Regional Water Quality Control Board
North Coast Region

Executive Officer's Summary Report
Thursday, May 18th, 2017
Regional Water Board Office
Santa Rosa, California

ITEM: 6

SUBJECT: Salts and Nutrients in Groundwater: Considerations for Regulatory Actions (*Jeremiah Puget*)

BOARD ACTION: This is an informational item. No action will be taken by the Regional Water Board.

BACKGROUND: The rationale for developing discharge limitations and receiving water (groundwater) limitations in permits and other regulatory actions is based on a long established method of evaluating beneficial uses, narrative and numeric water quality objectives, and the Antidegradation Policy. Water Quality Control Plans (Basin Plans) establish water quality standards – beneficial uses and water quality objectives – for particular bodies of water and their tributaries. The Basin Plans also contain the state's Antidegradation Policy (State Water Board Resolution 68-16 *Statement of Policy with Respect to Maintain High Quality Waters in California*).

The water quality objectives establish concentrations or conditions intended to provide reasonable protection of the beneficial uses and/or to prevent nuisance for the specified body of water. Water quality objectives may be stated in either numeric or narrative form. Several objectives, like chemical constituents, are a hybrid referencing both numeric criteria (e.g., CCR title 22 Maximum Contaminant Levels) and narrative conditions. The Basin Plan includes the following narrative groundwater objectives:

- Chemical Constituents: *Groundwaters shall not contain concentrations of chemical constituents in amounts that cause nuisance or adversely affect beneficial uses.*
- Tastes and Odors: *Groundwaters shall not contain taste- or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses.*
- Toxicity: *Groundwaters shall not contain toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in, humans or that adversely affects beneficial uses. This objective applies regardless of whether the toxicity is caused by a single substance or the synergistic effect of multiple substances.*

Additionally, the State and Regional Water Boards implement the statewide Water Quality Control Plans, regional Basin Plans, water quality regulations, and policies for water quality control through the issuance of waste discharge requirements (WDRs), conditional waivers of WDRs, prohibitions, and enforcement orders. For example in 1988, the State Water Board adopted Resolution 88-63, *Adoption of Policy Entitled "Sources of Drinking Water",* that, except under specifically defined circumstances, designates all surface water and groundwater of the state as existing or potential sources of municipal and domestic supply.

In February 2009, the State Water Board adopted the Recycled Water Policy. The purpose of the Policy is to increase the use of recycled water in a manner that implements state and federal water quality laws. The Recycled Water Policy requires that Salt and Nutrient

Management Plans (SNMP) be developed to facilitate basin-wide management of salts and nutrients from all sources in a manner that optimizes recycled water use while ensuring protection of human health and beneficial uses of municipal, domestic, and agricultural supply. However, in a region where nearly 70% of communities are considered small and disadvantaged, resources are limited for SNMP development. Therefore, the Regional and State Water Board have agreed to: 1) develop a programmatic region-wide approach to addressing salts and nutrients in the North Coast Region; and 2) implement the Recycled Water Policy through existing regulatory and non-regulatory approaches. Consequently, salt and nutrient management and monitoring requirements are becoming more common in applicable permits.

On September 12, 2012, Governor Edmund G. Brown Jr. signed Assembly Bill (AB) 685, making California the first state in the nation to legislatively recognize the human right to water. Water Code as Section 106.3, recognizes that "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes." The human right to water extends to all Californians, including disadvantaged individuals and groups and communities in rural and urban areas. On February 16, 2016 the State Water Board approved Resolution 2016-0010 *Adopting the Human Right to Water as a Core Value and Directing its Implementation in Water Board Programs and Activities* and encourages the Regional Water Boards to continue considering, the human right to water in all activities that could affect existing or potential sources of drinking water (MUN), including, but not limited to, revising or establishing water quality control plans, policies, and grant criteria, permitting, site remediation, and monitoring.

DISCUSSION: Water quality compliance programs for groundwater protection develop regulatory orders such as WDRs and/or cleanup and abatement orders (CAOs) that implement all applicable plans and policies. In most cases, these orders implement water quality objectives as the upper limit (or minimum level of protection) and the Antidegradation Policy (natural background) as the lower limit (or maximum level of protection) when considering discharge limitations and receiving water limitations for constituents of concern. Additionally, Water Code Section 13263 states "A regional board, in prescribing requirements, need not authorize the utilization of the full waste assimilation capacities of the receiving waters." In this context assimilative capacity is the range of values between the existing water quality and the numeric value necessary to support beneficial uses. See Figure 1 for a conceptual illustration of upper limits, lower limits, and assimilative capacity.

