December 28, 2015

Delivered Via E-mail to RB5S-NPDES-Comments@waterboards.ca.gov

Ms. Nichole Morgan
Supervising Water Resource Control Engineer
California Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670

Subject: Comments on the Tentative Order R5-2016-XXXX, NPDES No. CA0085316, for Waste Discharge Requirements for the City of Turlock Regional Water Quality Control Facility and the City of Modesto Water Quality Control Facility, Stanislaus County

Dear Ms. Morgan:

The State Water Contractors[1] (SWC) appreciates the opportunity to provide comments on the Central Valley Regional Water Quality Control Board's (Regional Water Board) Tentative Waste Discharge Requirements (NPDES No. CA0085316) for the City of Turlock Regional Water Quality Control Facility, and the City of Modesto Water Quality Control Facility (Tentative Permit). The Tentative Permit would regulate the discharge of recycled wastewater from the cities of Turlock and Modesto to the Delta Mendota Canal (DMC) via the North Valley Regional Recycled Water Program (NVRRWP) joint outfall. The NVRRWP proposes to discharge and convey up to 59,000 acre-feet per year (52.7 MGD average dry weather flow at build out) of tertiary treated wastewater to the DMC for use downstream by agricultural users within the Del Puerto Water District, and by Central Valley Project Improvement Act designated wildlife refuges downstream of the DMC.

[1] The SWC organization is a nonprofit mutual benefit corporation that represents and protects the common interests of its 27 member public agencies in the vital water supplies provided by California's State Water Project (SWP). Each of the member agencies of the State Water Contractors holds a contract with the California Department of Water Resources (DWR) to receive water supplies from the SWP. Collectively, the SWC members deliver water to more than 25 million residents throughout the state and more than 750,000 acres of agricultural lands. SWP water is served from the San Francisco Bay Area, to the San Joaquin Valley and the Central Coast, to Southern California. The SWC's members are: Alameda County Flood Control and Water Conservation District Zone 7; Alameda County Water District; Antelope Valley-East Kern Water Agency; Casitas Municipal Water District; Castaic Lake Water Agency; Central Coastal Water Authority; City of Yuba City; Coachella Valley Water District; County of Kings; Crestline-Lake Arrowhead Water Agency; Desert Water Agency; Dudley Ridge Water District; Empire-West Side Irrigation District; Kern County Water Agency; Littlerock Creek Irrigation District; Metropolitan Water District of Southern California; Mojave Water Agency; Napa County Flood Control and Water Conservation District; Oak Flat Water District; Palmdale Water District; San Bernardino Valley Municipal Water District; San Gabriel Valley Municipal Water District; San Gorgonio Pass Water Agency; San Luis Obispo County Flood Control & Water Conservation District; Santa Clara Valley Water District; Solano County Water Agency; and Tulare Lake Basin Water Storage District.

The proposed project is the first time, to our knowledge, that an entity has proposed discharging recycled wastewater to the DMC, which would result in the blending of the recycled wastewater with State Water Project (SWP) and Central Valley Project (CVP) drinking water supplies in the jointly used facilities of O'Neill Forebay and San Luis Reservoir, as well as the SWP's California Aqueduct. The SWC has a significant interest in protecting water quality in the SWP and CVP facilities, which are critical drinking water sources for municipal SWP and CVP contractors. The SWC is concerned about the potential water quality impacts of introducing recycled wastewater to the SWP and CVP system and, as such, provided comments on the Environmental Impact Report/Environmental Impact Statement for the project in March 2015.

The SWC believes that the NVRRWP project meets the definition of a surface water augmentation project, as it is the planned placement of recycled water into a surface water reservoir (San Luis Reservoir via the DMC) used as a source of domestic drinking water supply. As a result, the SWC requests that the Regional Water Board determine, in consultation with the State Water Resources Control Board Division of Drinking Water (DDW), appropriate Tentative Permit requirements and conditions applicable for a surface water augmentation project in order to be fully protective of public health and downstream drinking water uses.

In particular, the SWC is concerned about the impacts of increased loading of nutrients to the SWP/CVP system as a result of the NVRRWP project. The SWP and CVP contractors are already challenged by the algae and aquatic macrophyte growth that occurs in the SWP and CVP aqueducts and reservoirs. The challenges include taste and odor producing algae, algal toxins, filter-clogging algae, and aquatic macrophytes that clog conveyance structures and cause numerous other problems associated with drinking water systems. The problems with algal and aquatic plant growth in the SWP/CVP system are well documented and described in Exhibit 1. These issues can be exacerbated during periods of drought, when low water levels and other environmental conditions in conveyance facilities and reservoirs can enhance algal activity. The SWC requests that the Regional Water Board include language in the permit to further support nutrient controls for effluent discharge to the DMC.

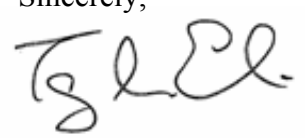
The Tentative Permit allows for mixing zones and dilution credits for the City of Turlock for compliance with human health water quality criteria. The SWC does not believe this is appropriate based on the State Implementation Policy (SIP), which identifies that mixing zones should not be provided when adversely impacting beneficial uses. As noted above, SWP and CVP contractors are currently challenged by nuisance conditions created through excess nutrients. In addition, the SIP indicates that mixing zones should not be allowed at or near drinking water intakes. The SWC believes that the DMC serves as a drinking water intake and requests that the Regional Water Board not allow for a mixing zone and dilution credits for the City of Turlock.

The monitoring requirements for the NVRRWP Tentative Permit are also inadequate to assess the water quality effects of the project. The Tentative Permit monitoring requirements should be revised to include additional effluent and receiving water monitoring. Specifically, the Tentative Permit should require monitoring for nutrients and pathogens, as well as monitoring for nitrosamines and other constituents of emerging concern that are not currently regulated but may have potential impacts on public health.

The SWC recognize the inclusion of certain provisions in the Tentative Permit intended for the protection of drinking water supplies. The SWC supports these provisions, such as the reopener provision for the Delta Nutrient Research Plan and development of nutrient objectives, requirements for the City of Turlock to conduct a mixing zone validation study, and requirements for the City of Turlock and City of Modesto to continue to implement their Salinity Source Control Programs. However, the SWC believes that the Tentative Permit, as a whole, is not protective of drinking water uses. To further support protection of SWP and CVP drinking water supplies, the SWC provides detailed comments on the Tentative Permit and identifies potential impacts of the NVRRWP project in Exhibit 1.

We appreciate the opportunity to provide comments on the Tentative Permit and look forward to continuing to work with the Regional Water Board on the permitting process and ensuring long-term water quality protection of SWP and CVP drinking water supplies.

Sincerely,



Terry L. Erlewine
General Manager

Exhibit and Attachments

Exhibit 1

State Water Contractors Detailed Comments on the Tentative Order for the City of Turlock Regional Water Quality Control Facility and the City of Modesto Water Quality Control Facility

The State Water Contractors (SWC) provides the following detailed comments on the Tentative Permit for the North Valley Regional Recycled Water Program (NVRRWP) project. The SWC requests the Central Valley Regional Water Quality Control Board (Regional Water Board) include applicable requirements in the Tentative Permit associated with a surface water augmentation project, add language to support additional nutrient controls to protect downstream drinking water uses, not allow a mixing zone and dilution credits for the City of Turlock, and include additional water quality monitoring requirements to address drinking water constituents of concern.

Surface Water Augmentation with Recycled Water

Requested Permit Condition

The SWC requests that the Regional Water Board determine, in consultation with State Water Resources Control Board Division of Drinking Water (DDW), appropriate Tentative Permit requirements and conditions applicable for a surface water augmentation project in order to be fully protective of public health and downstream drinking water uses.

Discussion

The Tentative Permit regulates the NVRRWP project as a recycled water discharge to the Delta Mendota Canal (DMC). The Regional Water Board applies DDW reclamation criteria in the Tentative Permit, but does not reference the NVRRWP as a surface water augmentation project, nor provide appropriate conditions that would constitute a similar level of public health protection.

The NVRRWP project will discharge recycled water to the DMC, an engineered water conveyance facility of the Central Valley Project (CVP), which would mix with State Water Project (SWP) supplies in the O'Neill Forebay, in San Luis Reservoir, and in the California Aqueduct. In addition to the DMC providing source water to San Luis Reservoir, the flow in the DMC can be reversed to provide an emergency drinking water source from San Luis Reservoir to DMC water users[1], and can also provide backup conveyance for the SWP to serve drinking water to municipal SWP contractors via the Delta Mendota Canal/California Aqueduct Intertie[2].

The SWC believes the NVRRWP project meets the definition of a surface water augmentation project as it represents the "planned placement of recycled water into a surface water reservoir used as a source of domestic drinking water supply" (California Water Code, § 13561 (d)). The DMC is an engineered channel designed to convey water from the Bill Jones Pumping Plant in the Delta to downstream water users. The maximum diversion capacity of the DMC is 4,600

[1] San Luis & Delta-Mendota Water Authority 2015 Delta-Mendota Canal Reverse Flow Project
[2] Record of Decision Delta-Mendota Canal/California Aqueduct Intertie

cubic feet per second. Based on the approximate 32.7-mile distance between the NVRRWP project point of discharge and San Luis Reservoir, discharge water would reach San Luis Reservoir in less than a week. Engineered channels such as the DMC are not conducive for attenuation of contaminants, whereas natural water bodies with longer detention times (such as the cities' current discharges to the San Joaquin River) can degrade certain contaminants through natural biological, physical, and chemical processes. Per Water Code § 13263.7, "compliance with effluent limitations and any other permit or waste discharge requirements, as appropriate, for the release or discharge of recycled water determined to be suitable for direct potable reuse or surface water augmentation… into a conveyance facility may be determined at the point where the recycled water enters the conveyance facility but prior to commingling with any raw water" [which is defined as surface water or groundwater]. In addition to supplying water for municipal and agricultural uses in the Central Valley, the SWC also recognizes the DMC as a means to convey water to San Luis Reservoir for surface storage of drinking water supplies. As such, the NVRRWP project should consider applicable requirements for surface water augmentation projects prior to discharge into the DMC.

