INFORMATION SHEET

ORDER NO. R5-2015-XXXX
TULARE LAKE DRAINAGE DISTRICT
MID EVAPORATION BASIN
KINGS COUNTY

This Information Sheet provides material to supplement, clarify, and elaborate upon the findings and requirements contained in the Waste Discharge Requirements (Order) for Tulare Lake Drainage District's (District or Discharger) proposed Mid Evaporation Basin (Middle Basin). The Order is not a National Pollutant Discharge Elimination System (NPDES) permit, and does not authorize discharges to surface waters that would otherwise require a NPDES permit. This Information Sheet is considered a part of the Order.
This Order requires the Discharger to:

- Monitor wastewater inflow, evaporation basin water, and basin bottom sediment;
- Monitor surface water and groundwater in accordance with a monitoring and reporting program;
- Keep records for the evaporation basins operation and maintenance;
- Submit annual monitoring reports; and
- Improve or replace operational practices that are found not to be protective of water quality.

Proposed Project
The District is proposing to build and operate a new 1,800 acre (±) agricultural drainage evaporation basin that will be constructed on portions of three sections (three square miles) of agricultural land in the south central portion of the Tulare Lake Bed, Kings County (Figure 1). The proposed evaporation basin will allow for an estimated 18,500 acres of agricultural lands within the Tulare Lake Bed to be drained of shallow saline groundwater.

Background
Soils on the west side of the San Joaquin Valley are principally derived from the marine sediments that make up the Coast Ranges and consequently are high in the salts and trace elements that naturally occurred in the marine environment. Irrigation of these soils dissolves these substances and as the water evaporates and is transpired by plants, salts are further accumulated in the shallow agricultural soils. Unless the salts are leached out of the root zone, they continue to amass in the soil and ultimately obstruct plant germination and impede the adsorption of water and nutrients by plants.

In regions with shallow groundwater with limited lateral movement, salts washed downward from agricultural soils accumulate in the groundwater and as the salty groundwater rises towards land surface, plants begin to show signs of salinity damage and die from salty water in the root zone and waterlogging. Without a means for removal and disposal of the shallow saline groundwater, agricultural operations are curtailed or cease completely.

The accumulation of saline groundwater beneath irrigated agriculture is particularly severe in the western portion of the Tulare Lake Basin where a shallow groundwater table coupled with the lack of natural drainage outlets from the basin has created drainage problems beneath a large portion of the former Tulare Lake Bed. In response to this problem, landowners within the historic Tulare Lake Bed authorized the formation of the Tulare Lake Drainage District in 1966 and in 1972 authorized the District to acquire lands to be used as evaporation basins.

In 1973, the District certified a Negative Declaration for construction of the North Evaporation Basin and began its construction in 1974. In 1979, the District prepared an Environmental Impact Report (EIR) for the construction of the South Evaporation Basin and the Hacienda Evaporation Basin. Also in 1979, the Central Valley Water Board adopted Waste Discharge Requirements (WDRs) Order No. 79-252 for the regulation of the North, Hacienda, and South evaporation basins.

In 1983 high rates of water bird mortalities and deformities were discovered at Kesterson Reservoir. These discoveries led the Central Valley Water Board in 1989 to notify the District and other basin operators that new WDRs would be prepared for all evaporation basins within the Tulare Lake Basin, including those that had previously received waivers from the Central Valley Water Board. Also in 1989, the State Department of Fish and Game (DFG) identified a need to analyze the cumulative impacts of all evaporation basin operations within the Tulare Lake Basin on wildlife in order to satisfy the requirements of the California Environmental Quality Act, Public Resources Code section 21000, et seq. (CEQA). A Cumulative Impacts Report for the evaporation basins was developed for the Central Valley Water Board under contract for the State Department of Water Resources (DWR) by private consultants. The Cumulative Impacts Report was completed in November 1992. Among other things, the Cumulative Impacts Report concluded that the basins have significant and cumulative adverse impacts on bird reproduction. The most significant risks posed by the ponds include exposure to high salinity and selenium levels. Evaporation ponds provide significant water bird habitat for the area, and are used particularly by avian species that feed on invertebrates and plants found within the ponds.

The Cumulative Impacts Report additionally concluded that site-specific EIRs were needed to clarify the extent of avian impacts due to individual pond operations. Following completion of the Cumulative Impacts Report, consultants hired by the pond operators began preparation of site-specific EIRs that were termed Site-Specific Biological Impact Analysis or Technical Report (Technical Reports). In 1993, the District submitted a draft biological impact analysis evaluating the potential site-specific risk of adverse impacts to wildlife resulting from exposure to selenium, trace elements, physical hazards, and other aspects of evaporation basin operations. The site-specific

Technical Reports, in general, indicated that pond operations place avian species at risk from four general types of impacts; avian disease, salinity, physical hazards, and selenium.

Following public review of the documents, the Technical Reports, in combination with the cumulative impact report were used by the Central Valley Water Board to prepare tentative WDRs. The Central Valley Water Board circulated the tentative WDRs on 16 July 1993 and the final EIRs on 22 July 1993. On 6 August 1993, the Central Valley Water Board certified the EIRs and adopted a series of Orders including Order 93-136, which regulates the District's North, Hacienda, and South Evaporation Basins.

In August and September of 1993, the WDRs were petitioned to the State Water Board (State Board) by the United States Fish and Wildlife Service (USFWS), Patrick Progans and Lloyd Carter, and the Bay Institute of San Francisco. On 21 March 1996, State Water Board adopted Order No. WQ 96-07, which remanded a portion of the waste discharge requirements and EIRs, including the District's, to the Central Valley Water Board for reconsideration and directed the Central Valley Water Board to "consider any relevant information in its CEQA compliance documents."

On 4 December 1996, the Central Valley Water Board entered into a Memorandum of Understanding (MOU) for the Preparation of Environmental Documents with the Tulare Lake Drainage District for their existing evaporation basins. In response to the MOU, the District contracted with Jones & Stokes Associates, Inc. for the preparation of an EIR for the Tulare Lake Drainage District Evaporation Basins, Waste Discharge Requirements. An Administrative Draft EIR was submitted to the Central Valley Water Board on 19 August 1998. It is uncertain what the final determination was regarding this submittal. No record could be found at the State Clearinghouse, Office of Planning & Research regarding the Draft EIR, Final EIR, or Notice of Determination.

