chlorine level remains under the NPDES limit.

6.0 Record-Keeping:

6.1 The Environmental Project Manager, District Operator or consultant will complete monitoring record forms on a daily basis while the discharge is occurring. For projects requiring a NPDES permit, these forms will be used in preparing a monitoring report once the project is completed.

6.2 Keep all records for a minimum of 3 years.

Section 6 – Annual Review of BMPs, Reporting and Training

6.1 Annual Review of BMPs

Cal Water will perform a review of the BMPs detailed in this manual at least once per year to determine if any changes or improvements are needed. This determination should be based partly on the field monitoring results documented in the previous year by Cal Water Districts on the Best Management Practices (BMP) and Discharge Record Form.

Any field monitoring data showing that the existing BMPs were inadequate to meet established discharge benchmarks will be considered an indicator that changes or improvements may be needed. The determination should also be based partly on input from the Districts implementing the BMPs.

Cal Water will revise the BMPs based on new methods and technology that may be available in the drinking water industry, as well as input from District personnel.

6.2 Annual Reporting

Cal Water must submit an annual report to the Regional Water Quality Control Board in tabular form for all planned and unplanned discharges. The report must include the following details for each discharge:

- Project name
- Type of discharge
- Name(s) of receiving water(s)
- Date of discharge
- Duration of discharge (in military time)
- Estimated volume (gallons)
- Estimated flow rate (gallons per day)
- Total chlorine residual (mg/L)
- pH
- Turbidity (NTU) for receiving water where feasible and at point of discharge
- Description of implemented BMPs or corrective actions

6.3 Annual Training

Cal Water will provide annual training for Environmental Project Managers, District Superintendents and District Operators to ensure that the contents of this manual are well understood and that the BMPs are implemented properly to achieve compliance with Provision C.15.b.iii.of the San Francisco Bay Region Municipal Regional Stormwater NPDES Permit.

Section 7 - Glossary (Definition of Terms) and Acronyms

7.1 Glossary (Definition of Terms)

Administrative BMPs: Operational practices that reduce potential pollutants at the source, including maintenance procedures, managerial practices, operational practices and scheduling of activities that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution.

Adverse Impact: Means a detrimental effect upon water quality caused by a discharge or loading of a pollutant or pollutants.

Basin Plan: Means the Water Quality Control Plan adopted by each Regional Water Quality Control Board to protect and preserve the watersheds within their jurisdiction.

Best Management Practices (BMPs): Any program, technology, process, operating criteria, methods, schedules, measures, or device that controls, prevents, removes, or reduces pollution. Also includes any practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters. BMPs include structural and nonstructural controls, and operation and maintenance procedures, which can be applied before, during, and/or after pollution producing activities.

Biofilm: General term referring to thin, usually resistant, layer of microorganisms (algae and various aquatic photosynthetic organisms) that form on and coat various surfaces such as water pipes.

Dechlorination: A treatment method that removes or replaces chlorine atoms in water. Dechlorination can be accomplished by physical and/or chemical treatment and also can occur naturally due to other parameters (i.e., time, temperature, etc). The term dechlorination applies to all potable water, whether disinfected with free chlorine or with chloramines.

Discharge of a Pollutant: Means any addition of any "pollutant" or combination of pollutants to "waters of the United States". The term discharge includes additions of pollutants into storm drains, surface waters, etc, from surface runoff, channels, pipes, sewers, or other conveyances that do not lead to a treatment works.

Drinking Water System Discharges: Means sources of flows from drinking water storage, supply and distribution systems including, but not limited to, flows from system failures, pressure discharges, system maintenance, distribution line testing, fire hydrant flow testing, flushing and dewatering of pipes, reservoirs, vaults, and well maintenance activities.

Erosion: The wearing away of land surface by wind or water. Erosion may occur naturally from weather or runoff but can be the result of man-made activities.

Field Measurements: *Refers* to water quality testing performed in the field with portable field-testing kits or meters.

