CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

TECHNICAL ANALYSIS

Proposed Administrative Civil Liability
Contained in Complaint No. R2-2011-0006
City of Redwood City

Noncompliance with
California State Water Resources Control Board
Order No. 2006-0003 DWQ
Statewide General Waste Discharge Requirements for Sanitary Sewer Systems

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By

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A. INTRODUCTION

This technical analysis provides a summary of factual and analytical evidence that support the findings in Complaint No.R2-2011-0006 to support a proposed administrative assessment of civil liability in the amount of **$95,288** against the City of Redwood City (City) for violation of Prohibition C.1 of California State Water Resources Control Board Order No. 2006-0003 DWQ Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (Sewer System Order).

The City owns and operates a sanitary sewer collection system (collection system) consisting of 197 miles of gravity sewer pipeline, 12 miles of force main, and 31 pump/lift stations. The wastewater collected by the collection system is conveyed to the South Bayside System Authority (SBSA) for treatment and disposal.

On August 25, 2010, a force main failure occurred in the City's collection system, causing approximately 94,907 gallons of untreated sewage to escape from the force main. The City undertook spill response activities, and contained and recovered 35,800 gallons (or 38 percent of the spill). The City intercepted 963,600 gallons of untreated sewage upstream of Pump Station 10 (PS 10) and transported the untreated sewage around the damaged force main to SBSA's treatment facility. In addition, the City shut down PS 10, sandbagged the affected area, covered storm drains, and placed absorbent materials to prevent additional flow from reaching surface waters. Tide gates between the Redwood Shores Lagoon (Lagoon) and the San Francisco Bay were immediately closed so as to isolate the Lagoon waters.

A total of 57,107 gallons of untreated sewage discharged to the Lagoon waters. As a result of the force main failure, 59,107 gallons of untreated sewage discharged from the City's collection system. Of this volume discharged, the City provided calculations demonstrating that 2,000 gallons of the untreated sewage was lost to percolation into the ground and evaporation to the atmosphere. Thus, 57,107 gallons reached surface water.

The sanitary sewer overflow (SSO) was caused by a force main failure due to fatigue in the force main wall. Fatigue resulted from frequent pressure transients from PS 10 that exceeded the design operation pressure of the pipe. (See City of Redwood City Redwood Shores Sewer Spill Report (dated 12/1/10), p. 2.) The City chose to operate PS 10 in fixed speed mode after the variable frequency drive experienced repeated failures. Operating PS 10 in fixed speed mode created fatigue within the pipe (because the pipe was frequently exposed to pressure transients), which in turn caused the failure of the force main wall.

B. VIOLATIONS SUBJECT TO THE COMPLAINT

The City is required to operate and maintain its collection system in compliance with requirements of Clean Water Act section 301 and the Sewer System Order, as amended.

Clean Water Act section 301 and Prohibition C.1 of the Sewer System Order form the bases for assessing administrative civil liability pursuant to California Water Code (Water Code) section 13385. Section 301 makes it unlawful for any person to discharge any pollutant to waters of the United States unless that person has complied with all permitting requirements under the Clean Water Act. Prohibition C.1 of the Sewer System Order provides, in relevant part, that it is unlawful for any person to discharge untreated wastewater to waters of the United States. The City discharged 57,107 gallons of untreated wastewater to the Redwood Shores Lagoon, a water of the United States. Therefore, the City is in violation of both the Clean Water Act section 301 and Prohibition C.1 of the Sewer System Order.

C. DETERMINATION OF ADMINISTRATIVE CIVIL LIABILITY

Administrative civil liability may be imposed pursuant to the procedures described in Water Code section 13323. The complaint alleges the act or failure to act that constitutes a violation of law, the provision of law authorizing civil liability to be imposed, and the proposed civil liability.

Pursuant to Water Code section 13385(c), civil liability may be imposed administratively by the Regional Water Board in an amount not to exceed the sum of both of the following:

(1) Ten thousand dollars ($10,000) for each day in which the violation occurs; and

(2) Where there is a discharge, any portion of which is not susceptible to cleanup or is not cleaned up, and the volume discharged but not cleaned up exceeds 1,000 gallons, an additional liability not to exceed ten dollars ($10) multiplied by the number of gallons by which the volume discharged but not cleaned up exceeds 1,000 gallons.