In March 2002, TLDD submitted a Draft CEQA Initial Study and Proposed Mitigated Negative Declaration for compliance with CEQA regarding continued operation of the TLDD evaporation basins. The document provided a review of the regulatory history for the TLDD evaporation ponds and CEQA submittals but it did not discuss the 1996 Draft EIR. Similar to the 1996 Draft EIR, no record could be found at the State Clearinghouse, Office of Planning & Research regarding the Draft EIR, Final EIR, or Notice of Determination.

On 15 August 2006, TLDD submitted a draft Mitigated Negative Declaration (MND), Initial Study, and Environmental Checklist for the proposed construction and operation of the Mid-Evaporation Basin for management and disposal of sub-surface agricultural drain water. The documents also included proposed expansion of the Hacienda Evaporation Basin by the addition of 230 acres of new ponds. Comments on the draft MND were submitted to TLDD by the Central Valley Water Board, DFG, Caltrans, and other agencies. Stating that "It is unlikely that the proposed mitigation measures mitigate potential Project-related impacts to less than significant…" DFG stated that preparation of an EIR for CEQA compliance is warranted. Similarly, Central Valley Water Board staff concluded, "After reviewing your document, staff finds that it does not adequately describe potential water quality issues, and consequently, the proposed mitigation measures may not be sufficient to reduce water quality impacts to less than significant."

The MND was filed with the State Clearinghouse, Office of Planning & Research (SCH Number: 2006081092); however, no record could be found at the State Clearinghouse regarding a Notice of Determination for the project.

In 2012, citing a strong desire by many of its landowners to increase their drained acreage, the District again prepared and submitted a Mitigated Negative Declaration entitled "Construction and Operation of the Mid Evaporation Basin for Management and Disposal of Sub-Surface Agricultural Drainwater". The MND was revised to address comments received and a Notice of Determination and Final Document were filed with the State Clearinghouse (SCH#20121057) and the County of Kings on 22 May 2013. In November 2013, the District submitted a Draft Report of Waste Discharge (RWD) to the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board or Board) for the construction and operation of the proposed Middle Basin. The RWD was revised to address comments and resubmitted on 31 January 2014. The resubmitted RWD specified a need to install additional subsurface drainage systems on several thousand acres within the District and determined that although the District has participated in and supported a number of research projects on alternate means of agricultural drainage water disposal, a viable option to evaporation basins has yet to be discerned. Without a viable option, the RWD concluded that the District's ability to dispose of additional drainage water beyond that received from its current 34,693 drained acres can only be achieved through construction of the MEB.

Review of the District's Yearly Evaporation Basin Water Disposal Reports for 2009 to 2012, documents that approximately 71% of the design capacity (13,415 acre feet for the three existing evaporation basins) was utilized during this four year period of time. However, greater than 90% of the design capacity was utilized for 10 months during the same four year period (varied from 91% to 113% of the total design capacity of the three existing basins). Recent drought years (2013 & 2014) have reduced irrigation of croplands within the District resulting in a corresponding reduction in tile drainage water entering the evaporation basins. The highest usage in 2013 occurred in March and April (86%) and in February and March in 2014 (44% and 46%). The reduction in drainage water is deemed to be temporary. The resumption of a normal irrigation water supply and landowners desiring to drain additional lands will again necessitate the need for greater drainage water evaporation capacity.

REGIONAL AND SITE CONDITIONS

The proposed Middle Basin property is owned by the District (purchased in 2007) and has been continuously farmed or routinely disked to maintain it vegetation-free since it was acquired. The property is underlain by an existing subsurface drainage system (tile drainage system) that was installed by a prior landowner to reclaim the productivity of the lands and to control the level of shallow groundwater beneath the agricultural cropland.

No water supply wells or domestic wells have been identified within three miles of the project site. Annual mean precipitation over the last 56 years is 7.35 inches based on the Corcoran Irrigation District weather station located in the town of Corcoran approximately 15 miles to the northeast of the site. The California Irrigation Management Information System (CIMIS) has developed reference ETo Zone Maps allowing users to view reference evapotranspiration (ETo) based on the long term average monthly ETo for each of 18 zones in California. Kings County is included in Zone 16 and has an average annual ETo of 62.5 inches. The District utilized this average annual ETo value to calculate an approximate annual evaporation rate of 65.6 inches for the proposed Middle Basin. Because ETo includes transpiration by plants as well as evaporation, the calculated approximate annual evaporation rate for the Middle Basin will likely be somewhat different than the District's estimate. An average pan evaporation rate for Kettleman City (approximately eight miles to the northwest) of 99.03 inches is provided by the California Climate Data Archive (CCDA). CCDA recommends adjusting the pan value by multiplying the average by 0.70 or 0.80 to more closely estimate the evaporation from naturally existing surfaces such as a shallow lake, wet soil or other moist natural surfaces. This correction factor results in an evaporation rate of 69.3 to 79.2 inches per year.

Regional Geology

The proposed site is situated in the southwestern portion of the San Joaquin Valley, which is a broad structural trough with the Sierra Nevada Mountains on the east and the Coast Ranges on the west. Rocks of the Sierra Nevada Mountains are composed primarily of consolidated igneous and metamorphic rocks of pre-Tertiary age, which slope south-westward from the foothills and form the basement complex that underlies the valley at depth. The Coast Ranges consist principally of folded and faulted marine and non-marine sedimentary rocks of Jurassic, Cretaceous, and Tertiary age. These deposits slope eastward and overlie the basement complex. Unconsolidated deposits of Late Pliocene to Holocene age, blanket the underlying consolidated rocks in the valley. The Tulare Formation and other continental deposits of Pliocene to Holocene age crop out near Kettleman City and underlie the Tulare Lake Bed at depth. Sediments in the Tulare Formation consist mainly of unconsolidated clays, silts, and sand, which were derived chiefly from the Sierra Nevada on the east and the Coast Ranges on the west and that have been deposited as alluvial-fan, deltaic, flood-plain, lake, and marsh deposits (Croft 1972).

Extending outward from beneath the margins of the Tulare Lake Bed are lacustrine and marsh deposits that form a series of silt and clay-rich zones that interfinger with more permeable beds of the continental deposits. These deposits include a series of clay units that were designated as the A through F clays (youngest to oldest) by Croft (Croft, 1972). These clay zones are low permeability horizons that locally separate the alluvial sequence into several aquifers (Page, 1986). The most prominent of these clays is the E Clay of Pleistocene age that is equivalent to the Corcoran Clay Member of the Tulare Formation. This clay extended almost the entire length of the San Joaquin Valley (Lettis, 1982). Studies have linked the development of the A-D clays to major lacustrine episodes of post Corcoran Clay age induced by outwash from Sierra Nevada glaciation (Atwater, et, al., 1986, Page, 1986).