General NPDES Permit: NPDES Regulations, 40 CFR 122.28, provides for the issuance of general permits to regulate discharges of waste which result from similar operations, are the same type of waste, require the same effluent limitations, require similar monitoring, and are more appropriately regulated under a general permit rather than individual permits.

Granular Activated Carbon (GAC): A highly adsorbent form of carbon used to remove dissolved organic matter from wastewater.

Hazardous Waste: A waste or combination of wastes that, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either cause or significantly contribute to an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity or toxicity) or appears on special EPA or state lists. Regulated under the federal Resource Conservation and Recovery Act and the California Health and Safety Code.

Hydrostatic Test Water: Hydrostatic test water discharges are those discharges resulting from testing of pipelines, tanks, and vessels that are dedicated to drinking water purveyance and storage.

Individual NPDES Permit: A National Pollutant Discharge Elimination System (NPDES) Permit issued by the Regional Water Quality Control Board for a facility specific discharge of wastewater to receiving waters.

Low Volume Discharges: These types of discharges are usually flows smaller than 50 gpm and typically last for less than 2 hours.

Maximum Extent Practicable (MEP): Means the standard for implementation of storm water management programs to reduce pollutants in storm water. CWA § 402(p)(3)(B)(iii) requires that municipal permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. See also State Board Order WQ 2000-11.

Municipal Separate Storm Sewer System (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) designed or used for collecting or conveying storm water; (ii) which is not a combined sewer; and (iii) which is not part of a Publicly Owned Treatment Works (POTW) as defined at Title 40 of the Code of Federal Regulations (CFR) 122.2.

National Pollutant Discharge Elimination System (NPDES): Means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and

enforcing permits, and imposing and enforcing pretreatment requirements, under CWA §307, 402, 318, and 405.

Passive Non-Chemical Dechlorination: Using the relatively stable, moderately reactive nature of chlorine to neutralize it upon reaction with air, sunlight, and contact with organic and inorganic impurities in soil, paved surfaces, water and wastewater.

Pollutant: Generally, any substance introduced into the environment that adversely affects the usefulness of a resource. Pollutants may include sediment, debris, litter, toxic substances, solid wastes, etc. (The exact definition for "pollutants" is defined in CWA §502(6) 33.U.S.C.§1362(6)), and incorporated by reference into California Water Code §13373).

Potable Water Discharge: Includes a discharge from drinking water storage, supply, and distribution systems, including flows from system failures, pressure discharges, system maintenance, distribution line testing, fire hydrant flow testing, and flushing and dewatering of pipes, reservoirs, vaults, and minor non-invasive well maintenance activities. Discharges may also result from repair, maintenance, and disinfection of pipelines, tanks, vessels, and reservoirs.

Receiving Waters: Means all surface water bodies identified in a Regional Water Quality Control Board Basin Plan. This includes inland surface waters, enclosed bays, harbors, lagoons, estuaries, and the ocean.

Reclaimed/Recycled Water: Means water that, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.

Runoff: Water originating from rainfall, melted snow, and other sources (e.g., sprinkler irrigation) that flows over the land surface to drainage facilities, surface waters, rivers, streams, springs, seeps, ponds, lakes, and wetlands.

Sediment: Solid particulate matter, both mineral and organic, that becomes entrained or in suspension and is transported, or moved from its site of origin by air, water, or other means. Sediment includes soil particles, clays, sands, and other natural or man-made materials that may be picked up when water is discharged over a surface.

State Water Resources Control Board (SWRCB): California State regulatory agency that formulates and adopts state policy for water quality control in accordance with the provisions of the Porter-Cologne Water Quality Control Act. The SWRCB is designated as the state water pollution control agency for all purposes stated in the Federal Water Pollution Control Act and any other federal act and is authorized to administer the NPDES Program in California.

Storm Drain: Above- and below-ground storm conveyance systems and structures for transporting stormwater to streams or outfalls for flood control purposes.