Water Code section 13327 requires the Regional Water Board to consider several factors when determining the amount of civil liability to impose administratively. These factors include: "…the nature, circumstance, extent, and gravity of the violation or violations, whether the discharge is susceptible to cleanup or abatement, the degree of toxicity of the discharge, and, with respect to the violator, the ability to pay, the effect on ability to continue in business, any voluntary cleanup efforts undertaken, any prior history of violations, the degree of culpability, economic benefit or savings, if any, resulting from the violation, and other matters that justice may require."

The 2009 State Water Resources Control Board Water Quality Enforcement Policy (amended November 2009 and approved by the Office of Administrative Law on

May 20, 2010)[1] (the Enforcement Policy), Section VI, provides a penalty calculation methodology for Regional Water Boards to use in applying the statutory factors for determining administrative civil liability. The Enforcement Policy's penalty calculation methodology enables the Water Boards to fairly and consistently implement liability provisions of the Water Code to promote maximum enforcement impact and address, correct, and deter water quality violations. The penalty calculation methodology provides a consistent approach and analysis of factors to determine liability based on the applicable Water Code section.

The alleged violation in the Complaint and this technical analysis is a "discharge violation" for the purpose of applying Water Code section 13385 and the Enforcement Policy's penalty calculation methodology. Therefore this analysis skips step three of the penalty calculation methodology, which addresses "non-discharge violations."

1. Step 1: Potential for Harm for Discharge Violations

Pursuant to the Enforcement Policy, Water Boards shall calculate actual or threatened impacts to beneficial uses using a three-factor scoring system to determine a final score for potential for harm. The three factors utilized in the determination of the potential for harm score include: (a) the potential for harm to beneficial uses; (b) the degree of toxicity of the discharge; and (c) the discharges' susceptibility to cleanup or abatement for any violation or group of violations. The Water Boards are to determine a numeric score for each of the three factors, then add them together to reach a final Potential for Harm score.

Based on the above scores for harm to the environment, risk to potential receptors, and susceptibility to cleanup, and as further detailed below, a score of **6** (six) is assigned to Step 1 of the penalty calculation.

a. Factor 1: Harm or Potential Harm to Beneficial Uses

This factor evaluates direct or indirect harm or potential for harm from the violation. A score between 0 (negligible) and 5 (major) is assigned in accordance with the statutory factors of the nature, circumstances, extent and gravity of the violation.

The discharge of 57,107 gallons of untreated wastewater resulted in moderate harm to the beneficial uses of Redwood Shores Lagoon. Accordingly a score of **3** (three) is assigned to Factor 1 of the penalty calculation. The Enforcement Policy defines Moderate as:

[1] The Enforcement Policy may be found at:
http://www.waterboards.ca.gov/water_issues/programs/enforcement/docs/enf_policy_final111709.pdf

3 = *Moderate – moderate threat to beneficial uses (i.e., impacts are observed or reasonably expected and impacts to beneficial uses are moderate and likely to attenuate without appreciable acute or chronic effects).*

The beneficial uses of Redwood Shores Lagoon are contact and non-contact water recreation and estuarine habitat. Examples of contact water recreation are wading, swimming, windsurfing, and fishing. Additionally, examples of non-contact water recreation are picnicking, sunbathing, hiking, boating, kayaking, sightseeing, and aesthetic enjoyment. Examples of estuarine habitat are feeding and resting for waterfowl and migratory birds.

