

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION

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**FACT SHEET**

for

NPDES PERMIT and WASTE DISCHARGE REQUIREMENTS for

**MARIN MUNICIPAL WATER DISTRICT'S**

**DESALINATION PILOT PLANT**

SAN RAFAEL, MARIN COUNTY

**NPDES Permit No. CA0038814**

**ORDER NO. R2-2005-XXXX**

**PUBLIC NOTICE:**

**Written Comments**

- Interested persons are invited to submit written comments concerning this draft permit.
- Comments must be submitted to the Board no later than 5:00 p.m. on March 2, 2005.
- Send comments to the Attention of Gayleen Perreira.

**Public Hearing**

- The draft permit will be considered for adoption by the Board at a public hearing during the Board's regular monthly meeting at: Elihu Harris State Office Building, 1515 Clay Street, Oakland, CA; 1<sup>st</sup> floor Auditorium.
- This meeting will be held on: March 16, 2005, starting at 9:00 a.m.

**Additional Information**

- For additional information about this matter, interested persons should contact Board staff member: Ms. Gayleen Perreira, Phone: (510) 622-2407; email: gperreira@waterboards.ca.gov.

This Fact Sheet contains information regarding the issuance of waste discharge requirements and National Pollutant Discharge Elimination System (NPDES) permit for the Marin Municipal Water District for discharge primarily of recombined bay water. The Fact Sheet describes the factual, legal, and methodological basis for the sections addressed in the proposed permit and provides supporting documentation to explain the rationale and assumptions used in deriving the effluent limitations.

## **I. INTRODUCTION**

- A. On December 31, 2004, the Marin Municipal Water District (the Discharger) applied to the Board for issuance of waste discharge requirements and a permit to discharge recombined reverse osmosis permeate and concentrate, mixed with overflows (consisting of bay water and pretreated bay water) from the temporary desalination plant to waters of the State and the United States under the National Pollutant Discharge Elimination System (NPDES).
- B. The Discharger is a public water supply and management agency that is responsible for providing drinking water to over 170,000 consumers in the eastern corridor of southern Marin County, and manages over 38,000 acres of watershed, which includes seven reservoirs. The Discharger's current water supply capacity operates at a 10% deficit, which exists despite the Discharger's long-standing and comprehensive conservation and water-recycling program that reduced per capita potable water use by 25%. The Discharger estimates that the deficit will grow to 20% by the year 2020, and therefore is investigating the feasibility of producing drinking water from bay water through the continuous operation of a temporary reverse osmosis desalination plant (the Pilot Plant) to supplement its source water supply.
- C. The Pilot Plant will be in operation for approximately nine months, and is located at 2675 Francisco Boulevard East, San Rafael. The Pilot Plant will withdraw water from the bay, filter the bay water in one of three pretreatment systems, and then desalt the bay water in a seawater reverse osmosis skid. After the Discharger evaluates the efficacy of the treatment processes to produce drinking water that meets both the Discharger's and regulatory standards, the reverse osmosis permeate (drinking water) and concentrate (brine) are recombined with overflows (consisting of bay water and pretreated bay water), and discharged (returned) to the bay. The sludge produced from the pretreatment processes is discharged to the local sanitary sewer, and therefore the discharge to the receiving water should be of higher quality.
- D. The Pilot Plant will withdraw, process, and discharge an average of 180,000 gallons per day (gpd) at a flow rate of 125 gallons per minute (gpm). The bay water is drawn from San Pablo Bay through a screened intake that will be suspended from the end of the Marin Rod & Gun Club pier (A-001). At high tides the intake and discharge rate may increase slightly, and at high-high tides the intake pump may increase to no more than 150 gpm or 216,000 gpd. The fish screens will be sized for this maximum flow, with 3/32-inch openings and at a maximum velocity of 0.33 feet per second (fps).

## **II. TREATMENT PROCESS DESCRIPTION**

- A. The treatment processes for the bay water will consist of three trains of equipment that will be operated in parallel. The first equipment train is a conventional treatment system that consists of a Lamella high-rate clarifier, two-stage granular media filters, and a seawater reverse osmosis skid. The second and third equipment trains are membrane microfiltration treatment systems; one is a USF Memcor CMFS unit and the other is the Zenon Z-1000 unit. The filtrate from both the second and third equipment trains, which are the membrane microfiltration systems, will be desalted in a single

seawater reverse osmosis skid. All the sludge and filter backwash water will be discharged to the local sanitary sewer system, and all the overflows (consisting of bay water and pretreated bay water) will be piped to the Pilot Plant's return water tank.