Storm Water: Runoff that consists solely of discharges that originates from a precipitation event (rain or snowmelt). Storm water is that portion of precipitation that flows across a surface to the storm drain system or receiving waters.

Total Chlorine Residual: A measurement of the amount of remaining chlorine concentration (the sum of free and combined chlorine) in fresh water that has not yet degraded or dissipated after the water has been treated with chlorine.

Treatment BMPs: Means any engineered system or train of treatment methods designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process.

Unplanned Discharge: A discharge that occurs at the result of an accident or incident that cannot be scheduled or anticipated in advance, including main breaks, leaks and overflows.

Water Quality Standards & Water Quality Objectives: Means water quality criteria contained in the Basin Plan, the California Ocean Plan, the National Toxics Rule, the California Toxics Rule, and other state or federally approved surface water quality plans. Such plans are used by the Regional Board to regulate all discharges, including storm water discharges and non-storm water discharges.

Water Utility: Means potable drinking water supplier, distributor, purveyor, municipality, district, agency, or private water company.

Waters of the State: Means any surface water or groundwater, including saline waters, within boundaries of the state.

7.2 Acronyms

AWWA	American Water Works Association
AWWARF	American Water Works Association Research Foundation
BAT	Best Available Technology (economically available)
BCT	Best Conventional Technology (pollution control)
BMPs	Best Management Practices
BOD	Biological Oxygen Demand
CAL-EPA	California Environmental Protection Agency
CAL-OSHA	California Division of Occupational Safety and Health Administration
CASQA	California Stormwater Quality Association
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CTR	California Toxics Rule
CWA	Clean Water Act (Federal Water Pollution Control Act of 1972 as amended in 1987)
DHS	California Department of Health Services
DTSC	California Department of Toxic Substances Control
GAC	Granular Activated Carbon
Hazmat	Hazardous Material
HTH	Calcium Hypochlorite
MBAS	Methylene Blue Active Substances
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
MSDS	Material Safety Data Sheet

NDEP	Nevada Division of Environmental Protection (NDEP)
NGO	Non-Governmental Agency
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollution Discharge Elimination System
O&G	Oil and Grease
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
P^2	Pollution Prevention
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
POTW	Publicly Owned Treatment Works
PPE	Personal Protective Equipment
PPP	Pollution Prevention Plan
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board
SWRCB	State Water Resources Control Board
TCE	Trichloroethylene
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TSDF	Treatment, Storage & Disposal Facility
TSS	Total Suspended Solids
TTU	Transportable Treatment Unit

USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds
WDR	Waste Discharge Requirements

Appendix A

Potable Water Supply Discharges

	Discharge Process	Activities	Probable Pollutants of Concern
1.	Main Flushing	Flushing	Sediment, Rust Particles, Chlorine, Algae
2.	Main/Service Pipeline Installation/Replacement	Leak Testing, Disinfecting, Flushing	Sediment, Chlorine, Algae
3.	Reservoir Dewatering/ Tank Dewatering	Tank Draining/Cleaning, Maintenance, Cyclic Blow-off Testing, Emergency Drawdown	Sediment, Chlorine, Algae, Metals
4.	Pump Station /Chlorination Station / Regulator Station Discharges	Relief Valves, Pump Packing/Sealing Water, Emergency Pump Cooling Water	Sediment, Chlorine, Algae
5.	Groundwater Well Development/ Maintenance/WQ Sampling	Sampling, Developing, Testing, Flushing, Drilling	Sediment, Chlorine, Algae, PCE,TCE, Nitrate
6.	System Pressure Protection	Relief Valves	Sediment, Chlorine, Algae
7.	Main and Service Leaks, Leak Repair and Hydrant Knockoffs	System Failures, Hydrant Knock-Offs	Sediment, Chlorine, Algae
8.	Service/Lateral Replacements	Flushing	Sediment, Chlorine, Algae
9.	Substructure/Vault Dewatering	Pumping	Sediment, Chlorine, Algae