Redwood Shores Lagoon was closed to public recreation from August 25, 2010, the date of the SSO, until September 7, 2010. Based on water quality sampling, the San Mateo County Health Supervisor concluded that the Lagoon's public access areas could have been re-opened on September 2, 2010. Unfortunately, a plane crashed into the Lagoon on September 2, 2010, delaying re-opening. Since the City posted health warning signs along the affected water areas as a result of the SSO discharging to the Lagoon, the beneficial uses have been impacted as the public's use has been limited. The SSO caused the public loss of contact and non-contact recreation beneficial uses for 9 days during the summer, the time at which the public's use of the Lagoon is at its highest. Due to temporary/long-term restriction of beneficial uses, the Enforcement Policy states Water Boards should use Harm Factor 5. In this case even though beneficial uses were restricted for over 5 days, the Regional Water Board Prosecution Team used Harm Factor 3. The City closed the Lagoon's tide gates to contain the SSO to significantly limit the aerial extent of the use restrictions. Had the City kept the tide gates open, the SSO would have more quickly dispersed, resulting in fewer days of beneficial use restrictions but a larger area would have been impacted.

b. <u>Factor 2 : Physical, Chemical, Biological or Thermal Characteristics of the Discharge</u>

The toxicity of this SSO poses an above-moderate risk due to its full strength chemical makeup. The degree of toxicity of raw untreated sewage cannot be accurately quantified. An SSO would be expected to have a deleterious effect on the environment. Raw sewage typically has elevated concentrations of biochemical oxygen demand, total suspended solids, oil and grease, ammonia, high levels of viruses and bacteria, trash and toxic pollutants (such as heavy metals, pesticides, personal care products, and pharmaceuticals). These pollutants exert varying levels of impact on water quality, and as such, will adversely affect beneficial uses of receiving waters to different extents, depending, in part on whether the SSO occurs during dry weather conditions.

The City did not collect any water samples immediately after the SSO. However, it collected water quality samples at several locations in the Lagoon two days after the SSO occurred on August 27, 2010. Bacteria concentrations in receiving waters indicate the presence of waste. The SSO event resulted in an elevated level of enterococcus bacteria in the Lagoon area at the point of discharge location at 52 colonies per 100 mL on August 27, 2010. (The USEPA bacteriological criteria for water contact recreation [salt water, designated beach] as stated in the Basin Plan are a steady state of 35 colonies per 100 mL with a maximum at 104 colonies per 100 mL.)

By September 1, 2010, enterococcus bacteria were detected at several locations within the Lagoon ranging from 16 to 470 colonies per 100 mL. Since the Lagoon's tide gates were closed a few hours after the SSO began to isolate the Lagoon waters from entering San Francisco Bay, the elevated bacteria levels indicate that the raw sewage had migrated and flowed to other areas of the Lagoon.

Also on September 1, 2010, the City treated the Lagoon water with hydrogen peroxide in order to reduce the bacteria levels. The treatment worked as evidenced by the September 2, 2010, water quality sample results which were significantly lower for enterococcus bacteria (with the majority at less than 10 colonies per 100 mL).

The characteristics of the discharged material posed an **above-moderate** risk or threat to potential receptors. The Enforcement Policy defines above-moderate as:

> "*Discharged material poses an above-moderate risk or direct threat to potential receptors (i.e., the chemical and/or physical characteristics of the discharged material exceed known risk factors and/or there is substantial concern regarding receptor protection)*."

The high degree of toxicity in untreated wastewater poses a direct threat to human and ecological receptors. Accordingly, a score of **3** (three) is assigned to Factor 2.

c. <u>Factor 3: Susceptibility to Cleanup or Abatement</u>
Pursuant to the Enforcement Policy a score of 0 is assigned for this factor if 50 percent or more of the discharge is susceptible to cleanup or abatement. A score of 1 is assigned for this factor if less than 50 percent of the discharge is susceptible to cleanup or abatement.

The City's response time for this SSO was very good. The City arrived onsite 10 minutes after being notified of the SSO by a resident. The City recovered 35,800 gal out of the 94,907 gal SSO (or 38 percent). In addition, the City diverted 963,600 gal of sewage around the failed pipe section and prevented

this volume from being part of the SSO. Thus, of the 1,058,500 gal of sewage that could have escaped, the City prevented 1,001,400 gal from entering the Lagoon (or 95 percent "recovery"). Because more than 50% of this SSO discharge is susceptible to cleanup and abatement, a score of **0** is assigned to this factor.