Within the boundaries of the Tulare Lake Bed, the majority of Croft's A through F clays are indistinguishable from the variety of lacustrine and marsh deposits that extends to about 3,000 feet below the land surface (Croft and Gordon, 1968). These lacustrine and marsh deposits of Pliocene and Pleistocene age are locally interbedded with alluvium (principally fine-grained sands) derived from the Sierra Nevada and Coast Range Provinces (Atwater, et, al., 1986). Atwater interpreted a portion of these sands to represent a rising, marsh-fringed lake across the toe of an alluvial fan, followed by either drainage of the lake or progradation of a delta. Possible replacement of Tulare Lake by a trunk stream is suggested for a portion of buried soils and sands lenses, which were inferred by Atwater to be channel deposits.

Seismicity
The proposed facility's greatest potential for seismic activity is created by the San Andreas Fault, which is located approximately 35 miles southwest of the proposed site. The San Andreas Fault marks the divide between the North American Plate and the Pacific Plate. Potential peak ground acceleration measured as percent gravity (% G) is estimated to be 30-40% G by the State of California, Department of Conservation's Ground Motion Interpolator and by Kings County Earthquake Hazards map[1].

Site Geology
The proposed site is situated in the southern portion of the former Tulare Lake Bed. The ROWD identifies that various studies and geotechnical investigations performed in 1979, 1988, 2006 and 2013 produced soils information from ninety-nine different excavation pits and twenty-four soils borings conducted at locations depicted on the Figure 2. Not all of the test holes or excavations were located within the proposed Middle Basin site; however, they were all done in the general area (within two miles of the proposed site) and they provide supplemental information on the anticipated shallow soils existing below the proposed evaporation basin.

Sediments encountered in the shallow subsurface beneath the proposed Middle Basin consisted primarily of fine-grained silts, clays, and silt-clay mixtures, with varying amounts of sand or silty sands. The subsurface geology varies rapidly in both a lateral and vertical sense in response to changes in the depositional environment. The most

---

[1] Figure 4.6-3, of County of Kings, *2035 General Plan Update, Environmental Impact Report, June 2009*, prepared by Rincon Consultants, Inc.

recent of these changes is recorded in the pattern of deposition of the surface and near surface sedimentary deposits.
Review of available aerial photographs for the proposed facility suggests the past presence of a series of anastomosing or braided sand lenses (currently delineated by vegetation or soil color changes) in Section 36 and the southern half of Section 25 of Township 23 South, Range 21 East, Mt. Diablo Baseline and Meridian (Attachment C). No channels are discernable in Section 24 or the northern half of Section 25; however, past channels are visible in the adjacent Sections 23 and 26 and are presumed to have existed at some depth beneath the entire site (presence is likely masked by more intensive cultivation in the northern half of Section 25 and in Section 24). These geomorphic features generally trend in a northward direction (north, northeast, or northwest). The apparent source of these features was erosion resulting from northward directed flow of the historic Kern River followed by subsequent sediment deposition (either by fluvial [river] or eolian [wind]). Eolian deposition into the former channels is suggested by the generally well-sorted, fine grained nature of the sands encountered during the soils investigation of the site.

Site Groundwater Conditions
Regional groundwater is contained within a series of aquifers separated by low permeability clay deposits. These aquifers are generally separated into a lower confined aquifer, a series of semi-confined aquifers, and an upper unconfined aquifer. The lower confined aquifer is situated beneath the E-Clay or Corcoran Clay of the Tulare Formation at a depth of approximately 1,000 feet below the proposed Middle Basin. Water quality in the deeper confined aquifer is described to be good with total dissolved solids of approximately 500 milligrams per liter (mg/L).

Groundwater quality in the intermediate semiconfined aquifers is unknown for the area beneath the proposed facility. Electrical Conductivity values have, however; been measured in monitoring wells along the southern end of the Hacienda Evaporation Basin (2.5 to 3 miles southeast of the southern end of the proposed Middle Basin). EC values in monitoring well 18-1A (depth of 80-100 feet below site grade) averaged approximately 13,000 micromhos per centimeter (umhos/cm) for the period 1979 to 2014.

Shallow unconfined groundwater varies beneath the site from a depth of 3 to 7.5 feet in 1979 to between 10.5 and 13 feet in 2014. In July 2014, the shallow groundwater quality was investigated in the area of the proposed facility by installing four groundwater monitoring wells along the northern and western sides of the proposed basin into first encountered groundwater (Figure 4). Analytical results from four groundwater monitoring events (September, December 2014 and March, June 2015) are presented in Table 1. The first number listed is the average with the range of the detections shown in the parentheses below. Also listed in Table 1 are the California Department of Public Health’s (CDPH) Maximum Contaminant Levels (MCLs) for Drinking Water, CDPH’s Secondary MCLs, and Cal/EPA's Office of Environmental Health Hazard Assessment, Public Health Goals.