DDW is mandated to "develop and adopt uniform water recycling criteria for surface water augmentation" (Water Code § 13562 (2) (A)) by December 31, 2016. An expert panel has been convened to advise DDW on the development of the criteria for indirect potable reuse through surface water augmentation. The draft regulation for surface water augmentation has not yet been released for public review. However, based on the expert panel's preliminary review documented in the Final Panel Meeting Report #5[3], the draft criteria will likely include use of advanced treatment processes (e.g., reverse osmosis, advanced oxidation processes), compliance monitoring, minimum reservoir retention times (e.g., 6 months), dilution requirements (e.g., 1:100 dilution), and compliance monitoring. These requirements are essential to ensuring the safety of drinking water sources and protecting public health, while facilitating development of indirect potable reuse projects.

While the development of water recycling criteria for surface water augmentation is underway, California Health and Safety Code § 116551 allows for DDW to review and approve surface water augmentation projects on a case-by-case basis. The SWC believes the Tentative Permit should include applicable requirements for a surface water augmentation project except where there is clear justification to the contrary. Thus the SWC requests that the Regional Water Board determine, in consultation with DDW, appropriate Tentative Permit requirements and conditions applicable for a surface water augmentation project in order to be fully protective of public health and downstream drinking water uses. Based on the NVRRWP antidegradation analysis, the project discharge would constitute over 2 percent of water available at San Luis Reservoir. The draft surface water augmentation criteria require a 100:1 dilution of advanced treated recycled water with reservoir water. A greater percentage of recycled water may be allowed if additional pathogen reduction is demonstrated. In coordination with DDW, the Regional Water Board should evaluate how the draft surface water augmentation criteria should apply to the NVRRWP project and allow for alternatives to these criteria, when necessary, that demonstrate a similar level of public health protection.

[3] Final Panel Meeting Report #5: Surface Water Augmentation-IPR Criteria Review Based on an Expert Panel Meeting Held June 2-3, 2015

Nutrient Discharge Limits

Requested Permit Condition

The SWC requests that the Regional Water Board include language in the Tentative Permit to further support nutrient controls for effluent discharge to the DMC to prevent adverse impacts on downstream drinking water uses. In addition to the proposed nitrate plus nitrite effluent limitation of 10 mg/L, the permit should require phosphorus removal and optimization of denitrification treatment processes to maintain levels below permit requirements as deemed feasible. The SWC recognizes that although numeric nutrient objectives are not currently available, the discharge of nutrients can be limited based on the following narrative objectives from the Water Quality Control Plan for the Sacramento and San Joaquin River Basins:

- "waters shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses."
- "waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life."
- "waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses."
- "waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses."

Discussion

Excess nutrients are already contributing to water quality problems in SWP and CVP facilities, and drinking water agencies who receive water from the SWP and CVP are challenged by the algae and aquatic macrophyte growth that occurs in the aqueducts and reservoirs.[4] The increased nutrient loading from the NVRRWP project will exacerbate these water quality problems in the SWP and CVP aqueducts and reservoirs. Nuisance and public health concerns associated with excess nutrients include taste and odor producing algae, algal toxins, filter-clogging algae, aquatic macrophytes that clog conveyance structures, and organic carbon production. These issues may become more prevalent under drought conditions, with warmer temperatures and low flow conditions favoring algal activity in nutrient-rich waters. The Tentative Permit lacks protection of SWP drinking water supplies through the current provisions.

[4] See, e.g., State Water Resources Control Board Order No. WQ 2012-00143, In the Matter of Own Motion Review of Waste Discharge Requirements Order No. R5-2010-0114, [NPDES No. CA0077682] for Sacramento Regional Wastewater Treatment Plant at pp. 74 ("There is evidence in the record showing that the San Francisco Bay and Delta are nutrient-enriched, receiving external loads of total nitrogen and total phosphorus from point and non-point sources."), 81 ("In addition to ecosystem impacts and microcystin production, cultural eutrophication impacts the taste and odor of drinking water supplies. … The water exported from the Delta helps supply drinking water for approximately 25 million Californians. Excess primary productivity can clog drains and pumps for water treatment facilities. Elevated primary productivity adds to the levels of dissolved and total organic carbon in the water. High levels of organic carbon in source water for drinking water is a concern due to the formation of carcinogenic byproducts during disinfection at water treatment facilities. Some species of algae produce compounds such as geosmin and 2-methylisoborneol that produce objectionable odors and taste in drinking water.")

Increased Nutrient Loading from the NVRRWP

a. Phosphorus

Phosphorus is a limiting nutrient and can stimulate algae growth in waterbodies. Median concentrations of total phosphorus are approximately 0.1 mg/L in the Delta. The Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the NVRRWP indicates that based on limited sampling, phosphorus levels in the City of Turlock's effluent have averaged 4 mg/L, potentially 40 times greater than DMC levels[5]. No phosphorus data is available from the City of Modesto's facility, however it would be anticipated that levels would similarly be significantly higher than baseline DMC levels.

b. Nitrate

Nitrate can also stimulate algal activity in waterbodies. The Addendum No. 2 to the NVRRWP Antidegradation Analysis indicates that the DMC baseline nitrate plus nitrite level is 0.68 mg/L (as N) and the projected average comingled effluent is 4.87 mg/L, resulting in a future increase in DMC nitrate levels to 0.77 mg/L in the near-field downstream area. There are no findings that setting the nitrate limit to the drinking water MCL of 10 mg/L will prevent nuisance conditions due to excess nutrients. The drinking water MCL is based on health considerations and has no relevance to preventing eutrophication.

Nuisance and Public Health Concerns Associated with Excess Nutrients

a. Taste and Odor Production

Certain cyanobacteria and actinomycete bacteria produce chemical compounds that are not completely removed in conventional drinking water treatment processes and are capable of causing unpleasant tastes and odors (T&O) in drinking water. T&O incidents occur throughout the SWP and CVP and are commonly associated with geosmin and 2-methylisoborneol (MIB) that are produced by benthic and planktonic cyanobacteria. The ability of individuals to detect these chemicals varies, but the general population can detect either compound at a concentration of about 10 ng/L (parts per trillion) and sensitive individuals can detect even lower concentrations. Although most contaminants that cause T&O concerns in drinking water are not considered a threat to human health, most drinking water consumers judge the quality of drinking water by taste and odor, and unpleasant T&O undermine the consumer's trust in the safety of their drinking water.

Samples have been collected from SWP facilities by the Department of Water Resources (DWR) and analyzed for the T&O producing compounds, MIB and geosmin, since 2000 at some locations and since 2003 near San Luis Reservoir. O'Neill Forebay and San Luis Reservoir have the greatest potential to be impacted by the increased nutrient load from the NVRRWP project. **Figures 1 and 2** present the data for the Pacheco Pumping Plant at the western side of San Luis

[5] Total phosphorus levels were reported as 0.11 and 0.12 mg/L for the DMC in Appendix D: Delta-Mendota Canal Water Quality Monitoring Data Used to Characterize Upstream Receiving Water Quality for Proposed NVRRWP Discharge of the North Valley Regional Recycled Water Program Final Environmental Impact Report/Environmental Impact Statement Volume II Response to Comments.

Reservoir and for the Gianelli Inlet/Outlet Tower at the eastern side of the reservoir. Due to low water levels in San Luis Reservoir in 2013, sampling at the Gianelli Inlet/Outlet Tower was suspended and samples were collected from O'Neill Forebay in the channel leading to the pump/generating plant (**Figure 3**). Both MIB and geosmin have historically been found at low concentrations with only occasional peaks at or above 10 ng/L; however, geosmin concentrations increased in 2013 and MIB concentrations increased in 2015 by over an order of magnitude with peak concentrations of 301 ng/L at Pacheco and 294 ng/L at Gianelli. Santa Clara Valley Water District (SCVWD) takes water from San Luis Reservoir at Pacheco Pumping Plant. The SCVWD conducted independent monitoring for MIB at Pacheco and found results similar to DWR's results. The SCVWD data showed MIB concentrations exceeded 10 ng/L from mid September to mid December 2015, with a peak concentration of 260 ng/L, as shown on **Figure 4**. During this period, algal cell numbers increased to a high of 53,000 cells/ml. The predominant algae were *Microcystis* and *Oscillatoria*. The SCVWD had to blend San Luis Reservoir water with water from a local reservoir to avoid high levels of MIB in the treated water. **Figure 5** presents the data for O'Neill Forebay Outlet on the California Aqueduct. There were occasional peaks of MIB that exceeded 10 ng/L prior to 2014 but in 2014 and 2015 the concentrations of both MIB and geosmin increased dramatically. The peak MIB concentration was 292 ng/L and the peak geosmin concentration was 65 ng/L. Concentrations of MIB exceeded 10 ng/L from mid-August through the last sample collection date of December 7, 2015.

While some of the MIB and geosmin is exported from the Delta, MIB and geosmin are also generated by benthic cyanobacteria in the California Aqueduct, the Coastal Branch and the East Branch of the California Aqueduct (DWR, 2013). The Central Coast Water Authority experienced severe T&O issues due to MIB on the Coastal Branch Aqueduct in the summer and fall of 2015. **Figure 6** presents both the raw and treated water MIB data for this period at the Central Coast Water Authority's Polonio Pass Water Treatment Plant. MIB concentrations in the raw water exceeded 10 ng/L from late August to early December, with a peak concentration of 1,003 ng/L in September. The treated water concentrations exceeded 10 ng/L from early September until late October and again from late November to early December. The peak concentration in the treated water was 303 ng/L. During this episode, the Polonio Pass Water Treatment Plant removed less than 50 percent of the MIB from the raw water on average. This clearly indicates that controlling these episodes in the raw water is needed to prevent supplying treated water with high levels of T&O compounds.

MIB and geosmin are both frequently present at concentrations exceeding 10 ng/L at Check 41 on the California Aqueduct (**Figure 7**) and Check 66 on the East Branch of the aqueduct (**Figure 8**). In 2014, the concentrations of both MIB and geosmin increased dramatically with peak MIB concentrations reaching 507 ng/L at Check 41 and 532 ng/L at Check 66 in August. High concentrations of MIB and geosmin are found in Silverwood Lake on the East Branch of the California Aqueduct (**Figure 9**). **Figure 10** and **Figure 11,** present MIB and geosmin concentrations, respectively, for Castaic Lake on the West Branch. High concentrations of geosmin are found in Castaic Lake (**Figure 11**). Planktonic cyanobacteria are responsible for T&O problems in Silverwood Lake, Lake Perris, Pyramid Lake, and Castaic Lake in southern California (DWR, 2013). DWR uses a variety of aquatic pesticides in the SWP aqueducts and reservoirs to control these cyanobacteria, as does the Metropolitan Water District of Southern California in its reservoirs that store SWP supplies.

b. Algal Toxins

Microcystis aeruginosa was first detected in the Delta in the eastern Stockton Ship Channel on September 27, 1999. This cyanobacteria has bloomed every year following its initial detection during the late summer and early fall throughout the central and southern Delta. *Microcystis spp*. has been found in SWP facilities from Clifton Court Forebay to the terminal reservoirs in southern California. *Microcystis* produces microcystin, a potent hepatoxin (liver toxin). Other algal species, such as *Anabena*, *Aphanizomenon,* and *Planktothrix*, that produce algal toxins (US EPA, 2012 and 2015a) have also been found at a number of locations in the SWP.