2. Step 2: Assessments for Discharge Violations

a. Extent of Deviation from Requirement

The discharge of 57,107 gallons of untreated sewage is a major deviation from required standards (Discharge Prohibition C.1). Accordingly, using the Potential for harm score of 6 (six) and "Table 1 – Per Gallon Factor for Discharges" of the Enforcement Policy, the per-gallon deviation factor is **0.22.**

The penalty calculation methodology defines a major deviation as:

> *The requirement has been rendered ineffective (e.g., discharger disregards the requirement, and/or the requirement is rendered ineffective in its essential functions).*

The SSO rendered the Prohibition on discharging untreated sewage to waters of the United States ineffective in its essential functions because the Prohibition would be effective only if no SSO had occurred.

b. Initial Amount of the ACL

Calculating the initial base amount of the ACL for the discharge is achieved under the Enforcement Policy by multiplying:

(Per Gallon Deviation Factor **0.22**) X (**56,107** Gallons) X (Maximum Liability per Gallon **$10**)
($123,435)
+
(Per Day Deviation Factor **0.22**) X (Days of Violation **2**) X (Maximum Liability per Day **$10,000**)
(**$4,400)**

= (Initial ACL Amount)
$127,835

3. Step 3: Per Day Assessments for Non-Discharge Violations

Non-discharge violations are not alleged in the Complaint.

4. Step 4: Adjustment Factors

The Enforcement Policy describes three factors related to the violator's conduct that should be considered for modification of the amount of initial liability: The violator's culpability, the violator's efforts to cleanup or cooperate with regulatory authorities after the violation, and the violator's compliance history. After each of these factors is considered for the violations involved, the applicable factor should be multiplied by the proposed amount for each violation to determine the revised amount for that violation.

a. Adjustment for Culpability

For culpability, the Enforcement Policy suggests an adjustment resulting in a multiplier between 0.5 to 1.5, with the lower multiplier for accidental incidents, and the higher multiplier for intentional or negligent behavior. In this case a culpability multiplier of **1** has been selected as detailed below.

The City is responsible for the proper operation and maintenance of its collection system. The City routinely assesses its force mains and pump stations as part of its collection system capital improvement projects (CIP). Prior to August 25, 2010, the City did not identify PS 10 or the downstream force main on its CIP list.

The failed force main had no history of leaks since July 2007 when the City chose to operate PS 10 in fixed speed mode because the variable frequency drive (VFD) experienced repeated failures despite its several attempts to troubleshoot. The City also chose to operate the PS 10 in a fixed speed mode ironically to reduce the risk of an SSO occurring, because when the VFD failed, the City would have had limited time to respond to a high wet well alarm.

Furthermore, the City did not notice any deterioration of the pipe wall thickness in the failed force main when it performed the pipe repair work in August 2010.

The City has demonstrated its commitment to improving its collection system by steadily raising its sewer service rates on average between eight to ten percent over the past five years. The City plans to continue to increase its sewer service rates by nine percent over the next five years to support operations, capital improvements, and its share of costs at SBSA's treatment facility. The City's current monthly sewer service rate is $48.72 and is scheduled to increase to $53.10 in fiscal year 2011-2012.

The median monthly sewer service rate of collection systems in San Mateo County is $54.17 which is currently more than the City's rate. However, the rate will be comparable in fiscal year 2011-2012.

(These county sewer rates are based on the database maintained by the Bay Area Clean Water Agencies as of December 30, 2010.)

b. Adjustment for Cleanup and Cooperation

For cleanup and cooperation, the Enforcement Policy suggests an adjustment should result in a multiplier between 0.75 to 1.5, with the lower multiplier where there is a high degree of cleanup and cooperation. In this case a Cleanup and Cooperation multiplier of **0.75** has been selected.

During the initial hours of the SSO event, the City placed sandbags and sock tubing absorbents to contain any sewage that escaped the force main in the parking lot area, and to preclude further sewage from reaching residents' garages or the storm drain system that leads to the Lagoon. The City also immediately closed the tide gates between the Lagoon and San Francisco Bay so as to isolate the Lagoon waters and minimize the impact of the SSO.