Table 1 - Middle Basin Groundwater Results

Analyte	Well Middle Basin 24-1A	Well Middle Basin 24-1B	Well Middle Basin 25-1A	Well Middle Basin 36-1A	Units[1]	California MCL	California Secondary MCL[2]	PHG[3]
Electrical Conductivity	5075 (4500 - 5600)	5175 (2800 – 7500)	4825 (3800 – 6000)	18950 (8800 – 27000)	umhos/cm		2,200	
Total Dissolved Solids	3675 (3400 – 4100)	2300 (1700 – 3300)	3050 (2500 – 3700)	15600 (6400 – 25000)	mg/L		1,500	
Ammonia as N	0.26 (0.15 - 0.49)	0.28 (0.22 – 0.31)	0.28 (0.22 – 0.32)	0.16 (0.14 – 0.18)	mg/L			
Chloride	670 (560 – 790)	415 (250 – 740)	488 (290 – 720)	2850 (1300 – 4600)	mg/L		600	
Nitrate as N03	16 (1.0 – 26)	nd[4]	18 (1.0 – 67)	nd[4]	mg/L	45		45
Sulfate as S04	1775 (1600 – 2000)	805 (450 – 1500)	1205 (930 – 1600)	7525 (3300 – 11000)	mg/L		600	
Fluoride	1.0 (1.0 – 1.1)	5.0 (1.0 – 9.8)	3.0 (2.7 – 3.4)	1.0 (1.0 – 1.3)	mg/L			
Arsenic	**27** (2.0 – 87)	**184** (20 – 410)	**107** (2.0 – 210)	**40** (2.0 – 100)	ug/L	10		0.004
Alkalinity as CaCO3	313 (300 – 320)	615 (500 – 710)	658 (580 – 720)	505 (340 – 610)	mg/L			
Boron	1.1 (0.1 – 1.6)	3.0 (2.1 – 3.9)	3.6 (3.2 – 3.9)	9.2 (5.0 – 12)	mg/L			
Calcium	468 (410 – 500)	95 (43 – 130)	110 (59 – 160)	530 (490 – 590)	mg/L			
Magnesium	158 (120 – 200)	111 (25 – 200)	116 (34 – 200)	313 (220 – 390)	mg/L			
Molybdenum	63 (10 – 86)	285 (10 – 440)	465 (10 – 820)	1553 (10 – 4000)	ug/L			
Potassium	23 (nd[4] – 54)	48 (4.3 – 90)	53 (2.1 – 110)	40 (11 – 80)	mg/L			
Sodium	663 (580 – 750)	795 (750 – 890)	1078 (880 – 1230)	4000 (2000 – 5400)	mg/L			
Selenium	3.4 (2.7 - 4.1)	5.3 (2.2 – 9.1)	1.1 (0.4 – 2.5)	1.1 (0.4 – 1.6)	ug/L	50		30
Uranium	210 (1.0 – 310)	184 (66 – 270)	345 (70 – 620)	1400 (700 – 2000)	ug/L		0.5	
Uranium, Radiological	143 (1.0 – 210)	122 (44 – 180)	230 (47 – 410)	945 (470 – 1400)	pCi/L[1]	20		0.43

1. Units - umhos/cm = micromhos per centimeter; mg/L = Milligrams per liter; ug/L = micrograms per liter; pCi/L = picocuries per liter.
2. Maximum contaminant level shown is the short term limit.
3. PHG = Primary health goal. Action level only. Not a Maximum contaminant level.
4. nd = not detected.

Shallow groundwater samples were also collected from two existing drainage sumps along the western edge of the site in 2013. These sumps are part of a subsurface drainage system (tile drain) installed by a previous landowner. These sumps are located on the northwest corner of Section 24 and the northwest corner of Section 36 (Figure 1). The sumps were pumped for a period of time to withdraw the existing water in the subsurface drainage pipelines to allow current ambient groundwater to flow into the sumps. Following purging, single water sample was collected from each of the tile drainage sumps and submitted for chemical analysis. The results are presented on Table 2. Additionally, two samples of drainage water flowing in the District's Main Pipeline were also obtained in 2013, one at the Main Pipeline Outlet Structure and the other from the Main Pipeline adjacent to the Tule River to the northeast of the proposed Middle Basin. The Main Pipeline water samples represent the quality of the water flowing from other drained lands in the District and serve to provide an indication of the water that will be discharged into the new Middle Basin.

Table 2
Middle Basin Tile Groundwater and Source Water Chemical Analyses
Sampled May 2013

	Ambient Groundwater		Source Water					
Analyte	**Middle Basin North Sump NW Corner Section 24**	**Middle Basin South Sump NW Corner Section 36**	**Main Pipeline @ Outlet Structure**	**Main Pipeline @ Tule River**	**Units[1]**	**California MCL**	**California Secondary MCL[2]**	**Public Health Goals[3]**
Electrical Conductivity	15,000	9,800	8,900	7,200	umhos/cm		2,200	
Total Dissolved Solids	12,000	6,600	6,400	5,000	mg/L		1,500	
Chloride	2,500	1,500	1,200	690	mg/L		600	
Nitrate	220	120	110	100	mg/L	45		45
Sulfate	5,300	3,000	2,700	2,400	mg/L		600	
Hexavalent Chromium	1.2	0.8	0.8	nd[4]	ug/L	50		0.02
Aluminum	0.98	0.2	0.88	1.9	mg/L	1	0.2	0.6
Arsenic	36	51	110	110	ug/L	10		0.004
Cadmium	2.4	2.6	1.7	ND	ug/L	5		0.04
Calcium	390	290	200	150	mg/L			
Copper	0.27	0.086	nd[4]	nd[4]	mg/L	1.3	1.0	0.3
Hardness CaCO3	2,100	1,500	1,200	920	mg/L			
Lead	10	nd[4]	nd[4]	nd[4]	ug/L	5		0.2
Magnesium	270	180	170	130	mg/L			
Manganese	0.22	0.13	0.22	0.27	mg/L		0.05	
Potassium	24	17	18	12	mg/L			
Selenium	86	56	37	15	ug/L	50		30
Silver	nd[4]	nd[4]	nd[4]	nd[4]	mg/L		0.1	
Sodium	3,200	2,100	2,000	1,600	mg/L			
Uranium	590	570	390	84	ug/L		0.5	
Uranium, Radiological	390	380	260	57	pCi/L	20		0.43
Zinc	0.11	nd[4]	nd[4]	nd[4]	mg/L		5.0	

1. Units - umhos/cm = micromhos per centimeter; mg/L = Milligrams per liter; ug/L = micrograms per liter; pCi/L = picocuries per liter.
2. Maximum contaminant level shown is the short term limit.
3. PHG = Primary health goal. Action level only. Not a Maximum contaminant level.
4. nd = not detected.

The groundwater samples analyzed in 2014 and 2015 demonstrate that conductivity ranging from 2,800 to 27,000 umhos/cm; TDS ranging from 1,700 to 25,000 mg/L; chloride ranged from 250 to 4,600 mg/L; nitrate as Nitrate ranged from non-detect to 67 mg/L; sulfate varied from 450 to 11,000 mg/L, arsenic levels from non-detect to 410 ug/L, selenium from 0.4 to 9.1 ug/L, and uranium from non-detect to 2,000 pCi/L. Water quality in all of the site wells and in the two tile drainage sumps exceeded the Primary MCL values for arsenic and uranium and Secondary MCLs (defined as short term consumer acceptance contaminant levels) for conductivity, TDS, and sulfate. Additionally, both tile drainage sumps contained water that exceeded the Primary MCL value for selenium and the sump at the northwest corner of Section 24 exceeded Primary MCL values for aluminum and lead.