- B. The Discharger's treatment process consists of periodic chlorination, pretreatment, conventional filtration or submerged-membrane microfiltration, reverse osmosis-membrane desalination, possible addition of sulfuric acid to maintain pH, and dechlorination. In addition, chemicals may be added to prevent scaling and fouling of the reverse osmosis-membranes.

### III. DESCRIPTION OF INFLUENT AND EFFLUENT

- A. Bay water (raw saltwater) will be obtained through a pipeline installed on the deck of the Marin Rod & Gun Club pier, which runs parallel to the effluent discharge pipeline, at latitude 37 degrees 56 minutes 46.11 seconds North and longitude 122 degrees 28 minutes 25.33 seconds West (A-001). A screened intake will be suspended from the end of the Marin Rod & Gun Club pier, and is designed to comply with California Fish & Game requirements.
- B. After the Discharger evaluates the efficacy of the three trains of equipment to produce drinking water from the raw saltwater, the reverse osmosis permeate and concentrate are piped to the return water tank and combined with the overflows (the effluent).
- C. The effluent is discharged back into San Pablo Bay, a water of the State and the United States, through an additional pipeline installed on the deck of the Marin Rod & Gun Club pier (E-001-D). The effluent discharges approximately 500 feet from shore and approximately one-foot below mean low level through a T-pipe attached to the end of the pipeline. Because this is a new discharge, data is not available to characterize the effluent discharge.
- D. All the sludge and filter backwash are discharged to the local sanitary sewer system.
- E. The United States Environmental Protection Agency (the U.S. EPA) and the Board have classified this discharge as a minor discharge.

### IV. RECEIVING WATERS

- A. *Beneficial Uses.* Table 2-7 of the Board's June 21, 1995, *Water Quality Control Plan San Francisco Bay Basin (Region 2)* (the Basin Plan), and observation of known uses of the San Pablo Bay (the receiving water) in the vicinity of the subject discharge, have identified the following beneficial uses for San Pablo Bay:
- Commercial and Sport Fishing
  - Estuarine Habitat
  - Industrial Service Supply
  - Fish Migration
  - Navigation
  - Preservation of Rare and Endangered Species
  - Water Contact Recreation
  - Non-contact Recreation
  - Shell Fish Harvesting

- Fish Spawning
- Wildlife Habitat

B. *Shallow Water Discharge Prohibition.* Basin Plan Section 4, Table 4-1 prohibits the discharge of wastewater that contains pollutants of concern and that does not receive a minimum initial dilution of at least 10:1, or into any nontidal water, dead-end slough, similar confined waters, areas or any immediate tributaries thereof (the 10:1 discharge prohibition).

The 10:1 discharge prohibition provides an added degree of protection from the continuous effects of wastewater discharges that contain pollutants of concern (i.e. oxygen depleting pollutants, acutely toxic pollutants, etc.). However, the Board finds that the discharge regulated by this Order is not subject to the 10:1 prohibition because it is essentially recombined bay water that is not expected to contain pollutants of concern.

## V. GENERAL RATIONALE AND REGULATORY BASES

The limitations and requirements contained in this Order are based on:

- the Federal *Water Pollution Control Act*, Sections 301 through 305, and 307, and amendments thereto, as applicable (the Clean Water Act – the CWA);
- the Board’s June 21, 1995 *Water Quality Control Plan San Francisco Bay Basin (Region 2)* (the Basin Plan), and amendments thereto, as subsequently approved by the State Water Resources Control Board (the State Board), the Office of Administrative Law (OAL) and the U.S. EPA;
- the State Water Resource Control Board’s (the State Board’s) March 2, 2000 *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (the State Implementation Plan - the SIP), as subsequently approved by the OAL and the U.S. EPA;
- the U.S. EPA’s May 18, 2000 *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California* (the California Toxics Rule – the CTR);
- the U.S. EPA’s National Toxics Rule as promulgated [Federal Register Volume 57, 22 December 1992, page 60848] and subsequently amended (the NTR);
- the U.S. EPA’s *Quality Criteria for Water* [EPA 440/5-86-001, 1986], and subsequent amendments, (the U.S. EPA Gold Book);
- applicable Federal Regulations [40 CFR Parts 122 and 131];
- 40 CFR Part 131.36(b) and amended [Federal Register Volume 60, Number 86, 4 May 1995, pages 22229-22237];
- the U.S. EPA’s December 10, 1998 *National Recommended Water Quality Criteria* compilation [Federal Register Vol. 63, No. 237, pp. 68354-68364];