There are currently no state or federal drinking water standards for microcystins; however, the World Health Organization released a provisional guideline of 1.0 µg/L for microcystin-LR in drinking water in 1998. The United States Environmental Protection Agency (USEPA) added cyanobacteria and cyanotoxins to the candidate contaminant list (CCL) in 1998, 2005 and 2009. Cyanotoxins are also on the draft CCL4 released by USEPA on February 4, 2015. USEPA published health advisories for microcystins and cylindrospermopsin in June 2015 (US EPA, 2015b), presented in Table 1.

Table 1. US EPA Algal Toxin 10-Day Health Advisories

	Microcystins, µg/L	**Cylindrospermopsin, µg/L**
Children, Six Years and Younger	0.3	0.7
Older Children and Adults	1.6	3.0

DWR initiated microcystin monitoring in the SWP in 2006. Between 2006 and 2012, dissolved microcystin was detected in a few samples at levels ranging from <1.0 to 1.7 µg/L. In 2013, DWR changed laboratories and methods. The new method measures total microcystin, including the microcystin contained in the algal cells. This resulted in more frequent detections at more locations and at higher concentrations. Microcystin has been detected throughout the SWP.

Figures 12 and 13 present the microcystin concentrations in San Luis Reservoir at the Pacheco Pumping Plant and the Gianelli Intake. San Luis Reservoir had concentrations ranging from <0.15 to 9.8 µg/L at the Gianelli intake and <0.15 to 6.5 µg/L at the Pacheco Pumping Plant. Many of these samples exceeded the US EPA Health Advisories for drinking water. SCVWD takes water from San Luis Reservoir at Pacheco Pumping Plant. The SCVWD conducted independent monitoring for microcystin in 2015 and found concentrations of 2.5 ug/L in September and October 2015, as shown in **Figure 14**.

The data for O'Neill Forebay Outlet, presented in **Figure 15**, shows that the Health Advisory level for young children was frequently exceeded and the Health Advisory level for adults was exceeded in several raw water samples. High levels of microcystin are also found in the terminal reservoirs. Some water treatment facilities can remove microcystin but algal toxicity is still a concern in raw water. **Figure 16** presents the data for Silverwood Lake and **Figure 17** presents the data for Pyramid Lake. The highest concentration of microcystin ever found in the SWP was found in Pyramid Lake in June 2015. DWR issued a news release on June 26, 2015

advising the public to avoid contact with the algae growing in Pyramid Lake, as algal blooms are considered harmful if they produce toxins (Attachment A). Although Lake Del Valle is part of the South Bay Aqueduct system and is upstream of the proposed discharge, it is relevant to note that it was closed to body contact recreation in December 2015 due to a toxic algae bloom (Attachment B).

c. Filter Clogging Algae

Filter clogging algae are present throughout the SWP but they are particularly troublesome in the SBA. The high concentrations of nutrients, combined with shallow canal depths, abundant sunlight, and warm water temperatures during the spring, summer, and fall months leads to excessive algal growth in the SBA. This creates a number of treatment challenges for the SBA Contractors. The SWC are concerned that these same problems could occur in the DMC as a result of the proposed NVRRWP discharge and filter clogging algae could then enter O'Neill Forebay, San Luis Reservoir, and the California Aqueduct.

d. Obstruction of Conveyance and Pumping Facilities

Excessive growth of macrophytes and algae create water conveyance problems at a number of locations in the SWP. Macrophyte accumulation can be so severe at the Banks Pumping Plant that pumping is restricted or halted. At times, up to 20 cubic yards of macrophytes are removed each day from the trash racks at the Banks Pumping Plant. Macrophytes also create major operational problems in O'Neill Forebay, the California Aqueduct and the Coastal Branch. Macrophytes are also present in the littoral zone of the four southern California SWP reservoirs. DWR expends a significant amount of time and money controlling macrophytes in the SWP. Copper products are used in many locations, although they have not been used since 2006 in Clifton Court Forebay due to potential impacts on listed species. Mechanical harvesting is used in Clifton Court Forebay and O'Neill Forebay and some sections of the California Aqueduct are scraped by dragging a large chain along the aqueduct lining.

e. Organic Carbon Production

Algal production in the SWP and CVP facilities results in higher concentrations of total organic carbon in the system. The relative contribution from the Delta and from production in the system is not known. Also, the NVRRWP effluent would increase total organic carbon mass emissions.

Levels of organic carbon are regulated in drinking water treatment operations to minimize the formation of harmful disinfection by-products. Water utilities using surface water and conventional filtration are required to remove specified amounts of total organic carbon through enhanced coagulation. The amount of organic carbon that must be removed by a water treatment plant is based on the concentrations of total organic carbon and alkalinity in the source water. Water utilities incur additional treatment costs in removing total organic carbon to meet coagulation requirements.

f. Diurnal Swings in pH

Wide swings in pH periodically occur in the SBA. The increases in pH in the SBA are most likely a result of photosynthetic removal of carbon dioxide (CO_2) from the water along the

length of the open canal, primarily by algae. These pH excursions are currently problematic for the SBA Contractors because the pH of the treatment plant influent water must be adjusted to within a specific range for the drinking water treatment process to meet regulations and to effectively disinfect the water. Tracking rapid pH changes and adjusting acid feed makes it difficult to meet water treatment regulations and increases treatment costs. Treatment costs increase because acid is added to lower pH going into the plant and then must be subsequently offset by addition of base to raise pH of the finished water leaving the plant to meet the requirements of the Lead and Copper Rule. While this is currently a major issue for the SBA Contractors, there is concern that it could become an issue in other locations of the SWP if algal growth increases.

g. Solids Production

Water agencies must use additional quantities of chemicals in the water treatment process to remove algae from the source water. This produces greater quantities of solids that must be disposed of, resulting in higher disposal costs.

Antidegradation

The increased nitrate and phosphorus concentrations and loadings are inconsistent with the state and federal anti-degradation polices. The state policy, which incorporates the federal policy, states that "any activity which produces a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control [BPTC] of the discharge necessary to assure that (a) *a pollution or nuisance will not occur* and (b) the highest water quality consistent with the maximum benefit to the people of the State will be maintained." (State Water Resources Control Board Resolution No. 68-16, emphasis added.)

The current quality of receiving waters in the Delta and DMC does not meet the narrative water quality objectives in the Regional Water Board's Basin Plan. The Tentative Permit must therefore prescribe effluent limits that will maintain or improve receiving water quality to a level that achieves all applicable numeric and narrative objectives for nutrients.

The draft surface water augmentation regulations being developed by DDW prescribe treatment requirements that would result in BPTC and assure consistency with the anti-degradation policy. Whether lesser treatment requirements might also result in BPTC is beyond the scope of these comments. However, by virtue of the fact that existing treatment facilities at the City of Modesto Water Quality Control Facility already reduce nitrate to a maximum level of 6.87 mg/l (Tentative Permit, p. F-52), an average monthly nitrate plus nitrite limit of 10 mg/l and an average weekly nitrate plus nitrite limit of 12 mg/l (City of Turlock) and 19 mg/l (City of Modesto) clearly do not correspond to BPTC.

Mixing Zone

Requested Permit Condition

The SWC requests that the Regional Water Board not allow for a mixing zone and dilution credits for the City of Turlock.

Discussion

The Tentative Permit allows for mixing zones and dilution credits for the City of Turlock for compliance with human health water quality criteria. The State Implementation Policy (SIP) provides that "a mixing zone shall not … 5) produce undesirable or nuisance aquatic life, … 7) produce objectionable color, order, taste, or turbidity, … 11) be allowed at or near any drinking water intake. A mixing zone is not a source of drinking water." As discussed above, excess nutrients are already causing nuisance conditions, including taste and odor problems. In addition, the DMC itself serves as a drinking water intake. The SWC disagrees with the Tentative Permit that "the receiving water is not at or near a drinking water intake". The SWC believes the DMC serves as a drinking water intake as it is a direct conveyance, as noted earlier, to the San Luis reservoir, a source of drinking water supplies.

Additional Water Quality Monitoring Requirements

Requested Permit Condition

The monitoring requirements in the Tentative Permit should be revised to include additional effluent and receiving water monitoring for drinking water constituents of concern. Specifically, the Tentative Permit should require monitoring for nutrients and pathogens, as well as monitoring for nitrosamines and other constituents of emerging concern (CECs) that are not currently regulated but may have potential impacts on public health.

Discussion

The proposed monitoring program is not adequate to fully evaluate the impacts of the NVRRWP discharge on algal and macrophyte growth in the receiving waters. The combined effluent from the two plants (EFF-002) and the receiving water (RSW-001 and RSW-002) should be monitored for nitrate, ammonia, total Kjeldahl nitrogen and total phosphorus so that the load of total nitrogen and total phosphorus can be determined. The receiving water monitoring location (RSW-001) is to be located in the DMC upstream of the discharge point. The receiving water monitoring location (RSW-002) should be selected at a location that provides sufficient separation time between the point of discharge and the location where algal production may be expected to occur in the DMC. The Antidegradation Analysis only considered nitrate when evaluating the downstream impacts. Other forms of nitrogen, such as ammonia, are converted to nitrate in receiving waters so the downstream increase in nitrate has been understated. In addition, phosphorus may be the limiting nutrient at times and the additional phosphorus load from the discharge may stimulate algal growth.

Monitoring the DMC should be required with no exceptions in the Tentative Permit. The Tentative Permit allows the dischargers to contribute to the Delta Regional Monitoring Program (RMP) in lieu of conducting the receiving water monitoring, and in lieu of conducting receiving water portion of the Effluent and Receiving Water Characterization in 2019. The dischargers should not be allowed to contribute to the Delta RMP in lieu of conducting site-specific monitoring. The option for participating in the Delta RMP is inappropriate because the discharge is not to the Delta or waters that flow into the Delta, so there is no "integrating" site that measures the impacts of this discharge. Further, receiving water monitoring is essential to be able to evaluate the impacts of the NVRRWP discharge on downstream water quality.