PROPOSED BASIN DESIGN AND CONSTRUCTION

The Discharger has submitted preliminary pond construction details for the proposed Middle Basin in its RWD. The RWD specifies that pond construction will commence with stripping of vegetation and organic topsoil for a distance of five feet beyond the limits of the levee footprint. The levee foundation will then be scarified and the foundation area compacted. Six (6) contiguous ponds or cells will then be constructed to a height of approximately 7 feet utilizing native silt/clay soils excavated from within the ponds interior. Each pond/cell will be approximately 310 acres in size. Interior levee side slopes will be constructed at 3:1 to minimize shallow foraging areas for water birds. All exterior levees would be constructed with a 4:1 side slope. All interior levees will be compacted to 90% of the American Society for Testing and Materials (ASTM) method D 1557 to reduce horizontal permeability. Two regulating structures are proposed between each pond/cell to facilitate the operator’s ability to quickly fill or dewater a given pond/cell and thus minimize the times when pond water depths would be less than two (2) feet in depth.

Basin construction will include installation of a primary booster pump station (Inlet #1) at the Main Pipeline Control Structure at the southerly end of the Main Pipeline for discharge of drainage water to the southeast corner of the Middle Basin. A second pump station (Inlet #2) will be constructed two miles to the north, adjacent to the Main Pipeline for discharge into the Middle Basin. Inlet #2 would provide operational flexibility to allow drainage water to continue to be diverted into the north half of the Middle Basin if for any reason there was a need to dewater the south half of the Middle Basin.

The existing subsurface tile drainage system will be utilized to intercept vertical and horizontal seepage from the basin. This system consists of a series of perforated drainage lines that are set 7 to 9 feet below site grade and spaced on approximately 500 feet centers (Figure 5). There are subsurface lines along the perimeter of the basin. The subsurface tile drainage lines discharge into two pump sumps, one at the northwest corner of Section 24 and the other at the northwest corner of Section 36. Automated pumps will be installed in the drainage sumps with their discharge being directed back into the evaporation basin.

This Order requires the Discharger to submit for Executive Officer approval, the final design, plans, and specifications, and a quality assurance plan for the construction of the proposed basin prior to construction.

Basin Operation
Normally, drainage water will be discharged from the primary booster pump station (Inlet #1) at the Main Pipeline Control Structure into Pond 1 that can be filled up to a height of approximately 5 feet above pond bottom. At this point, drainage water will begin to spill through a regulating structure into Pond 2. To facilitate this flow, Pond 1 will have the highest water elevation with each successive pond having a slightly lower water level elevation at each regulating structure. This system will allow drainage water to flow at a very slow velocity through the various ponds within the basin until reaching the final or crystallization pond. Each regulating structure is also fitted with a control gate that will be used to increase flows between ponds to facilitate the ability to quickly fill or dewater a given pond and thus minimize the times when pond water depths would be less than 2 feet in depth. Except when filling or draining a pond, the evaporation basin water levels will be kept greater than or equal to 2 feet in depth to minimize the opportunity for avian species to wade and forage in the ponds.

Drainage water collected by the subsurface tile drainage system will flow by gravity into drainage sumps. The sumps contain storage space for drain water below the drain inverts. Each sump is to be fitted with a pump and automatic control system designed so that the pumps can be cycled and not require continuous operation. Drainage water removed from the sumps will be discharged back into the ponds.

This Order requires the District to submit for Executive Officer approval, an operation and maintenance plan for the Middle Basin prior to discharge of waste.

Wildlife
The RWD proposes a variety of approaches to be used by the District to discourage and prevent avian species from seeking to nest on the evaporation basin areas. These methods include propane cannons, installation of wind-activated mylar tape set on lines between stakes, ground-disturbing activities by tractors dragging "floats", shotgun cracker-shells fired overhead from ATVs (3-4 seasonal personnel depending on bird activity), and continual disturbance by normal workday vehicle traffic (4 regular full-time employees). Hazing and maintenance activities shall not be conducted within 50 feet of any active nest, with the exception of those activities on top of the levees, which can be conducted within 15 feet of any active nest. During the winter months, monitoring and additional hazing activities together with a response plan are proposed be implemented to address potential salt encrustation issues related to wintering waterfowl.

The Discharger, in conjunction with the DFW and the United States Fish and Wildlife Service, prepared and agreed to protocols for avoidance (hazing) procedures and for assessing mitigation for unavoidable losses to breeding and non-breeding avian species

(Wildlife Protocol) as a result of operations of the District's Middle Basin. The Wildlife Protocols are included as Attachment E in WDRs R5-2015-XXXX.

APPLICABLE REGULATIONS, PLANS, AND POLICIES

Water Quality Control Plans

The Central Valley Water Board has adopted the Water Quality Control Plan for the Tulare Lake Basin (2nd ed.) (Basin Plan). The Basin Plan designates the beneficial uses of groundwater and surface waters of the Tulare Lake Basin Region, specifies water quality objectives to protect those uses, and includes implementation programs for achieving water quality objectives. The Basin Plan also incorporates, by reference, plans and policies of the State Water Board, including State Water Board Resolution 68-16 (*State Anti-Degradation Policy*) and State Water Board Resolution 88-63 (*Sources of Drinking Water Policy*). This Order contains requirements for the discharge of waste from proposed Middle Basin to be in compliance with the Basin Plan, including requirements to meet the water quality objectives and protect beneficial uses specified in the Basin Plan, and other applicable plans and policies.

Beneficial Uses of Surface Water and Groundwater

The State Water Board adopted statewide standard definitions for beneficial uses of surface and ground waters. These standard definitions were used to identify the existing and potential future beneficial uses contained in the Basin Plan. Consideration also was given to the practicability of restoring uses that may have been lost because of water quality impairments.

Surface Waters**:** The Basin Plan contains Table II-1 that lists the surface water bodies within the basin and their beneficial uses. The proposed Middle Basin is situated within the South Valley Floor Hydrologic Unit, in the Lake Sump Hydrologic Area 558.30 as depicted on interagency hydrologic maps prepared by the Department of Water Resources in August 1986. Pursuant to Chapter II of the Basin Plan, the beneficial uses of surface water for the Tulare Sump Hydrologic Area include: agricultural supply; industrial process supply; industrial service supply; water contact recreation; non-contact water recreation; warm freshwater habitat; wildlife habitat; rare, threatened, or endangered species; and groundwater recharge.

