**The California Nitrogen Removal Program**

The state of California through the State Water Resources Control Board regulates water quality and manages the NPDES surface water and groundwater discharge programs. The California State Water Resources Control Board is composed of 9 regional water quality control boards which maintain basin plans and issue surface and ground water permits. Each regional board covers a geographical region of the state. The basin plans designate beneficial use for water bodies and develop water quality standards for each water body in the regional jurisdiction. Each region is responsible for developing, issuing, and regulating NPDES permits. The State Water Resources Control Board provides assistance to the regional boards. Total maximum Daily Load evaluations, (TMDLs) for nutrients and other pollutants are established through regulatory actions to improve the water quality of impaired waterways

2006 the California State Regional Control Board issued the Technical Approach to Develop Nutrient Numeric Endpoints for California. This document serves as a guideline for setting numeric nutrient limits for NPDES permits, developing TMDLs, numeric nutrient endpoints and numeric nutrient NN criteria. This report defines three beneficial user classification categories, which are summarized below:

1. Category includes water bodies in which beneficial uses are sustained and impairment due to nutrients is not exhibited.
2. Category includes water bodies in which beneficial uses may be impaired; however, additional information and analysis may be needed to determine the extent of impairment and whether regulatory action is warranted.
3. Category includes water bodies in which impairment due to nutrients is clearly exhibited and regulatory action warranted.

In 2008, the State Water Board adopted a statewide policy for compliance schedules of NPDES permits, and consistency in implementation. Regional water boards are allowed to include compliance schedules in the NPDES permits.

A summary of each regional board’s nutrient removal plan is a follows:

1. **Region 1, North Coast Region**, the north coast region comprises the far northwestern portion of the state. This coastal region has a low population density compared to other regions of the state.

This region has a Total Maximum Daily Load (TMDL) published for the Kalmath River that includes nitrogen. There is only one significant discharger, a fish hatchery that is of concern for nitrogen discharged. This facility is not expected to need to use a supplemental carbon source to achieve nitrogen limits.

The region is highly agricultural as has an established wine industry. The region has published specific nitrate nitrogen limits of 10 mg/l for nitrate and 1 mg/l for nitrite for agricultural dischargers. There are no known major dischargers in this region using a supplemental carbon source at this time.

1. **Region 2, San Francisco Bay,** this region encompasses the entire San Francisco Bay watershed and includes the metropolitan areas of San Francisco, Oakland and San Jose with a population of greater than 7 million for the region. The major nutrient focus for this region is part of the San Francisco Bay Total Maximum Daily Load for nutrients (TMDL). This TMDL resulted in the San Francisco Bay Regional Water Quality Control Board issuing Order Number R2-2014-0014 for Waste discharge requirements for nutrients from municipal wastewater dischargers to San Francisco Bay.

The order covers 42 publically owned wastewater treatment facilities (POTWs) that include 39 major dischargers (over 1 million gallons per day flow) 2 minor dischargers and 1 military treatment facility. The combined wastewater flow for the 42 POTWs is 900 million gallons per day. The 2014 order requires the 42 POTWs to conduct nitrogen reduction evaluations. The evaluations are required to be completed by July 1, 2018 and will serve as a basis for future nitrogen removal requirements at each facility along with a nitrogen discharge limit. Each facility is presently required to monitor effluent nitrogen and this will establish a baseline nitrogen discharge for each facility.

Due to the large number of treatment facilities and complexity of the estuary evaluation it is estimated that any low level nitrogen discharge permit limits that would require a supplemental carbon source are a number of years in the future as implementation at the larger treatment facilities will require greater than five years to complete. This is the largest potential water quality improvement program in California from a nutrient prospective and progress should be monitored in the future for methanol market development. At the present time there are no major NPDES dischargers in this region using a supplemental carbon source.

1. **Region 3, Central Coast Region,** This region covers the coast line of California south of San Jose to Santa Barbara. This region is composed of mostly of rural land and several medium cities along the coast. The coastal cities with an ocean outfall discharge there is no nitrogen limit. Dischargers with an inland surface water or groundwater discharge a total nitrogen limit of 10 mg/l is required. The facilities with a 10 total nitrogen limit are meeting the limit without supplemental carbon. There are no known major dischargers in this region that use a supplemental carbon source.
2. **Region 4, Los Angeles Region,** This region covers the metro Los Angeles area and at population of greater than 10,000,000 this region represents m the highest population of the nine regions in the state.