Microcystin should be monitored at EFF-002, RSW-001, and RSW-002. The USEPA recently issued a health advisory for microcystin of 0.3 µg/L for young children and 1.6 µg/L for adults. Monitoring conducted by DWR in San Luis Reservoir shows that these levels are frequently exceeded, as shown in **Figures 12** and **13**. The proposed discharge has the potential to exacerbate this problem if it contributes to production of microcystin in the DMC, San Luis Reservoir, and California Aqueduct.

Cryptosporidium and *Giardia* should also be monitored at EFF-002 to determine the load of these organisms discharged to the DMC and to comply with the pathogen narrative objective requiring that "waters shall not contain *Cryptosporidium* and *Giardia* in concentrations that adversely affect the public water system component of the MUN [domestic water supply] beneficial use".

The Final EIR/EIS for the NVRRWP indicates that the Regional Water Board "can include CEC monitoring requirements if deemed necessary". The SWC requests that CECs be monitored at EFF-002 to determine the potential contribution of these constituents to the DMC. At a minimum, the Tentative Permit should require monitoring based on the Recycled Water Policy. The preliminary CEC monitoring list and monitoring parameters in the Recycled Water Policy were developed through an expert panel. Although the Recycled Water Policy CEC monitoring may have been primarily developed for groundwater recharge projects using recycled water, it is the most applicable regulatory guidance related to CEC monitoring and recycled water.

Figure 1. MIB and Geosmin Concentrations in San Luis Reservoir at Pacheco Pumping Plant

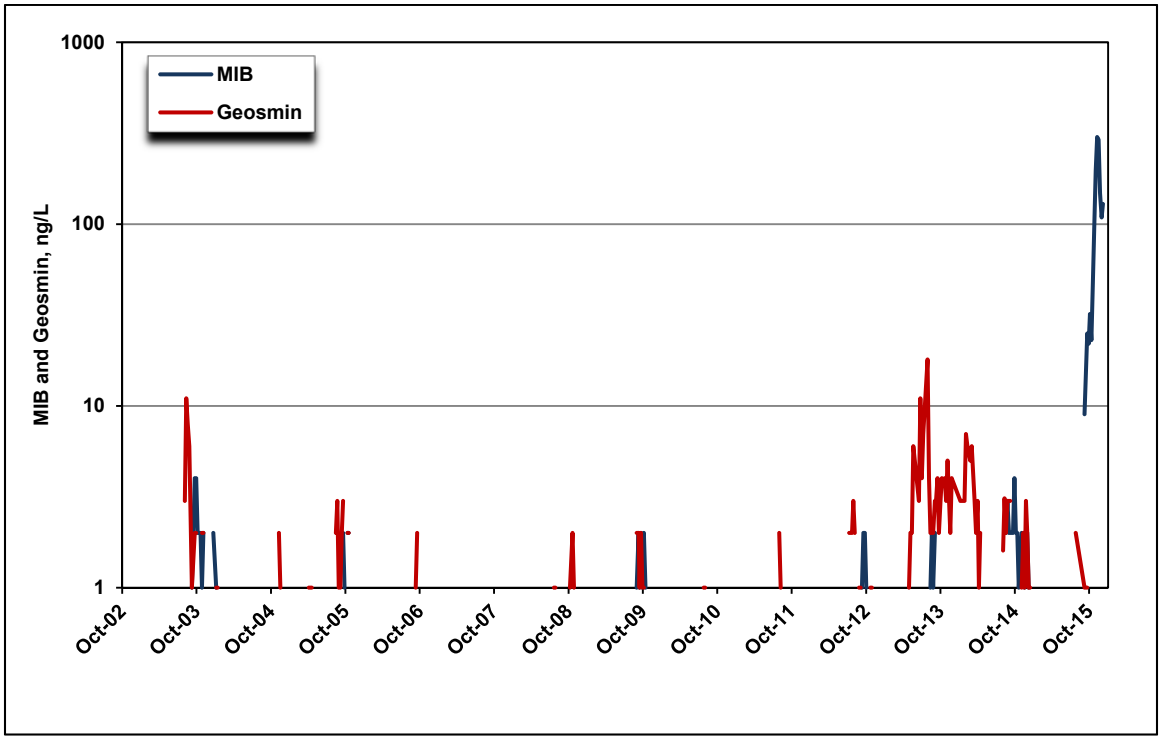


Figure 2. MIB and Geosmin Concentrations in San Luis Reservoir at Gianelli Inlet/Outlet Tower