The City cleaned up the affected garages where sewage flowed from the failed pipe, and restored the parking area and landscaping affected by the pipeline failure and repair work.

By implementing its diversion plan, the City prevented the SSO from being much larger in volume than it could have been and greatly reduced the potential resulting environmental impacts. The City diverted 963,600 gallons of incoming sewage to PS 10. The plan included procuring several vacuum and tanker trucks to collect and transport sewage to SBSA's treatment facility.

c. Adjustment for History of Violations

The Enforcement Policy suggests that where there is a history of repeat violations, a minimum multiplier of 1.1 should be used to reflect this. From May 2, 2007, through December 30, 2010, the City has had 59 SSOs. In this case, a multiplier of **1** was selected because the cause of this SSO was unique and the City has not had similar types of SSOs. The City's history of violations is set forth in Tables A through E, below. As shown in Table A, the City's median SSO rate is better for the years prior to the incident than the median rate for comparable collection systems having 100 or more miles of collection system pipe.

Table A: ALL SSOs			
Year[2]	# of SSOs	SSO rate[3]	Median SSO rate[4]
2009	15	5.2	7.4
2008	21	7.3	7.2
2007	9	3.1	4.0

Table B: Root blockage caused SSOs			
	# of SSOs	SSO rate	Median SSO rate
2009	3	1.0	3.0
2008	1	0.3	2.0
2007	1	0.3	1.7

Table C: Grease blockage caused SSOs			
	# of SSOs	SSO rate	Median SSO rate
2009	3	1.0	0.9
2008	8	2.8	1.4
2007	6	2.1	0.8

Table D: Debris caused SSOs			
	# of SSOs	SSO rate	Median SSO rate
2009	2	0.7	1.1
2008	0	0	0.7
2007	0	0	0.6

Table E: Pipe Structural Failure caused SSOs			
	# of SSOs	SSO rate	Median SSO rate
2009	2	0.7	not available
2008	1	0.3	not available
2007	0	0	not available

[2] Data based on submitted certified California Integrated Water Quality System (CIWQS) SSO reports. For 2007, data based on submitted CIWQS reports from May 2, 2007, through December 31, 2007.
[3] The SSO rate is the number of sanitary sewer overflows per 100 miles of collection system.
[4] The median SSO rate is for all Bay Area large collection systems which are defined as having 100 or more miles of collection system.

5. Step 5: Determination of Total Base Liability Amount

The Total Base Liability amount of **$95,876** is determined by multiplying the initial liability amount for the violation by the adjustment factors in section 4. Accordingly, the Total Base Liability amount for the violations is calculated by multiplying the initial liability amount by the adjustment factors:

(Initial Liability Amount) X (Culpability) X (History of Violations) X (Cleanup) =
($127,835) X (1) X (1) X (0.75) = $95,876

6. Step 6: Ability to Pay and Ability to Continue Business

The Enforcement Policy provides that if the Regional Water Board has sufficient financial information necessary to assess the violator's ability to pay the Total Base Liability or to assess the effect of the Total Base Liability on the violator's ability to continue in business, then the Total Base Liability amount may be adjusted downward. Similarly, if a violator's ability to pay is greater than similarly situated dischargers, it may justify an increase in the amount to provide a sufficient deterrent effect.

The City's fiscal year 2010-2011 (FY2010-11) collection system operation and maintenance budget is $6,166,626. The City has additional funds of $2,000,000 and $3,065,000 being allocated in FY2010-11 to its capital improvement program and a sewer fund reserve (including emergency response funds), respectively. Regional Water Board Prosecution Staff believes the proposed civil liability will not affect the City's ability to continue operation and maintenance of its collection system.

Accordingly, this penalty factor in this step is neutral and does not weigh either for or against adjustment of the Total Base Liability.

7. Step 7: Other Factors as Justice May Require

The Enforcement Policy provides that if the Regional Water Board believes that the amount determined using the above factors is inappropriate, the liability amount may be adjusted under the provision for "other factors as justice may require," if express finding are made to justify this. In addition, the costs of investigation should be added to the liability amount according to the Enforcement Policy.