Surface waters in the vicinity of the proposed Middle Basin include: the Homeland Canal and the Liberty Farms South Canal. The beneficial uses of these waters are protected by this Order by a prohibition on the direct discharge of waste from the Middle Basin to surface waters and a prohibition on the discharge of waste from Middle Basin to surface waters that causes or contributes to an exceedance of any applicable water quality objective or any applicable state or federal water quality criterion. Indirect discharge from within the Middle Basin to the adjacent West Homeland Canal and/or the Liberty Farms South Canal via lateral seepage will be controlled by the operation of the subsurface tile drain system and compliance with the water quality objectives.

Ground waters: Chapter II of the Tulare Lake Basin Plan designates that the Detailed Analysis Unit (DAU) for the area of the proposed Middle Basin is 241 (Tulare Lake Basin). The identified beneficial uses of groundwater within this DAU are municipal and domestic supply, agricultural supply, and industrial service supply.

These beneficial uses are protected in this Order by requiring the operation of the existing subsurface tile drainage system that will be used to intercept vertical seepage from beneath the basin, coupled with the specification that the discharge of waste at the proposed Middle Basin shall not cause a violation of water quality objectives or cause a condition of pollution or nuisance. Degradation of groundwater is allowed provided it is in accordance with State and Regional Board's plans and policies and this Order.

Water Quality Objectives

Pursuant to Water Code section13263(a), WDRs must implement the Basin Plans, and the Board must consider the beneficial uses of water, the water quality objectives reasonably required to protect those beneficial uses, other waste discharges, and the need to prevent nuisance conditions. Water quality objectives are the limits or levels of water quality constituents or characteristics that are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area. (Wat. Code, section 13050(h)). Water quality objectives apply to all waters within a surface water or groundwater resource, for which beneficial uses have been designated. Water quality objectives are listed separately for surface water and groundwater in Chapter III of the Basin Plan and are either numeric or narrative. The water quality objectives are implemented in WDRs consistent with the Basin Plans' *Policy for Application of Water Quality Objectives*, which specifies that the Central Valley Water Board "will, on a case-by-case basis, adopt numerical limitations in orders that will be used to implement the narrative objectives." To derive numeric limits from narrative water quality objectives, the Board considers relevant numerical criteria and guidelines developed and/or published by other agencies and organizations.

The primary waste constituents of concern (COC's) due to discharges of waste from the Middle Basin with respect to surface waters are: nitrogen, phosphorus, potassium, arsenic, boron, molybdenum, selenium, uranium, total dissolved solids, total suspended solids, and electrical conductivity. In addition, agricultural drainage water may contain a variety of water soluble pesticides.

The COC's due to discharges of waste from the Middle Basin with respect to groundwater are: nitrogen in its various forms (ammonia and un-ionized ammonia, nitrate, nitrite, and total Kjeldahl nitrogen), sulfate, chloride, TDS, E.C., and select minerals (aluminum, arsenic, cadmium, copper, lead, potassium, selenium, and uranium).

The discharge of waste from the Middle Basin must not cause surface water or groundwater to exceed the applicable water quality objectives for those constituents. If compliance cannot be immediately achieved, the Board may set a compliance time schedule for the discharger to achieve compliance with the water quality objectives. Under the Basin Plans, this time schedule must be "as short as practicable."

Water Quality Objectives and Federal Criteria for Surface Water
Water quality objectives that apply to surface water include, but are not limited to, (1) numeric objectives, including the bacteria objective, the chemical constituents objective (includes listed chemicals and state drinking water standards, i.e., maximum contaminant levels (MCLs) promulgated in Cal. Code Regs., title. 22, sections 64431 and 64444 and are applicable through the Basin Plans to waters designated as municipal and domestic supply), dissolved oxygen objectives, pH objectives, and the salinity objectives; and (2) narrative objectives, including the biostimulatory substances objective, the chemical constituents objective, and the toxicity objective. The Basin Plans also contain numeric water quality objectives that apply to specifically identified water bodies, including for example, electrical conductivity objectives for the Kings and Tule Rivers.

Federal water quality criteria that apply to surface water are contained in federal regulations referred to as the California Toxics Rule and the National Toxics Rule. (See 40 C.F.R. sections 131.36 and 131.38.)

Water Quality Objectives for Groundwater
Water quality objectives that apply to groundwater include, but are not limited to, (1) numeric objectives, including the bacteria objective and the chemical constituents objective (includes state MCLs promulgated in Cal. Code Regs., title. 22, sections 64431 and 64444 and are applicable through the Basin Plan to municipal and domestic supply), and (2) narrative objectives including the chemical constituents, taste and odor, and toxicity objectives. The Tulare Lake Basin Plan also includes numeric salinity limits for groundwater.

State Water Board Resolution 88-63 (The Sources of Drinking Water Policy)
The *Sources of Drinking Water Policy* states that all surface waters and groundwaters of the state are considered to be suitable, or potentially suitable, for municipal or domestic water supply, except where the groundwater meets one or more of the criteria specified in the Basin Plan, including:

a. The TDS exceeds 3,000 milligrams per liter (mg/L) (5,000 micromhos per centimeter (umhos/cm) electrical conductivity) and the aquifer cannot reasonably be expected by the Regional Board to supply a public water system;

b. There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable treatment practices; or

c. The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day.

d. The aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 CFR, section 146.4. for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR, section 261.3.