- the U.S. EPA's December 27, 2002 *Revision of National Recommended Water Quality Criteria* compilation [Federal Register Vol. 67, No. 249, pp. 79091-79095]; and
- guidance provided with State Board actions remanding permits to the Board for further consideration.

## VI. SPECIFIC RATIONALE

Specific factors affecting development of limitations and requirements in this Order are discussed as follows:

### A. Basis for Prohibitions

1. Prohibition A.1 (intake limit): The purpose of this prohibition is to protect the beneficial uses of the receiving water. This prohibition is based on the Pilot Plant's design criteria submitted in the Discharger's NPDES Permit application package, an email (1/13/05) from Vicky Frey, Environmental Scientist for the California Department of Fish and Game, and best professional judgment. This permit is for the Discharger's experimental desalination prototype plant that requires minimal intake of bay water supply (the intake limits), and therefore entrainment studies, biological resources studies, and sensitivity and toxicity screenings are not required for issuance of this permit. However, intake of bay water in amounts greater than the intake limits of 220,000 gallons per day or 150 gallons per minute, and greater than a velocity of 0.33 feet per second potentially may cause deleterious effects to aquatic life within the vicinity of the intake pipe and therefore, at a minimum, these studies would be required to be performed by the Discharger and reviewed by regulatory agencies before a permit would be granted. Based on staff's best professional judgment, these intake limits established in the prohibition are technically achievable and necessary to protect the receiving water.
2. Prohibition A.2 (no discharges of sludge or filter backwash): This prohibition is intended to prevent discharging pollutants of concern into the receiving water. This prohibition is based on the Pilot Plant's design criteria submitted in the Discharger's NPDES Permit application package, and the Basin Plan's objective on sediment and objectives to prevent deleterious effects to receiving waters from discharges that contain pollutants of concern. This prohibition is necessary to ensure that these objectives are protected. In the permit application package, the Discharger committed to discharging all sludge and filter backwash to the local sanitary sewer system; as a result, the effluent discharge into San Pablo Bay should be comprised primarily of bay water of higher quality. This Order allows the effluent discharge into the receiving water without a 10:1 dilution only because the discharge should not contain pollutants of concern, of which most are to be extracted during the treatment processes and discharged to the local sanitary sewer system.
3. Prohibition A.3 (no discharge at a location or in a manner different from that described in this Order): This prohibition is based on the Basin Plan to protect beneficial uses of the receiving water from un-permitted discharges, and of the California Water Code that requires filing of a report of waste discharge before a permit to discharge can be granted.

### B. Basis for Effluent Limitations

1. Effluent Limitations B.1 and B.2 (pH and chlorine residual limits): These limitations are based on Basin Plan objectives requirements [Basin Plan Chapter 4, Table 4-2, at pg 4-69], which is derived in turn from federal requirements [40 CFR 133.102], and best professional judgment. These technology-based limitations are representative of, and are intended to ensure, adequate and reliable treatment. While these limits were developed primarily for sewage treatment facilities, they are also applicable to other discharges. The Discharger is periodically chlorinating the water, and may add sulfuric acid to maintain the pH. Based on staff's best professional judgment, these limits are technically achievable, economically feasible, necessary to protect the receiving water, and are generally consistent with limits in permits for similar industries.
2. Effluent Limitation B.3 (Whole Effluent Acute Toxicity): The Basin Plan specifies a narrative objective for toxicity, requiring that all waters shall be maintained free of toxic substances in concentrations that are lethal to, or produce other detrimental response in, aquatic organisms. Detrimental responses include, but are not limited to: decreased growth rate, decreased reproductive success of resident or indicator species, and/or significant alternations in population, community ecology, or receiving water biota. To ensure that the manipulation of bay water by the Discharger does not introduce toxicity, these whole effluent toxicity limitations are necessary to ensure that the Basin Plan's objective is protected. The whole effluent acute toxicity limitations for a three-sample median and an eleven-sample 90<sup>th</sup> percentile value are based on the Basin Plan [Table 4-4, pg. 4-70]. This Order requires acute toxicity testing using the most sensitive marine bioassays, determined through the specifications in Provision 3 of this Order, and to be carried out consistent with the requirements of the U.S. EPA's "Methods for Measuring The Acute Toxicity of Effluents and Receiving Water To Freshwater and Marine Organisms." The most current requirements are the 5th Edition (EPA-821-R-02-012), and the Discharger shall implement succeeding editions as soon as practicable after their adoption by U.S. EPA.