Generally, identifying and implementing the *numeric* water quality objectives is straight forward, while *narrative* objectives often require case-by-case review for specific pollutants using literature-derived numeric values for the constituents of concern. In conjunction with site-specific conditions, these numeric values are used to implement narrative water quality objectives. Under the Antidegradation Policy, it is important to determine natural background constituent levels. Additionally, before the Water Boards can authorize any degradation of water quality, specific conditions in the Antidegradation Policy must be satisfied, including the requirement to use "best practicable treatment and control," thereby imposing technology-based limitations as well.

With respect to salts and nutrients there are subtleties to their respective water quality objectives and natural background concentrations that warrant further consideration. The water quality objectives for nitrate is fairly simple, 10 mg/L[1] for nitrate as nitrogen (nitrate-N). As for background concentrations of nitrate, the USGS has reported that concentrations of nitrate-N greater than 1 - 2 mg/L generally indicate anthropogenic sources.

For salts, also known as salinity, there are multiple water quality objectives that can and should be considered in regulatory actions. There are several ways to measure salinity; the two most common are total dissolved solids (TDS) and electrical conductivity (EC). "Salinity" can include hundreds of different ions; however, relatively few make up most of the dissolved material in water: chloride, sodium, nitrate, potassium, magnesium, fluoride, calcium, magnesium, carbonate, bicarbonate, phosphate, and sulfate. Additionally, the background levels of these compounds vary greatly depending on local geology, hydrology, precipitation and historic land use.

In summary, the purpose of this informational item is to provide the board with additional context in a complex decision making process by: 1) elaborating on the various levels/concentrations for water quality objective related to salts and nutrients in groundwater; 2) explaining how permit limitations are developed for salts and nutrients; and 3) providing basin-wide groundwater data analysis for several of our high priority basins to establish background concentrations, existing conditions, and trends.

RECOMMENDATION: N/A

SUPPORTING MATERIALS: None

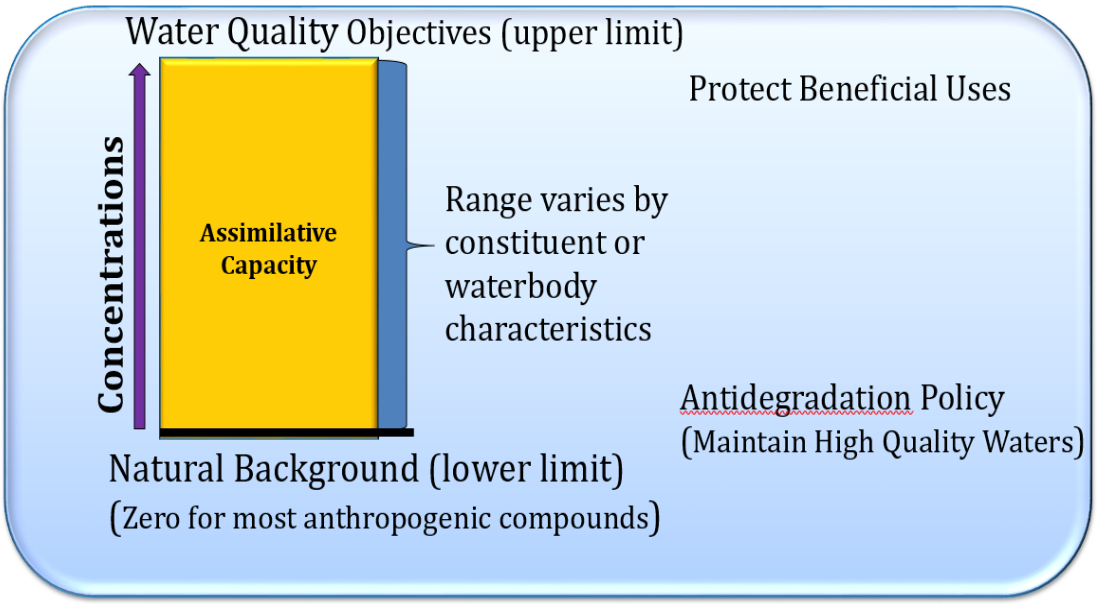

Figure 1. Conceptual illustration of upper limits, lower limits, and assimilative capacity.

[1] It should be noted that the former standard of 45 mg/L for Nitrate-NO_3. This is not a different nitrate compound, rather a difference in reporting units. In other words 10 mg/L of Nitrate-N equals 45 mg/L of Nitrate-NO_3.