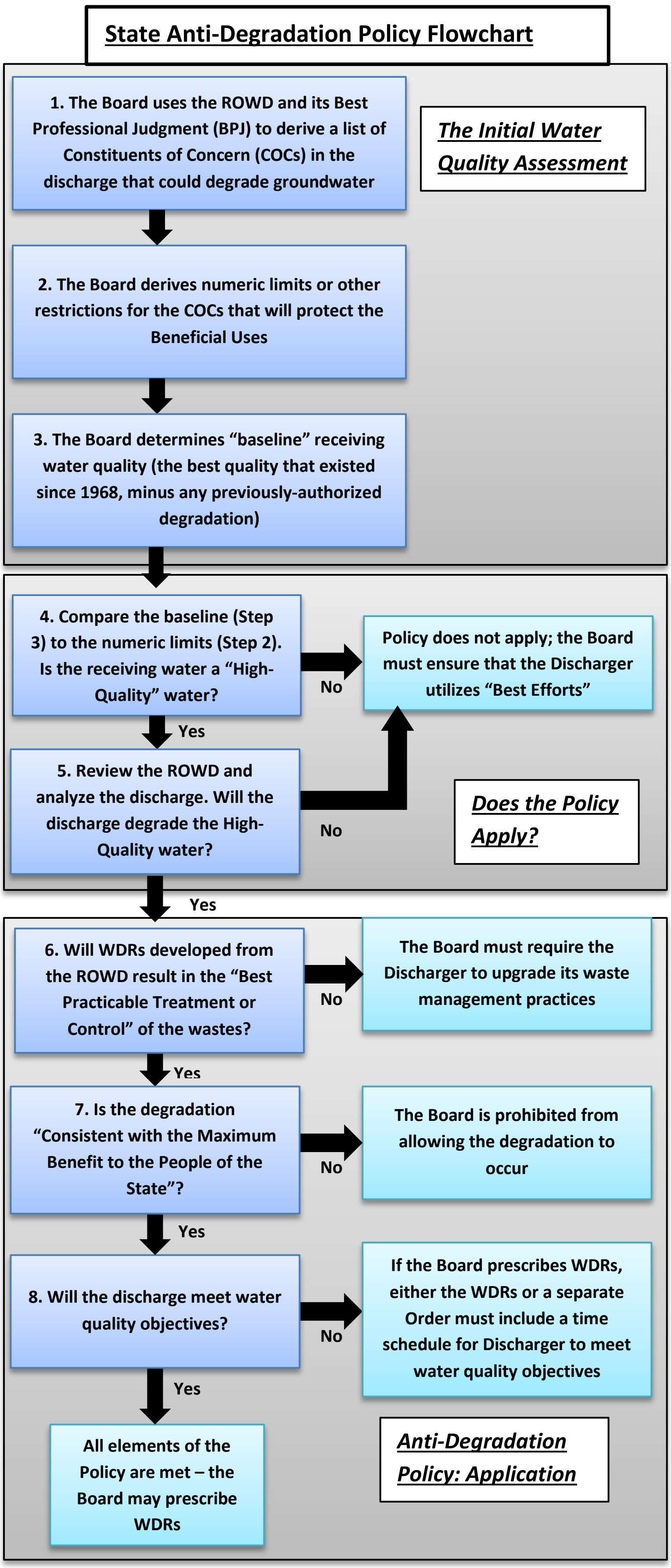
The Basin Plan includes criteria for granting exceptions to municipal and domestic supply designations based on the *Sources of Drinking Water Policy*. The Basin Plan also includes criteria for granting exceptions to the designation of beneficial uses for agricultural supply and industrial supply. Exceptions to the *Sources of Drinking Water Policy* are not self-implementing, but must be established in an amendment to the Basin Plan.

Title 27 of the California Code of Regulations
California Code of Regulations, title 27 contains regulatory requirements for the treatment, storage, processing, and disposal of solid waste, which includes designated waste, as defined by Water Code section 13173. However, title.27 exempts certain activities from its provisions. Discharges regulated by this Order are exempt from title.27 pursuant to a provision that exempts wastewater under specific conditions. This exemption, found at title. 27, section 20090, is described below:

(b) Wastewater – Discharges of wastewater to land, including but not limited to evaporation ponds, percolation ponds, or subsurface leachfields if the following conditions are met:

(1) The applicable regional water quality control board has issued WDRs, reclamation requirements, or waived such issuance;
(2) The discharge is in compliance with the applicable water quality control plan; and
(3) The wastewater does not need to be managed according to Chapter 11, Division 4.5, title. 22 of this code as a hazardous waste.

In general, the Waste Discharge Requirements (WDRs) Program (sometimes also referred to as the "Non Chapter 15 (Non 15) Program") regulates point discharges that are exempt from title. 27 and not subject to the Federal Water Pollution Control Act.



Resolution 68-16 (State Anti-Degradation Policy) The *State Anti-Degradation Policy*, adopted by the State Water Board in October 1968, limits the Central Valley Water Board's discretion to authorize the degradation of high-quality waters. This policy has been incorporated into the Central Valley Water Board's Basin Plans. High-quality waters are those waters where water quality is more than sufficient to support beneficial uses designated in the Central Valley Water Board's Basin Plan. Whether or not a water is a high-quality water is established on a constituent-by-constituent basis, which means that an aquifer can be considered a high-quality water with respect to one constituent, but not for others. (State Water Board Order WQ 91-10).

The following provisions of the *State Anti-Degradation Policy* are directly applicable to the discharges regulated by this Order:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water,

and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce 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 of the discharge necessary to assure that (a) a pollution or nuisance will not occur and

(b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

Generally speaking, these provisions require that the Central Valley Water Board adopt standards and requirements to ensure the discharger controls the discharge by employing "best practicable treatment or control" methodologies to limit the extent of the degradation, and that the Central Valley Water Board carefully consider whether the permitted degradation inheres to the maximum benefit to the people of the State when the Central Valley Water Board prescribes waste discharge requirements that will result in the degradation of high-quality waters. The *State Anti-Degradation Policy* also requires that the Central Valley Water Board prohibit waste discharges from resulting in water pollution or nuisance, though this is a requirement that also exists outside the context of the *State Anti-Degradation Policy*. (*see* Wat. Code, section 13263.)

The State Water Board has provided only limited guidance regarding the *State Anti-Degradation Policy*. The State Water Board's Administrative Procedures Update (APU) 90-004 provides guidance for implementing *State Anti-Degradation Policy* and the Clean Water Act's anti-degradation provisions (40 C.F.R. section 131.12.) in the context of NPDES permitting. Although APU 90-004 is not directly applicable to the Order because nonpoint discharges from agriculture are exempt from NPDES permitting requirements, the document is informative for interpreting the *State Anti-Degradation Policy*.

The flow chart on the previous page describes the process that the Central Valley Water Board generally uses to apply the *State Anti-Degradation Policy*, and the following discussion elaborates on how these requirements are applied in the context of the Order.

The following sections describe the step-by-step approach for applying the Anti-Degradation Policy, followed by the direct application of this policy to the Middle Basin Order.