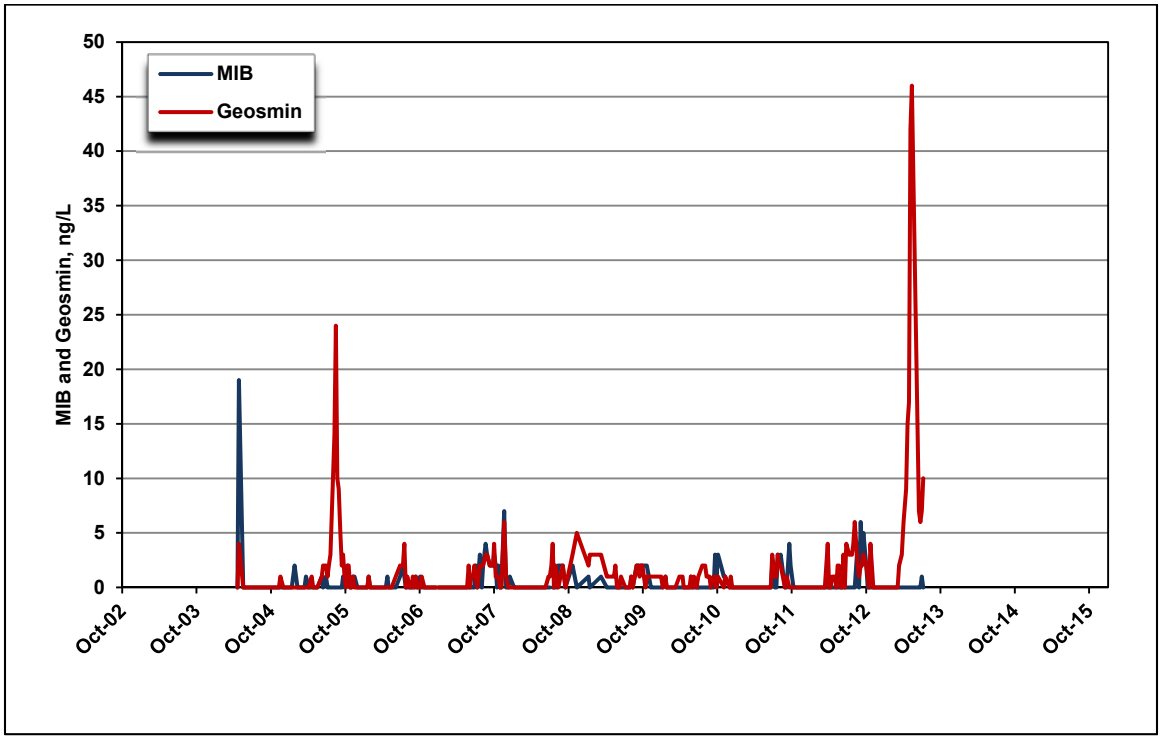


Figure 3. MIB and Geosmin Concentrations in O'Neill Forebay at Gianelli Channel

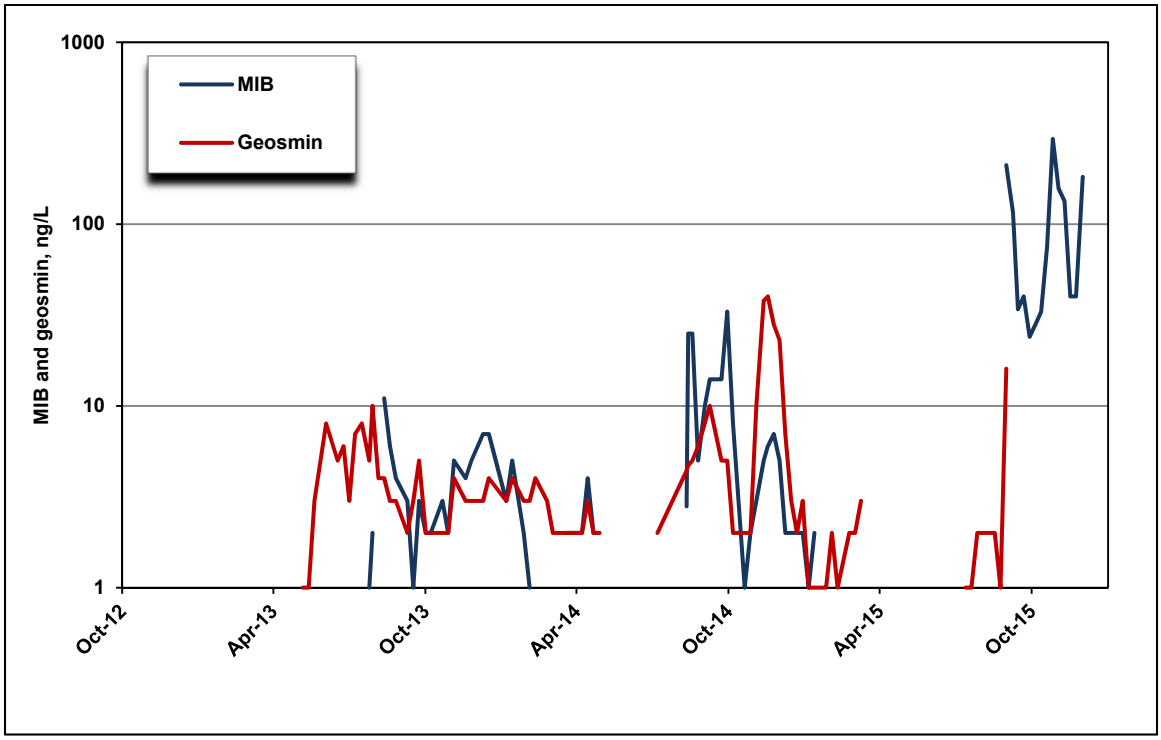


Figure 4. MIB Concentrations at Pacheco Pumping Plant

Santa Clara Valley Water District Data

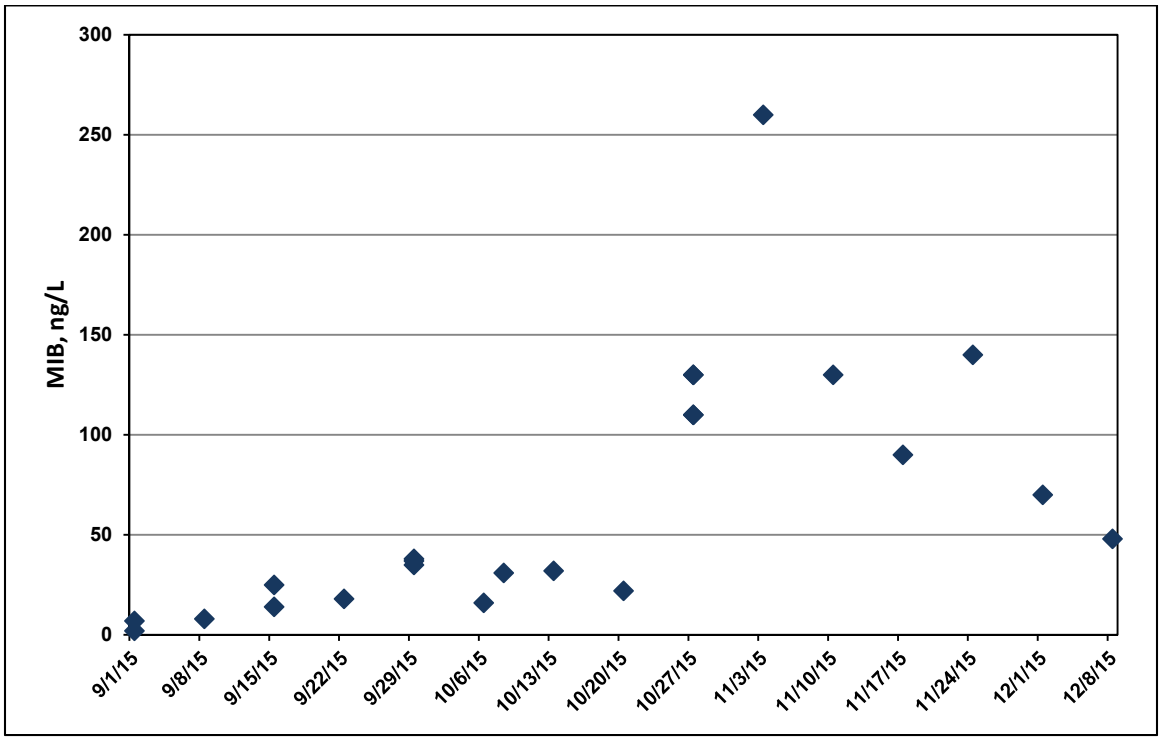


Figure 5. MIB and Geosmin Concentrations at O'Neill Forebay Outlet on the California Aqueduct

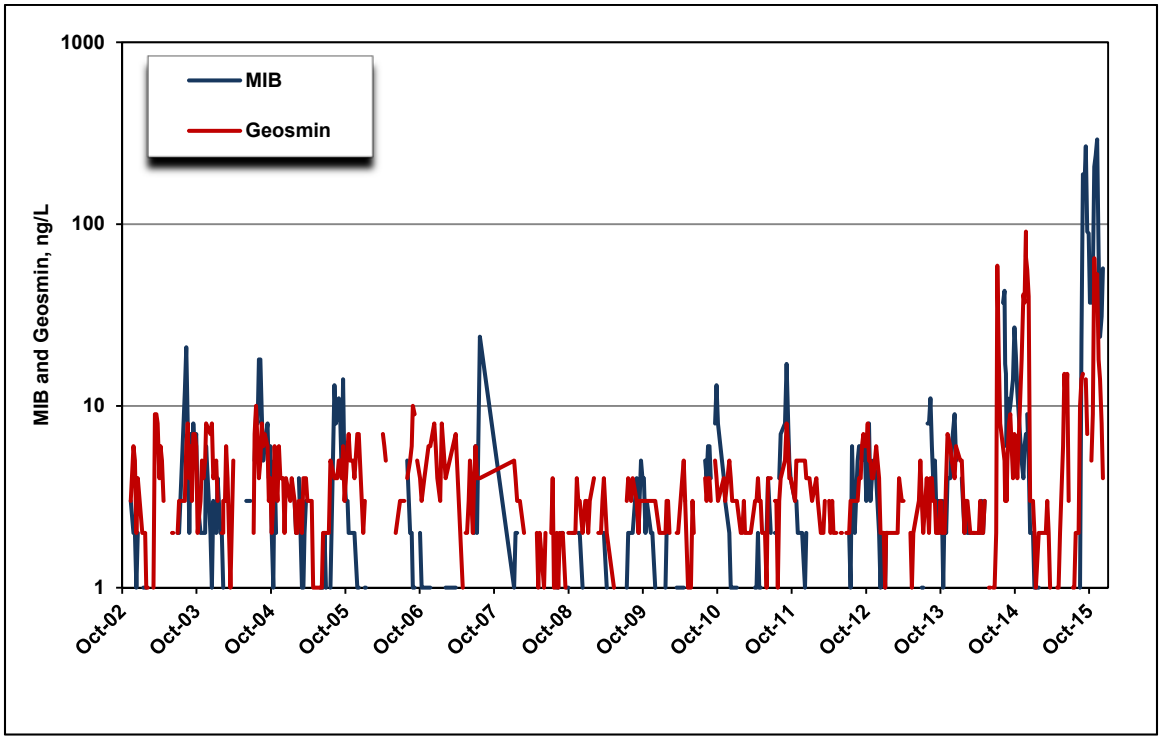


Figure 6. MIB Concentrations in Raw and Treated Water at Central Coast Water Authority's Polonio Pass Water Treatment Plant