Appendix B

Cal Water Environmental Department Contacts

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1720 N. First St.
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Northeast Bakersfield Treatment Plant
Bakersfield, CA
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Queen Uchekwe
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San Jose, CA
(408) 367-8506 Office
FAX (408) 367-8428

Appendix C

Material Safety Data Sheets (MSDS)

MATERIAL SAFETY DATA SHEET

Best Sulfur Products
A division of Ag Formulators Inc.
5427 E. Central Ave.
Fresno, CA 93725
For Emergency Information call Chemtrec (800) 424-9300
For Technical Information call (800) 800-4854

Effective date: 05-16-05
Supersedes: 02-25-03

I. IDENTIFICATION

Product: **BSP CAPTOR®**
Chemical Name: **Calcium Thiosulfate Solution**
Formula: CaS_2O_3
Chemical Family: Inorganic Salt

II. COMPOSITION

Chemical	CAS#	Concentration	Regulation
Calcium Thiosulfate	10124-41-1	30%w/v	No
A solution of CaS_2O_3 in water			

III. HAZARDOUS IDENTIFICATION

CERCLA Ratings (0-3): Health = 0 Fire = 0 Reactivity = 0 Persistence = 0
NFPA Ratings (0-4): Health = 0 Fire = 0 Reactivity = 0

NSF International Standard 60 listed for use in drinking water.

IV. EMERGENCY AND FIRST AID PROCEDURES

POTENTIAL SHORT-TERM HEALTH EFFECTS:

SKIN CONTACT: Immediately flush with large quantities of water, remove contaminated clothing and shoes and wash product from skin.

EYE CONTACT: Immediately flush eyes with clean water, lifting upper and lower lids, for at lest 15-20 minutes. Obtain medical attention if irritation occurs or persist.

INGESTION: If vomiting occurs, keep head lower than hips to help prevent aspiration. Treat symptomatically and supportively. Get medical attention if needed.

INHALATION: Remove victim from contaminated area. If breathing is labored, administer oxygen. If breathing has ceased, clear the airway and begin mouth to mouth.

LONG-TERM HEALTH EFFECTS: No information on long-term effects is available.

V. FIRE AND EXPLOSION HAZARD

Negligible hazard when exposed to heat or flame

EXTINGUISHING MEDIA: Extinguish using agent suitable for type of surrounding fire.

FIRE FIGHTING: Move container from fire area if possible. Avoid breathing vapors. Keep upwind. Use agents suitable for type of surrounding fire. Avoid breathing hazardous vapors. Keep upwind.

HAZARDOUS COMBUSTION PRODUCTS: Thermal decomposition products may include toxic oxides of sulfur.

FLASH POINT :	n/d
FLAMMABLE LIMITS IN AIR:	n/d
AUTO IGNITION TEMPERATURE (degrees C (F) :	n/d
EXTINGUISHING MEDIA:	CO_2, dry chemical foam, water spray

VI. ACCIDENTAL RELEASE MEASURES

Absorb small spills with sand, earth, sweeping compound or other inert absorbent. Dispose of in accordance with all government regulations. Large spills should be diked to prevent entry of large quantities of product into sewers or drains. Recover as much of solution as possible. On large spills, land application could be possible as long as application rates are not exceeded, please check with the local Ag Commissioner for permission. Dispose of in accordance with applicable local, county, state, and federal regulations.

VII. HANDLING AND STORAGE

Do not heat drums with any welding equipment as explosion may occur. Avoid breathing gas. Do not get in eyes, on skin, or on clothing. Store in a cool, dry place in properly designed vessels.

VIII. EXPOURE CONTROLS / PERSONAL PROTECTIONS

No occupational exposure limits have been established by OSHA, ACGIH, or NIOSH.