### **C. Basis for Receiving Water Limitations**

Receiving water limitations C.1 and C.2 (conditions to be avoided): These limitations are based on the narrative/numerical objectives contained in Chapter 3 of the Basin Plan, pages 3-2 – 3-5.

### **D. Basis for Provisions**

1. 1. Provision E.1. (Permit Compliance): Time of compliance is based on 40 CFR 122.
2. Provision E.2. (Effluent Characterization for Selected Constituents): Reasonable potential could not be determined for priority pollutants due to the lack of data. The purpose of this requirement is to provide discharge data that are sufficient for Board staff to determine if water quality-based effluent limitations for priority pollutants are required. This provision is based on regulations contained in the SIP, which was promulgated by the CTR. The Board's August 6, 2001 Letter to all permittees required dischargers to initiate or continue to monitor for those pollutants in this category, using analytical methods that provide the best detection limits reasonably feasible. This Order requires the Discharger to monitor and evaluate priority pollutants during the effective period of this Order in accordance with the specifications stated in the Board's August 6, 2001 Letter under Effluent Monitoring for minor Dischargers. This provision requires the data and the final report to be submitted as part of the NPDES permit application for the permanent desalination plant or reissuance of this permit. Based on Board staff's best professional

judgment, we believe these monitoring requirements are technically achievable and economically feasible, necessary to protect the receiving water, and are consistent with requirements for dischargers in similar industries.

3. Provision E.3 (Whole Effluent Acute Toxicity): This provision establishes conditions by which compliance with permit effluent limitations for acute toxicity will be demonstrated. The Basin Plan requires compliance of acute toxicity limitations to be evaluated, at a minimum, using the most sensitive species determined from concurrent screenings of two species (Chapter 3 and 4), if toxicity has been observed in only one of the two species. To ensure that the Basin Plan's objectives are protected, this Order requires the Discharger to use the most sensitive marine test species determined from concurrent screenings, conducted for at least three months, of two marine-species, should toxicity only be observed in one of the test species; otherwise, the Discharger continues testing of both marine-species. This provision also requires the bioassays be conducted in compliance with the protocols in 40 CFR Part 136, currently "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms," 5<sup>th</sup> Edition (EPA-821-R-02-012). Based on the Basin Plan and Board staff's best professional judgment, these monitoring requirements are technically achievable and economically feasible, and are necessary to protect the receiving water.
4. Provision E.4 (Storm Water Pollution Prevention Plan): This provision is based upon 40 CFR 122.44(k), and best professional judgment. The purpose of this provision is to protect receiving waters from chemical spills or leakages, and is intended to prevent discharge of chemicals to the receiving water through the conveyance of storm water runoff. This provision requires the Discharger to implement best management practices, pollution prevention measures, and emergency response procedures. While the Discharger is categorically exempt to obtain a permit for storm water discharges (40 CFR 122.26(b)(14)), the Pilot Plant will be established on an existing parking lot that has storm drain inlets that discharge to waters of the State. During the Pilot Plant project, the Discharger will store and handle hazardous chemicals (chlorine, sulfuric acid, and antiscalants) that could potentially spill, or leak, and discharge to waters of the State via storm water runoff. Based upon staff's best professional judgment, we believe that this provision is necessary to protect the receiving water.
5. Provision E.5. (Self-Monitoring Program): The Discharger is required to conduct monitoring of the permitted discharges in order to evaluate compliance with permit conditions, and to provide data to determine if water quality-based effluent limitations for priority pollutants are necessary. Reasonable potential could not be determined for priority pollutants due to the lack of data, and therefore monitoring requirements are contained in the Self Monitoring Program (SMP) of the Permit. The Discharger is also required to conduct monitoring of the reverse osmosis concentrate to determine the salinity range. This provision requires compliance with the SMP, and is based on 40 CFR 122.44(i), 122.62, 122.63 and 124.5. The SMP is a standard requirement in almost all NPDES permits issued by the Board, including this Order. It contains definitions of terms, specifies general sampling and analytical protocols, and sets out requirements for reporting of spills, violations, and routine monitoring data in accordance with NPDES regulations, the California Water Code, and the Board's policies. The SMP also contains a sampling program specific for the facility. It defines the sampling stations and frequency, the pollutants to be monitored, and additional reporting requirements.
6. Provision E.6. (Standard Provisions and Reporting Requirements): The purpose of this provision is to require compliance with applicable standard provisions and reporting requirements given in