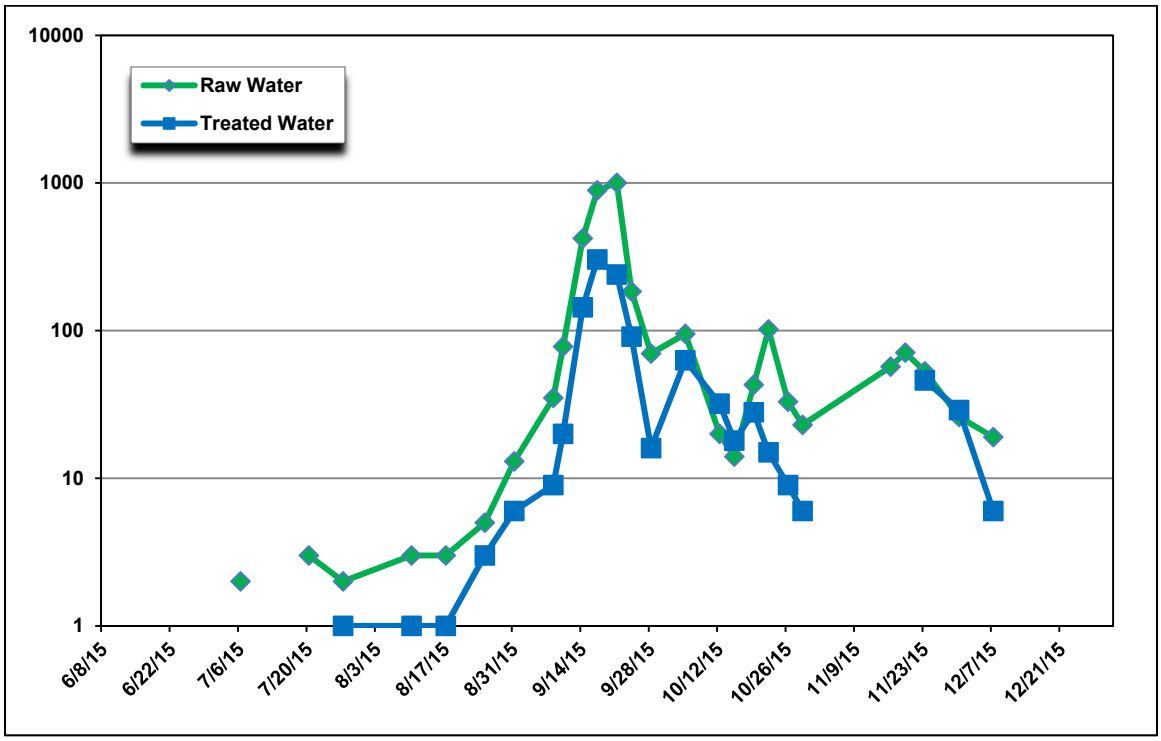


Figure 7. MIB and Geosmin Concentrations at Check 41 on the California Aqueduct

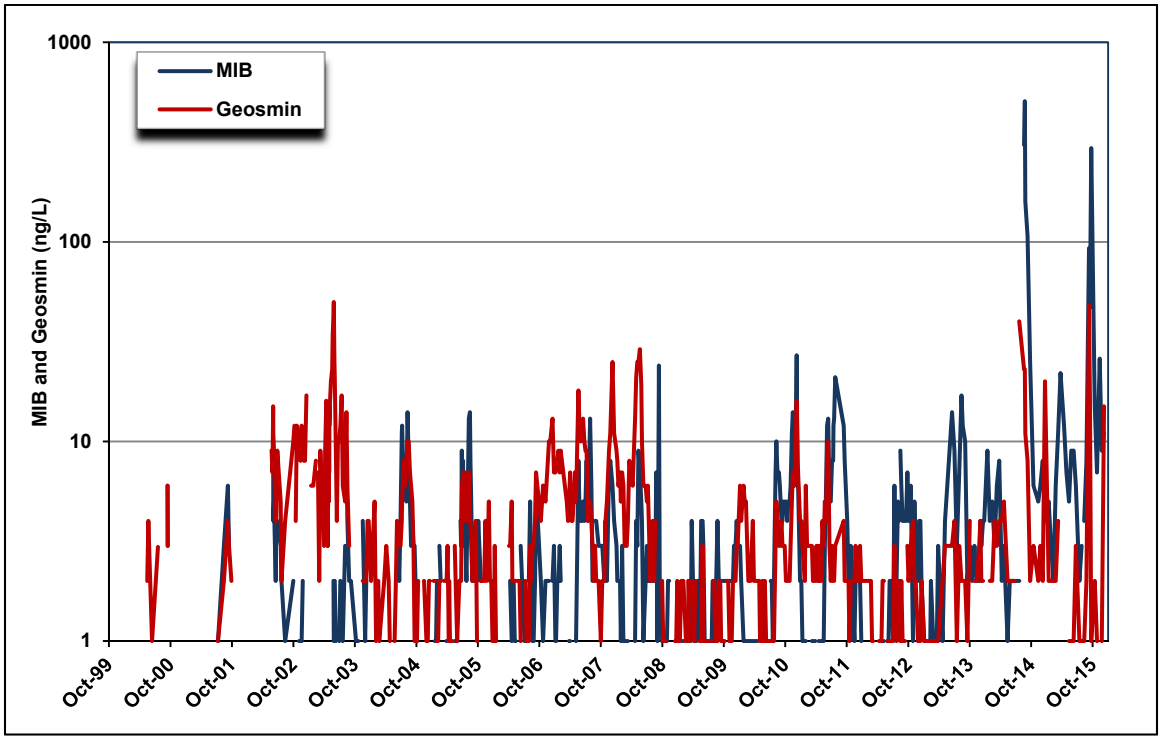


Figure 8. MIB and Geosmin Concentrations at Check 66 on the California Aqueduct

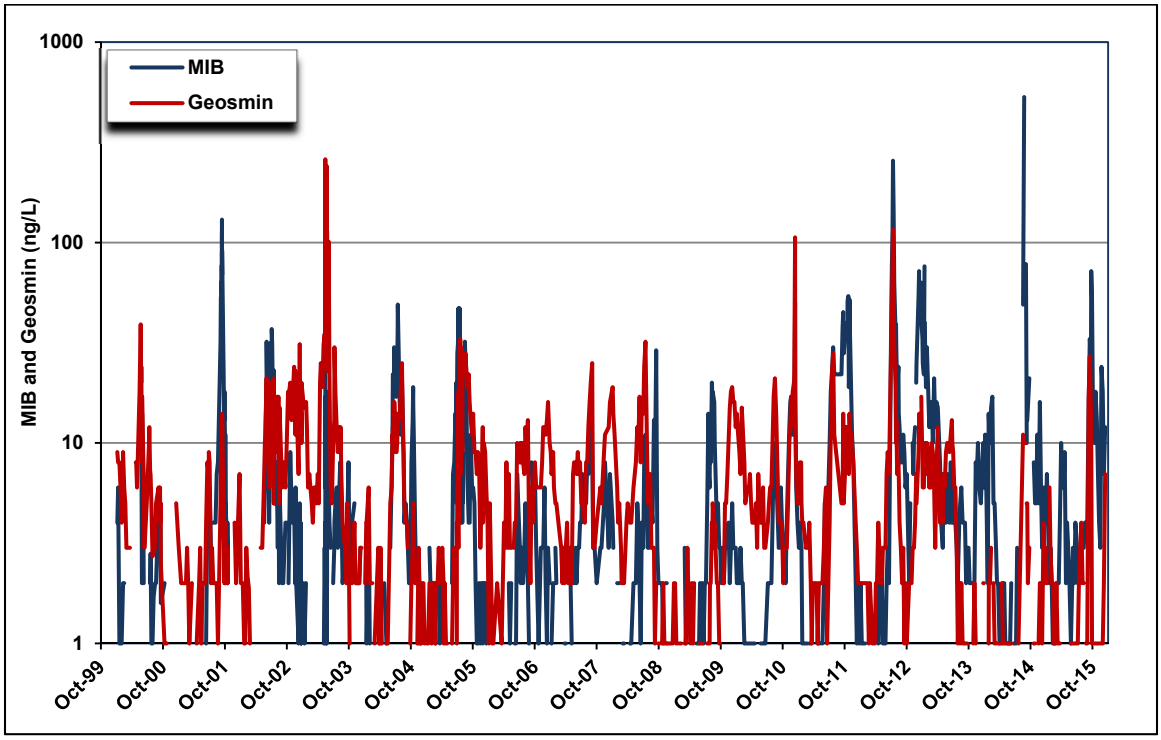


Figure 9. MIB and Geosmin Concentrations in Silverwood Lake at the Outlet Tower

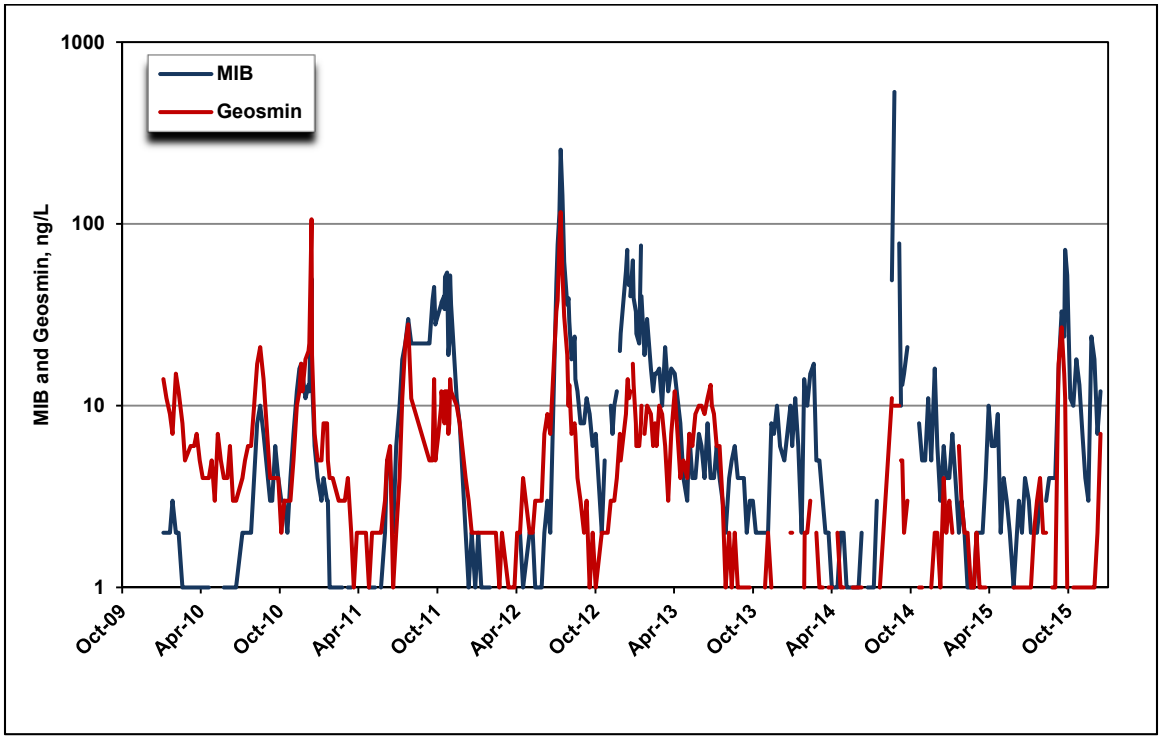


Figure 10. MIB Concentrations in Castaic Lake at the Outlet Tower

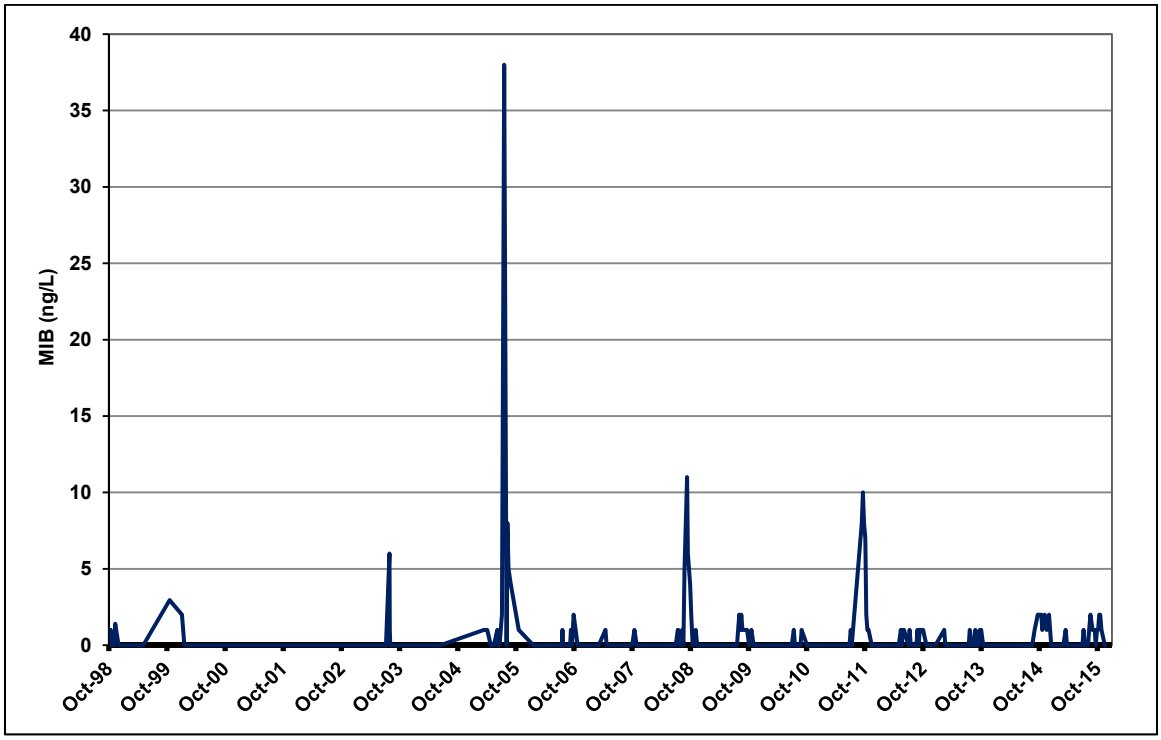


Figure 11. Geosmin Concentrations in Castaic Lake at the Outlet Tower