PROTECTIVE EQUIPMENT SHOULD BE USED DURING THE FOLLOWING PROCEDURES:

- Manufacture or formulation of this product
- Repair and maintenance of contaminated equipment.
- Clean up of leaks and spills
- Any other activity that may result in hazardous exposures.

RESPIRATORY PROTECTION:
None generally required. If conditions exist where excessive mist might be generated, a mist respirator is recommended.
In case of emergency conditions such as fire, high heat, and or contact with acids, use a NIOSH / MSHA approved full-face respirator with SO_2 gas cartridge. Use positive pressure self-contained breathing apparatus for emergency or other conditions requiring a higher level of protection.

CLOTHING: Rubber gloves and apron should be used for prolonged or repeated contact. Safety glasses or chemical goggles are recommended to avoid eye contact. Do not wear contact lenses.

IX. PHYSICAL AND CHEMICAL PROPERTIES

DESCRIPTION: Clear colorless solution
Molecular Weight: 152.20
Water Solubility: Completely soluble in water
Molecular formula for active ingredient: CaS_2O_3
Solvent Solubility: Nearly insoluble in alcohol
Specific Gravity: 1.245
pH: 6.5 – 7.5
Vapor pressure: (mm Hg) N/D

X. STABILITY AND REACTIVITY

Stable under normal conditions and pressures.

CONDITIONS TO AVOID: Avoid contact with acids. Sulfur dioxide could be released if mixed with acids.

INCOMPATIBILITIES: **Reacts with acid to form sulfur dioxide**. Corrosive to brass and copper.

XI. TOXICOLOGICAL INFORMATION:

LD 50 (rat): Anhydrous CaS_2O_3 : 374 mg/kg intravenous
LD 50 (rat): 573 mg/kg intraperitoneal
LD 50 (mouse): rat LD 50; 115 mg/kg intraperitoneal

CARCINOGEN STATUS: None
ACUTE TOXICITY LEVEL: Insufficient data.
TARGET EFFECTS: No data available.
SKIN CONTACT: May be irritating
EYE CONTACT: May be irritating.
INGESTION: Thiosulfate salts are poorly absorbed from the alimentary tract. Ingestion may result in a cathartic effect.
CHRONIC EXPOSURE: No data available for any type of exposure.

XII. DISPOSAL CONSIDERATIONS

Contaminated cleanup materials may be hazardous. Refer to Sections IV and VIII of this MSDS sheet before handling. All contaminated materials should be placed in disposable containers and buried in an approved dumping area. Follow all local rules governing waste disposal in your area.

XIII. TRANSPORTATION INFORMATION

Classification: NA
D.O.T. Proper Shipping Name: Not hazardous by D.O.T. Regulations
Other Requirements: NA

XIV. REGULATORY INFORMATION

REGULATORY INFORMATION

SARA TITLE III SECTION 313:	**NOT LISTED**
RCRA HAZARDOUS WASTE:	NOT LISTED
CA Prop. 65:	NOT LISTED

XV. OTHER INFORMATION

The information herein is given in good faith but no warranty, expressed or implied, is made.

MATERIAL SAFETY DATA SHEET

Vita-D-Chlor™

MSDS Number: V322N
Revision date: 05/24/01
Revision number: 001

Manufacturer:
Integra Chemical Co.
710 Thomas Ave SW
Renton WA 98055
425.277.9244

24 Hour Emergency Response Telephone: 800-451-8346

PRODUCT IDENTIFICATION

Product Name: Vita-D-Chlor
Synonyms: Dechlorinator
Chemical formula: Proprietary Chemical family: Organic acid Product number: V322.50

HAZARD OVERVIEW

HMIS Rating: 0-1-0-B NPFA: None established
Warning Label: Caution. Use safe chemical handling practices. Keep container closed. Use with adequate ventilation. Avoid breathing dust. Avoid contact with skin, eyes, and clothing. Wash thoroughly after handling.