this Board's document titled *Standard Provisions and Reporting Requirements for NPDES Surface Water Discharge Permits, August 1993* (the Standard Provisions), or any amendments thereafter. That document is incorporated in the permit as an attachment to it. The Standard Provisions are a standard requirement in almost all NPDES permits issued by the Board, including this Order. Where provisions or reporting requirements specified in the permit are different from equivalent or related provisions or reporting requirements given in the Standard Provisions, the permit specifications shall apply. The standard provisions and reporting requirements given in the above document are based on various state and federal regulations with specific references cited therein.

- vi) 7. Provision E.7 (Optional Whole Effluent Toxicity Screening): This provision allows the Discharger to conduct whole effluent acute and chronic toxicity screening phase monitoring requirements during this pilot study for a permanent desalination plant, if the monitoring data is obtained from discharges that are likely to occur at permanent desalination plant. This screening phase monitoring is important to help determine which test species is most sensitive to the toxicity of the effluent for future compliance monitoring, and therefore screening phase monitoring data must be included in the NPDES Permit application for the permanent desalination plant. The proposed conditions for chronic and acute toxicity screening phase monitoring requirements are based on the whole effluent toxicity limitations specified in the Basin Plan (Chapter 4), and best professional judgment.
8. Provision E.8 (Optional Biological Resources Survey): This provision allows the Discharger to conduct a survey of the plants, invertebrates, and fishes (biological resources) located within, or migrating through, the zone of the intake. Because the intake volume will increase substantially for a permanent desalination plant, this Order requires a study of the impacts (impingement or entrainment) to biological resources from the intake to be included in the NPDES Permit application for the permanent desalination plant, in order to determine what, if any, permit requirements are needed to protect those beneficial uses. This provision is based on the Basin Plan objectives (Chapter 3 and 4), conversations with Environmental Scientists, Vicky Frey from California Department of Fish and Game, and Korie Schaeffer, from U. S. National Oceanic and Atmospheric Administration (NOAA), and best professional judgment.
9. Provision E.9 (Optional Intake Credit Study): This provision allows the Discharger to conduct an intake water credit study during this pilot study. The study must be sufficient to characterize the quality of the intake water, must comprise of all priority pollutants for which intake credits will be sought, must be conducted for a duration of not less than 6 month, must address possible temporal fluctuations, and must be and in accordance with appropriate methods such as those described in the Board's August 6, 2001 Letter. The purpose of this provision is to provide intake water and receiving water data, of which the results of the study may form the basis for intake credits in the NPDES permit issuance for the permanent desalination plant. This provision is not required if the Discharger does not wish Board staff to consider the appropriateness of intake water credits. This provision is based on regulations contained in the SIP, which was promulgated by the CTR.
10. Provision E.10 (Optional Salinity Study): This provision allows the Discharger to conduct a salinity study during this pilot study. Salinity may be indirectly measured by conductivity. The purpose of this study is to predict the salinity range of the discharge (including the R.O. concentrate) from the permanent desalination plant, and to evaluate if the salinity will impact



biological resources, and evaluate mitigation of these impacts (e.g. discharge in combination with freshwater, such as wastewater treatment plant effluent).

11. Provision E.11 (NPDES Permit /the U.S. EPA concurrence): This provision is based on 40 CFR 123.
12. Provision E.12 (Permit Expiration and Reapplication): This provision is based on 40 CFR 122.46(a).

## **VII. WASTE DISCHARGE REQUIREMENT APPEALS**

Any person may petition the State Water Resources Control Board to review the decision of the Board regarding the Waste Discharge Requirements. A petition must be made within 30 days of the Board public hearing.