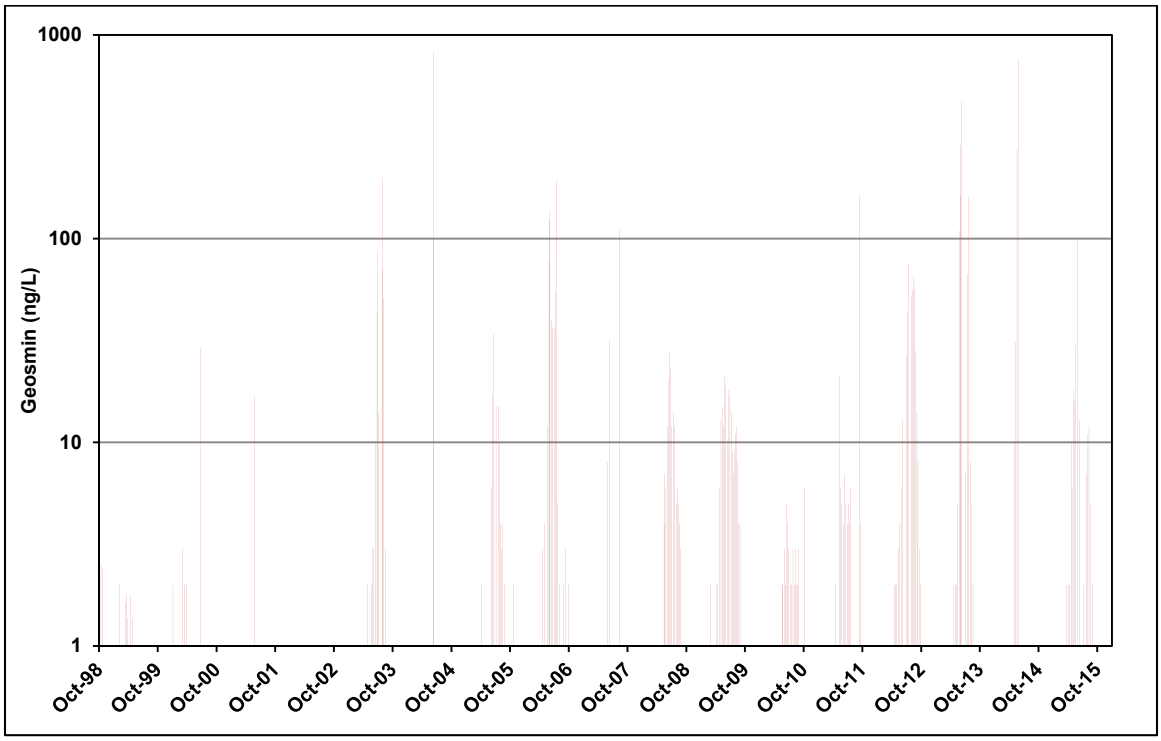


Figure 12. Microcystin Concentrations in San Luis Reservoir at Pacheco Pumping Plant

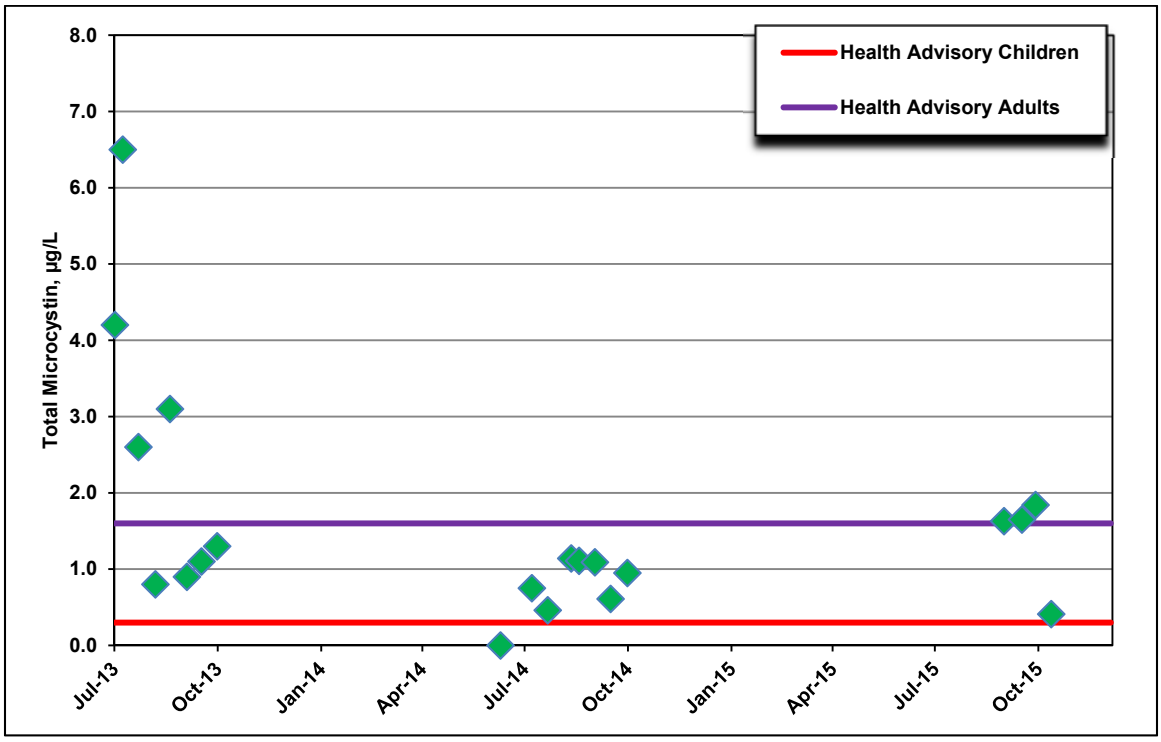


Figure 13. Microcystin Concentrations in San Luis Reservoir at Gianelli Inlet/Outlet Tower

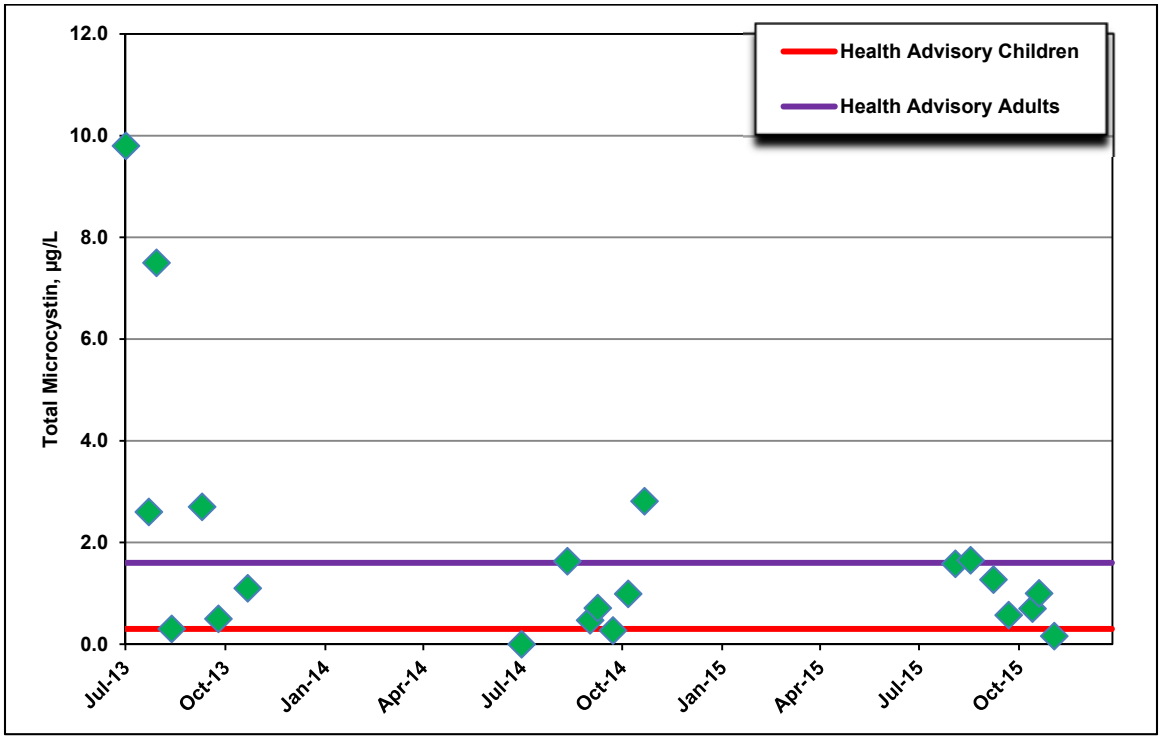


Figure 14. Microcystin Concentrations in San Luis Reservoir at Pacheco Pumping Plant
Santa Clara Valley Water District Data

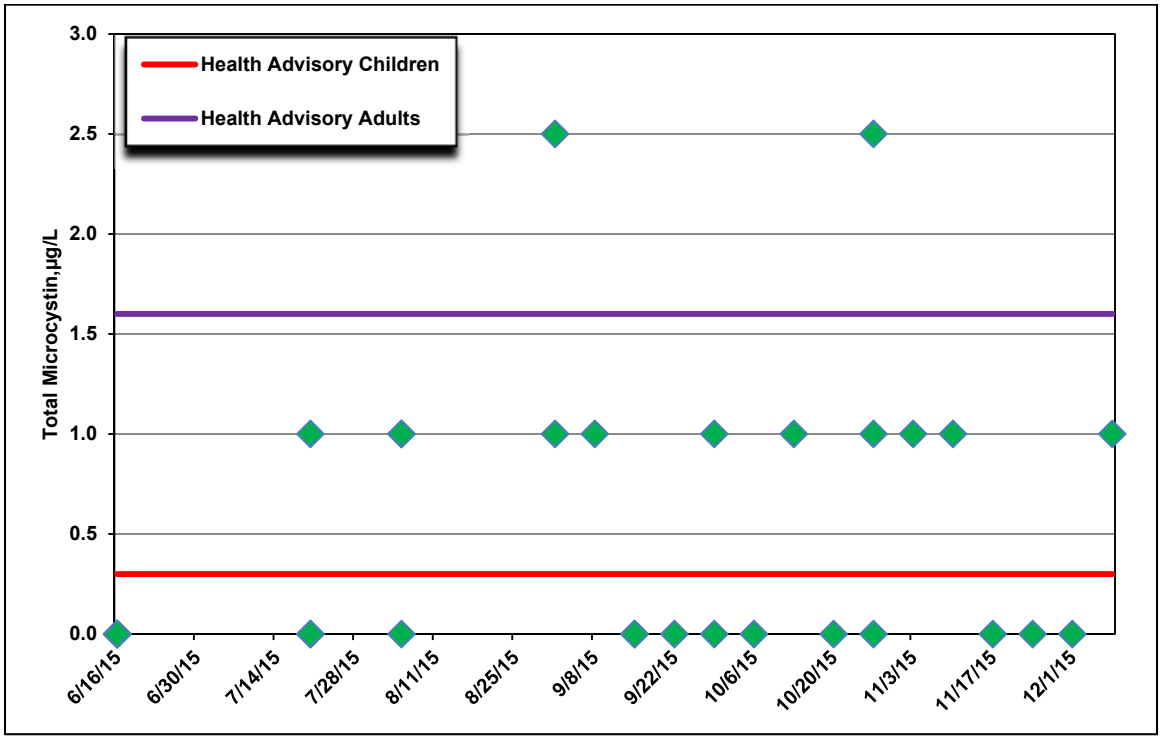


Figure 15. Microcystin Concentrations at O'Neill Forebay Outlet on the California Aqueduct