COMPOSITION/INFORMATION ON INGREDIENTS	ACGIH TLV/TWA	OSHA PEL/TWA
Organic acid	Not listed	Not listed

PHYSICAL DATA

Boiling point: NA
Melting point: 192C
Specific gravity: 1.65 (Water=1)
Evaporation rate: NA

Vapor pressure: NA
Vapor density: NA
Solubility: 33g/100mL water @25C
pH (1% solution): 2-3

Appearance and Odor:
Odorless, fine white crystals.

FIRE AND EXPLOSION DATA

Flash point: NA
Auto-ignition temperature: NA
Flammable limits (% by volume in air): Upper: NA, Lower: NA
Fire extinguishing media: Water spray, CO_2, dry chemical, or foam
Special firefighting procedures: Use water to cool nearby containers and structures. Wear full protective equipment, including suitable respiratory protection.
Unusual fire and explosion hazards: As with most organic solids, combustion is possible at elevated temperatures.

HEALTH HAZARD INFORMATION

Effects of overexposure:
- Contact: Contact may cause skin or eye irritation.
- Ingestion: No harmful effects expected.
- Inhalation: Inhalation may irritate the nose, throat and upper respiratory tract.

Chronic effects of overexposure: None identified
Exposure limits: None established
Toxicity data: No information available
Medical conditions aggravated by exposure: None identified
Target organs: None identified
Reproductive effects: None identified
Carcinogenicity: No listings by NTP, IARC, or OSHA

EMERGENCY FIRST AID PROCEDURES

Skin contact: Wash with soap and water. Seek medical attention if irritation develops.
Eye contact: Flush eyes with water for at least 15 minutes. If irritation persists, seek medical attention.
Inhalation: Remove to fresh air. If adverse symptoms develop, seek medical attention.
Ingestion: If adverse symptoms develop, seek medical attention.

MATERIAL SAFETY DATA SHEET

Vita-D-Chlor™ Tablets

MSDS Number: V325
Revision date: 01/31/01
Revision number: 001

Manufacturer:
Integra Chemical Co.
710 Thomas Ave SW
Renton WA 98055
425.277.9244

24 Hour Emergency Response Telephone: 800-451-8346

REACTIVITY DATA

Stability:	Stable
Hazardous polymerization:	Will not occur
Incompatibles:	Incompatible with strong acids, strong bases, strong oxidizers.
Decompostion products:	Oxides of carbon (CO, CO2)
Conditions to avoid:	Exposure to light, air, moisture and high temperatures.

SPILL AND DISPOSAL PROCEDURES

Spill and leak procedures: Sweep or scoop into clean, dry disposal container. Wear protective equipment. Flush spill area with water.
Disposal procedures: Dispose in accordance with all Local, State and Federal regulations.

PROTECTIVE EQUIPMENT

Ventilation: Use adequate general or local exhaust ventilation to keep fume dust levels as low as possible.

Respiratory protection: None needed unless use generates annoying or irritating dusts. Use a dust respirator mask if necessary.

Skin and eye protective equipment: Safety glasses. Use good chemical handling practices.

STORAGE AND HANDLING PRECAUTIONS

Storage area: General.
Store in a cool, dry area. Keep away from incompatible substances. Protect from direct light and minimize contact with air. Protect containers from physical damage. Keep material dry.

TRANSPORTATION INFORMATION

Material is not regulated via either ground or air transportation.

REGULATORY INFORMATION

TSCA Inventory: Yes
CERCLA RQ:
SARA EHS TPQ:
SARA 313 Toxic Release de minimus:
SARA hazard categories: Acute: NO; Chronic: NO; Flammability: NO; Pressure: NO; Reactivity: NO
Clean air act categories: SOCMI: NO; HAP: NO; Volatile HAP: NO; Organic HAP: NO; Ozone depleting: NO

MSDS Revision History:
Original MSDS

NE = Not established; NA = Not applicable or Not available

The information presented above is offered for informational purposes only. This MSDS, and the associated product, is intended for use only by technically qualified persons, and at their own discretion and risk. Since conditions and manner of use are outside the control of Integra Chemical Company, we make no warranties, either expressed or implied, and assume no liability in connection with any use of the information.