The City has encouraged its employees to pursue California Water Environment Association (CWEA) collection system certification and pays all costs associated with collection system staff obtaining and/or maintaining their CWEA certification. Beginning in 2010, City job announcements for wastewater positions state that CWEA grade certifications are "desirable" or must be obtained within a specified timeframe. As of December 2010, 15 collection system staff of the City's 19.4

full-time equivalents maintained CWEA certification. (The basic standard of CWEA certification is that all certificate holders have, and continue to perform at a level of basic competence that enables them to perform the essential duties of their job safely, effectively, without close supervision and without further training.) Having competently trained personnel demonstrates the City's commitment to a well operated and maintained collection system, which is demonstrated by the low SSO rates shown in section 5 above (except for grease blockages). Because of the City's commitment to this voluntary program and its resulting success with low SSO rates, the liability amount is adjusted downward by **$10,000**, bringing the total proposed liability to **$85,876**.

The costs of Regional Water Board Prosecution Staff investigation to date are $9,750, based on 65 hours of staff time at an hourly rate of $150. As a result the liability amount is recommended to be adjusted upward by $9,750, bringing the total proposed liability to **$95,600** when rounded to the nearest one hundred dollars.

The Regional Water Board's Resolution No. R2-2005-0059 declares support of local programs that inspect and rehabilitate private sewer laterals. The Resolution also states that the Regional Water Board would consider the existence of such programs, especially those experiencing significant infiltration and inflow from private sewer laterals, as an important factor when considering enforcement actions for SSOs. The City does not currently have a program that inspects and rehabilitates private sewer laterals. Thus, the liability amount is not affected by this factor.

8. Step 8: Economic Benefit

The Enforcement Policy directs the Regional Water Board to determine any economic benefit of the violations based on the best available information, and suggests that the amount of the administrative civil liability should exceed this amount whether or not economic benefit is a statutory minimum. The economic benefit of the violations is estimated to be **$28,350**.

The City derived economic benefit from not having to treat the 59,107 gallons of sewage that were not recovered. However, the associated savings is minor. Also, the City derived cost savings from not replacing the defective VFD at a then-applicable cost of about $6,100. The VFD should have been replaced about 4 years prior to when it was replaced. Assuming an interest rate of 5%, the City realized a cost savings of approximately $28,350 by not completely replacing the VFD when it should have.

9. Step 9: Maximum and Minimum Liability Amounts

The maximum civil liability that the Regional Water Board Prosecution Staff may assess administratively pursuant to Water Code section 13385(c) for the City's

August 25, 2010, SSO is $20,000 for the two days of violation, plus $561,070 for the 57,107 gallons spilled, but not cleaned up, less the 1,000 gallon statutory credit, for a total maximum potential administrative civil liability of $581,070.

The 2009 Enforcement Policy requires that:

> "*The adjusted Total Base Liability shall be at least 10 percent higher than the Economic Benefit Amount so that liabilities are not construed as the cost of doing business and that the assessed liability provides a meaningful deterrent to future violations*."

Therefore, the minimum liability amount the Regional Water Board may assess is **$31,185**. The recommended liability falls within the allowable statutory range for minimum and maximum amounts.

10. Step 10: Final Liability Amount

The total proposed civil liability in this matter is $95,626, which corresponds to approximately $1.67 per gallon.

The proposed amount of civil liability attributed to the discharge of 57,107 gallons of untreated sewage in violation of the Sewer System Order, Prohibition C.1 was determined by taking into consideration the factors in Water Code sections 13327 and 13385(c), and the penalty calculation methodology in the 2009 Enforcement Policy.

The proposed civil liability is appropriate for this untreated sewage discharge based on the following reasons:

a. The discharge of raw sewage into waters of the United States adversely affected beneficial uses of Redwood Shores Lagoon, including contact recreation and non-contact water recreation.

b. The high degree of toxicity in untreated sewage posed a threat to beneficial uses.

c. The proposed civil liability assessment is sufficient to recover costs incurred by the Regional Water Board Prosecution Staff, and it serves as deterrent for future negligent violations.