Nutrient based TMDLs have been establish for the lakes of the region, however the nitrogen source to the impaired lakes is from storm water runoff as there are no significant wastewater dischargers into the lakes.

The major NPDES dischargers within the Los Angeles basin utilize ocean outfalls for final effluent disposal. The largest wastewater treatment facility in the region is the Hyperion WRF a 450 mgd treatment plant. The inland or reuse treatment facilities within the region have typically a 10 total nitrogen limit that is achieved without supplemental carbon use. The Glendale WRF in the region has deep bed effluent filters that are presently used for suspended solids filtration that could be used for denitrification with methanol if the permit limits were lowered to below the present 10 mg/l total nitrogen. There are no major NPDES facilities in the Los Angeles region that are presently using supplemental carbon on a regular basis.

1. **Region 5, Central Valley Region,** The Central Valley Region is the largest region from a land basis consisting of 40% of California’s land mass. The major watercourses within the region are the Sacramento and San Joaquin rivers that flow into the Sacramento River delta system. This delta discharges into San Francisco Bay. The largest wastewater facility in the region, **t**he Sacramento Regional County Sanitation District Wastewater Treatment Plant is a 180 mgd facility that is currently under construction for an advanced wastewater treatment process including nitrogen removal. The facility when completed will need to meet average monthly concentration for nitrate of 10 mg/l. This represents the largest single wastewater treatment facility in California that will have a nitrate nitrogen limit. The facility will include a supplemental carbon system that is designed to utilize acetic acid as the selected carbon source. Acetic acid was selected at this facility as supplemental carbon is not expected to be used on a continuous basis.

There are several other smaller municipal wastewater treatment facilities that have been designed to use supplemental carbon including methanol. The city of Tulare, California does use methanol in the industrial process side of the treatment facility in the range of 100-200 gpd. Most of the other facilities designed to use a supplemental carbon source are not currently using any at this time.

The future nitrogen limits for the San Francisco Bay region will have an effect on the dischargers in the Central Valley Region that discharge into the Sacramento River delta system. This region should be evaluated for supplemental carbon needs once the final effluent limits are established in Region 2, the San Francisco Bay region.

1. **Region 6, Lahontan Region,** the Lahontan Region is located in the far eastern portion of the state and includes the Lake Tahoe area. The Lake Tahoe area includes two municipal wastewater treatment facilities that use methanol, the Tahoe Truckee WWTF that presently uses 300 gpd and the Arrowwood Lake WWTF that is presently under construction and will use methanol when completed for denitrification.

Other wastewater treatment facilities in the region that have ground water or water reuse permits have a total nitrogen limit of 10 mg/l and do not require the use of a supplemental carbon source.

1. **Region 7, Colorado River Region,** the Colorado River region covers the far southeastern region of the state. The region is arid and mostly desert lands. The few larger wastewater treatment facilities in the region discharge into the ground or the effluent is used for irrigation. Nitrogen limits for these facilities are 10 mg/l nitrate nitrogen. All of the major facilities within this region are achieving nitrate nitrogen limits without the need for a supplemental carbon source.

1. **Region 8, Santa Ana Region**, the Santa Ana Region covers that Santa Ana river basin that includes the City of San Bernardino. The dischargers into the Santa Ana River basin have total nitrogen limits as low as 6 mg/l total nitrogen on a monthly average. The only major discharger in this basin that is presently using methanol is the City of Yucaipa, California located at the upper reach of the Santa Ana River. The Yucaipa treatment facility uses approximately 100 gpd of methanol.

1. **Region 9, San Diego Region,** The San Diego region consists of the far south western portion of the state and incudes the City of San Diego and the International Border WWTF that treats wastewater from the City of Tijuana, Mexico. Most of the major wastewater treatment facilities in this region discharge through ocean outfalls and do not require the use of supplemental carbon. Smaller treatment facilities in the region discharge to either ground water or beneficial reuse for irrigation. The typical nitrogen discharge limit is 10 mg/l nitrate nitrogen and the major treatments plants of greater than 1 mgd are not required to use a supplemental carbon source.