Appendix D

Dechlorination & Energy Diffuser Supply Companies

Captor Dechlorination Agent (Liquid)
http://www.bestsulfurproducts.com/indust.htm

CAPTOR- Calcium Thiosulfate
Phone Number: (800) 800-4854
Front Desk/Ordering: Debbie Pilgram
Pricing/Technical Support: Bruce Graves
BSP Captor NSF® is a clear solution with little odor, pH is in the 6.5 to 7.5 range.
Safety- no off gassing

- This is the dechlorination agent of choice! This product reduces the risk to overdose the dechlorination agent, which deoxygenates the water and kills fish.
- A Captor Use Spreadsheet is available that makes calculating the amount of Captor needed much easier.

Vita-D-Chlor Dechlorination Agent (Tablets)
http://www.vita-d-chlor.com/

1. **Vita-D-Chlor™** - A feed solution made with Vita-D-Chlor will have a pH of about 2-3. The use of Vita-D-Chlor can drop the pH of the treated water.

2. **Vita-D-Chlor™, Neutral -** A feed solution made with Vita-D-Chlor, Neutral will have a pH around 7.5. Consequently, it will not adversely affect water that has a neutral pH of 6-8.

   Environment
   There are several powerful arguments for using Vita-D-Chlor instead of sulfur-based compounds. Vita-D-Chlor utilizes ascorbic acid chemistry for dechlorination. It is made with an essential vitamin for humans and many animals, which is known to boost the immune system in fish. Sulfur-based compounds can be toxic to both humans and animals. Vita-D-Chlor is 100% organic and is completely soluble. Other dechlorination compounds eventually decompose and may leave behind inorganics, including sulfur. The addition of excess sulfite and sulfate chemicals to our waters has always been a concern because they are known to cause oxygen depletion in treated water. Vita-D-Chlor, however, does not cause oxygen depletion and contains nothing known to be harmful to the environment. Vita-D-Chlor meets the same standards for purity as the ascorbic acid used in the pharmaceutical industry.

   Equipment
   Vita-D-Chlor works with both pump and venturi devices. Drip and broadcast systems can also be used but do not assure adequate and thorough mixtures.

Safety
Vita-D-Chlor is the safest and least toxic of dechlorination chemicals on the market.

Use Calculations available on website

Five Star Hydrant Dechlorinator/ Diffuser
http://www.hydrantdiffuser.com/index.htm
:
Tested by the Cal Water Flushing Team. This product is recommended. Vita-D-Chlor is safe. Do not use Sodium Sulfite**.**

Pollard Water Dechlorinator & Diffuser
http://www.pollardwater.com/

LPD-250 Dechlorinator & Diffuser with Vita-D-Chlor as the dechlorination agent. Vita-D-Chlor is safe. Do not use Sodium Sulfite**.**

Super Dechlor Kits for LPD-250 available for use with Liquid Captor. This kit has not been piloted yet by Cal Water.