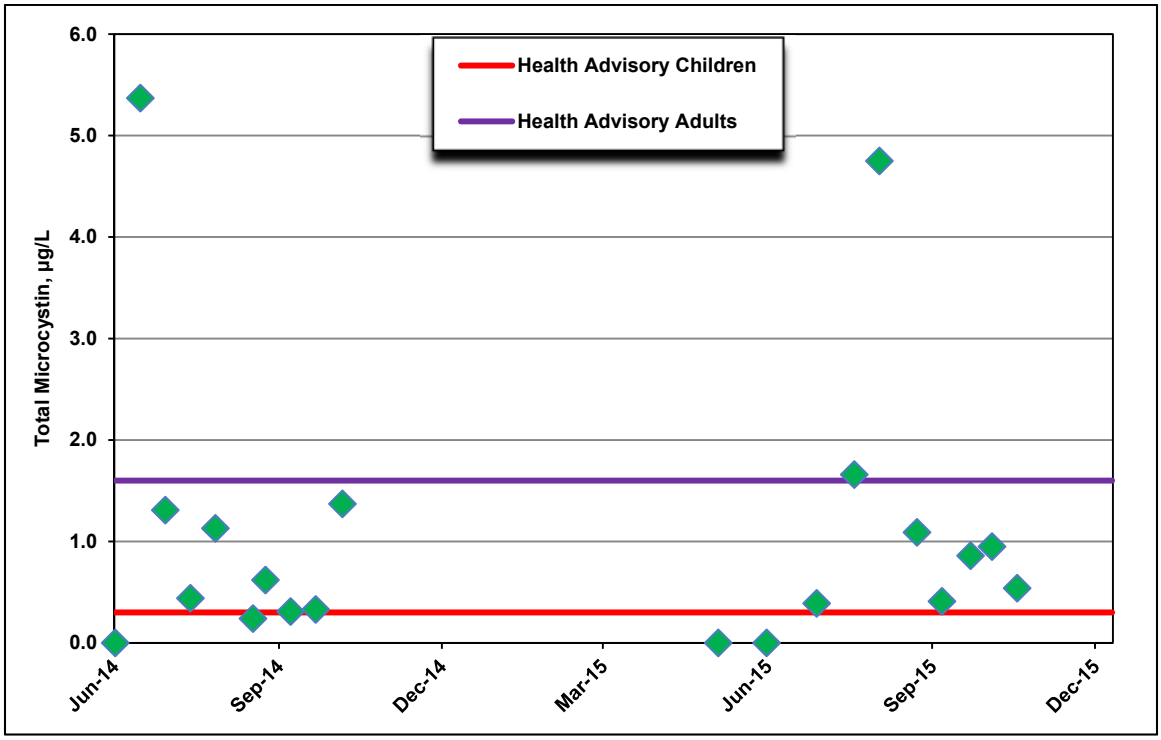


Figure 16. Microcystin Concentrations in Silverwood Lake at the Outlet Tower

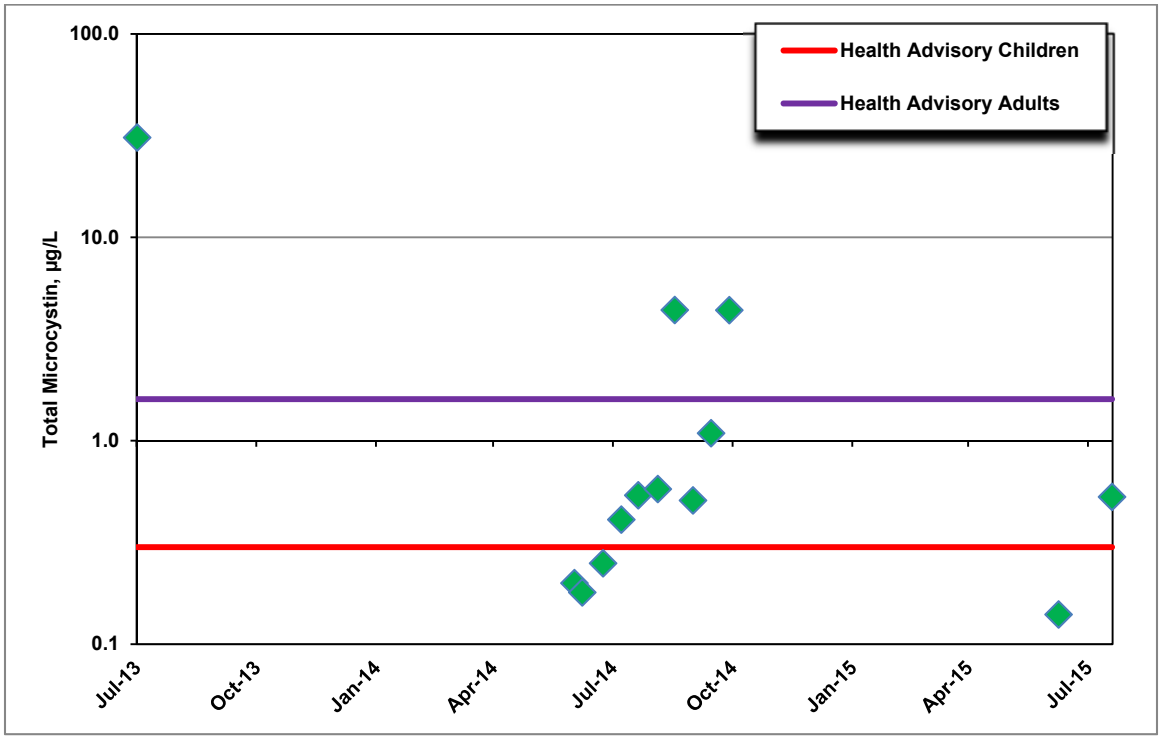
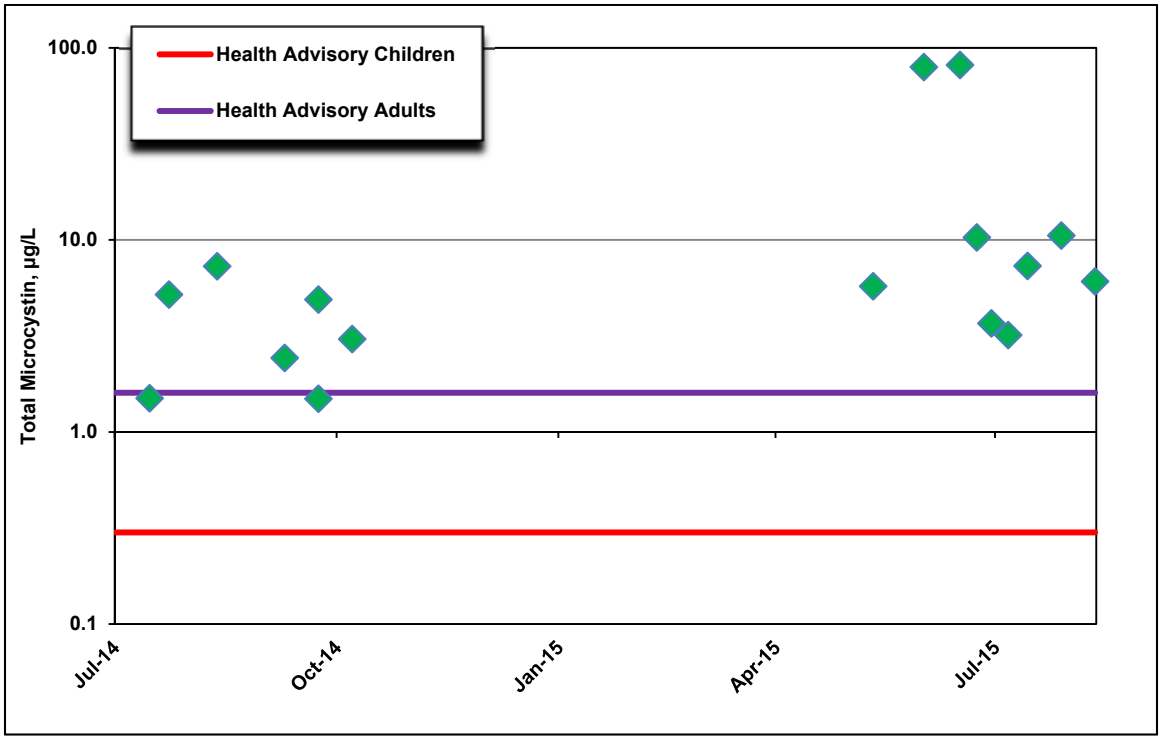


Figure 17. Microcystin Concentrations in Pyramid Lake



References

Archibald Consulting, Palencia Consulting Engineers, Starr Consulting. 2012. California State Water Project Watershed Sanitary Survey, 2011 Update. http://www.water.ca.gov/waterquality/drinkingwater/docs/Printerscopycombin.pdf

Department of Water Resources. 2013. Aquatic Pesticides Application Plan. http://www.water.ca.gov/swp/waterquality/docs/DWR_2013_APAP_Final.pdf

State Water Resources Control Board Resolution No. 68-16

State Water Resources Control Board Order No. WQ 2012-00143

United States Environmental Protection Agency. 2012. Cyanobacteria and Cyanotoxins: Information for Drinking Water Systems. ***http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/upload/cyanobacteria_factsheet.pdf***

United States Environmental Protection Agency. 2015b. 2015 Drinking Water Health Advisories for Two Cyanobacterial Toxins. http://www2.epa.gov/sites/production/files/2015-06/documents/cyanotoxins-fact_sheet-2015.pdf

United States Environmental Protection Agency. 2015a. Drinking Water Health Advisory for the Cyanobacterial Toxin Cylindrospermopsin. http://www2.epa.gov/sites/production/files/2015-06/documents/cylindrospermopsin-report-2015.pdf

United States Environmental Protection Agency. Undated. Contaminant Candidate List and Regulatory Determination. http://www2.epa.gov/ccl/chemical-contaminants-ccl-4