Appendix E

BMP Manual's Modification History

Date of Change	Change(s) Made
June 28, 2007	1. Changed spelling from "waddle" to "wattle". 2. Updated dates shown on cover page and in footnotes. 3. Changed "forms" to "form" in Section 4. 4. Added this *Appendix F* to track all changes. 5. Created .pdf and uploaded it to Environmental intranet.
July 9, 2007	1. On "Discharge BMP Form.xls", deleted text in *Notes* box: "For Flushing Team, B/A columns do not apply for "Observations"'" 2. Deleted same text from Form in MSWord version of Manual 3. Changed Manual dates (title page, footers) 4. Converted MSWord to .pdf 5. Uploaded revised .pdf Manual and .xls Form to intranet
July 11, 2007	1. Corrected spelling in "Discharge BMP Form.xls" (box #4, 'Where' --> 'Were') 2. Corrected same in Manual 3. Changed Manual dates (title page, footers) 4. Converted MSWord to .pdf 5. Uploaded revised .pdf Manual and .xls Form to intranet
August 18, 2008	1. Inserted 2 figures: 24A and 24B, Willows dechlorination equipment 2. Inserted 2 rows in Table of Contents/Figures 3. Cleaned up Figure table borders 4. Changed Manual dates (title page, footers) 5. Cleaned up Change History table borders 6. Converted MSWord to .pdf 7. Uploaded revised .pdf Manual to intranet 8. Notified EA and Clay Suskin of update
August 19, 2008	1. Corrected text page 17 "Dechlorination Equipment (see Figures 10-20)" to read "Dechlorination Equipment (see Figures 18-28)" 2. Corrected text page 17 "Extech... (see figure 21)" to read "Extech... (see figure 29)"
July 28, 2010	1. Added "Environmental, Health & Safety Department" to title page. 2. Added Sec. 1.1 in Quick BMPs Reference on BMP and Discharge Record Form 3. Changed "Environmental Affairs" to "Environmental, Health & Safety" or "EHS" throughout the manual and SOPs to reflect department name change. 4. Added row on Monitoring and Documentation to tables in Sec. 1.2 - 1.5, 3.6 and 3.7. 5. Added text about dechlorination following super chlorination in Sec. 1.2 - 1.5 and 3.2, and the SOP for Dechlorination and Chlorine Testing. 6. Added text about Sediment Control in Sec. 1.2 - 1.5. 7. Added text about using SCADA in Sec. 1.4, 1.5, 3.6 & 3.7. 8. Added text in Sec. 1.4 & 3.6 on installing permanent BMPs as contingencies to unplanned discharges. 9. Changed Sec. 1.5 title from "Tank Draining" to "Tank Draining and Overflows". Added text on installing dechlorinators for tank overflows. 10. Added text in Sec. 2.4 , Unplanned Discharges.

	11. Added note on BMPs form in Sec. 3.1, Quick Checklist. 12. Revised text in Sec. 3.6, Quick Checklist to clarify actions to take when responding to an unplanned discharge. 13. Added text on the minimal parameters that must be measured in the field to FAQs in Sec. 4.2 14. Inserted Figures 27A, 27B & 28 of tank overflow dechlorinators. 15. Inserted Figure 33 of dechlorination mat. 16. Updated EHS Dept. staff contact info in App. B and deleted App. C for former Safety Department.
September 27, 2010	1. Changed "Environmental, Health & Safety" or "EHS" throughout the manual to "Environmental Department". 2. Changed contact list to reflect only Environmental Department. 3. Inserted modified BMP Reporting Form. 4. Removed "Cement lining" row from table on page 60. 5. Renumbered remaining rows in table on page 60. 6. Reformatted Quick Reference pages to fit on 4 pages. 7. Inserted new column into the Quick Reference tables which refer reader for more detail to appropriate sections within the manual.
November 29, 2010	1. Reduced size of images to reduce file size. 2. Enclosed text of Sediment Filtration System / Treatment flow charts into text boxes.
December 20, 2010	1. Revised manual to meet the monitoring, notification, annual review and annual training requirements of Provision C.15 of the San Francisco Bay RWQCB's Order No. R2-2009-0074 – Municipal Regional Stormwater NPDES Permit. 2. Inserted modified BMP Reporting Form. 3. Added SF-Bay-specific note in page one and footers. 4. Uploaded new BMP Reporting Form to intranet.
January 12, 2011	1. RE Alternatives: Replaced "possibility" with "feasibility" (2.4) 2. Clarified that Annual Report will be submitted to the Regional Board. (6.2) 3. Clarified Monitoring of Unplanned Discharges (1.5, 2.7, 3.6) 4. Clarified language regarding Notifications. (2.5, 3.6)
February 7, 2011	1. Inserted new BMP Discharge Record form. 2. Reduced font size for this Modification History table.