The Initial Water Quality Assessment

Step 1: Due to the constituent-by-constituent nature of an anti-degradation analysis, the Central Valley Water Board must first compile a list of the waste constituents present in the discharge that could degrade groundwater. These constituents are referred to as "constituents of concern," or COCs. The Central Valley Water Board uses its best professional judgment to determine this suite of COCs, which is usually extrapolated from the Report of Waste Discharge (ROWD) or Notice of Intent (NOI) that was submitted by the discharger.

Step 2: Once the Central Valley Water Board has compiled the list of COCs, it then references numeric limits or other restrictions that would protect the beneficial uses associated with the receiving water. Some constituents, such as those constituents that have Maximum Contaminant Levels established in title. 22 of the California Code of Regulations, have numeric water quality objectives associated with them, while others have only narrative water quality objectives associated with them. For constituents that have only narrative water quality objectives associated with them, the Central Valley Water Board derives numeric limits by considering relevant numerical criteria and guidelines developed and/or published by other agencies and organizations. (e.g., State Water Board, California Department of Health Services, California Office of Environmental Health Hazard Assessment, California Department of Toxic Substances Control, University of California Cooperative Extension, California Department of Fish and Wildlife, U. S. EPA, U. S. Food and Drug Administration, National Academy of Sciences, U. S. Fish and Wildlife Service, Food and Agricultural Organization of the United Nations).

Step 3: The Central Valley Water Board then makes a good-faith effort to determine best water quality that has existed since 1968, the year in which the anti-degradation policy was promulgated (often data from 1968 or earlier are unavailable). The Central Valley Water Board then determines whether any subsequent lowering of water quality was due to a regulatory action taken by the Central Valley Water Board. The best quality that has existed since 1968, minus any authorized degradation, becomes the “baseline” water quality[2].

Determining Whether the Anti-Degradation Policy is Triggered

Step 4: The Central Valley Water Board compares the numeric limits derived in Step 2 with the baseline water quality derived in Step 3. For each constituent, if the baseline water quality is better than the derived limits (i.e., the quality needed to support all of the beneficial uses), then the water is considered a “high-quality water.” If the receiving water is not a high-quality water for all of the COCs, then the *State Anti-Degradation Policy* does not apply.

Step 5: The Central Valley Water Board determines whether the discharge will degrade the receiving water. The Central Valley Water Board makes this determination by comparing the information contained in the Discharger’s RWD or other applicable information with the baseline water quality. If the discharge will not degrade the receiving water, then the *State Anti-Degradation Policy* does not apply.

Application of the State Anti-Degradation Policy’s Requirements

[2] Water quality control policies adopted subsequent to 1968 may alter the calculation of this baseline.

Step 6: If the discharge will degrade a high-quality water, then the *State Anti-Degradation Policy* requires the Central Valley Water Board to prescribe requirements that will result in the best practicable treatment or control (BPTC) of the wastes in the discharge. BPTC is an evolving concept that takes into account changes in the technological feasibility of deploying new or improved treatment or control methodologies, new scientific insights regarding the effect of pollutants, and the economic realities that regulated industries face. Because this concept evolves over time, standard industry practices that are considered BPTC today may not be considered BPTC in the future. And though "practicality" limits the extent to which a discharger must implement expensive treatment or control measures, the Central Valley Water Board must ultimately ensure that discharges do not cause pollution or nuisance, thereby protecting those who rely on the quality of groundwater and surface waters. Neither the Water Code nor the *State Anti-Degradation Policy* defines the term "best practicable treatment or control." However, the State Water Board has stated that "one factor to be considered in determining BPTC would be the water quality achieved by other similarly situated dischargers, and the methods used to achieve that water quality" (See State Water Board Order WQ 2000-07, at pp. 10-11). Furthermore, in a "Questions and Answers" document for Resolution 68-16 (the Questions and Answers Document), BPTC is interpreted to include:

> "[A] comparison of the proposed method to existing proven technology; evaluation of performance data (through treatability studies); comparison of alternative methods of treatment or control, and consideration of methods currently used by the discharger or similarly situated dischargers."

Though the Central Valley Water Board is prohibited from specifying the design, location, type of construction, or particular manner in which a discharger may comply with a requirement, order, or decree (Wat. Code section 13360.), the Central Valley Water Board can still compare the treatment or control practices that a discharger has described in its ROWD to the treatment or control practices employed by similarly-situated dischargers in order to make a BPTC determination (State Water Board Order WQ 2000-7). Furthermore, "practicability" dictates that the Central Valley Water Board considers the costs associated with the treatment or control measures that are proposed in the ROWD.

Step 7: The *State Anti-Degradation Policy* also requires that the Central Valley Water Board consider whether the degradation authorized in a permit is "consistent with the maximum benefit to people of the state." For discharges subject to the federal Clean Water Act, it is only after "intergovernmental coordination and public participation" and a determination that "allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located" that the Central Valley Water Board can allow for degradation. (40 C.F.R. section 131.12.)

As described in the Question and Answers Document mentioned above, some of the factors that the Central Valley Water Board considers in determining whether degradation is consistent with the maximum benefit to people of the State include: economic and social costs, tangible and intangible, of the proposed discharge, as well as the environmental aspects of the proposed discharge, including benefits to be achieved by enhanced pollution controls. USEPA guidance clarifies that the federal anti-degradation provision,

> "… is not a 'no growth' rule and was never designed or intended to be such. It is a policy that allows public decisions to be made on important environmental actions. Where the state intends to provide for development, it may decide under this section, after satisfying the requirements for intergovernmental coordination and public participation, that some lowering of water quality in "high quality waters" is necessary to accommodate important economic or social development" (EPA Handbook for Developing Watershed Plans to Restore and Protect Our Waters, Chapter 4).

APU 90-004 requires the Central Valley Water Board to consider both the costs to the discharger and the costs imposed upon the affected public in the NPDES context, and states that "cost savings to the discharger, standing alone, absent a demonstration of how these savings are necessary to accommodate 'important social and economic development' are not adequate justification for allowing degradation."

It is, however, important to keep the "maximum benefit to people of the state" requirement in context. Neither the *State Anti-Degradation Policy* nor the Water Code allows unreasonable affects to beneficial uses. Therefore, such unreasonable effects (such as the unmitigated pollution of a drinking water source) are not the focus of the Central Valley Water Board's inquiry, because they are legally prohibited. Instead, the *State Anti-Degradation Policy* requires the Central Valley Water Board to consider the costs that may be imposed on other dischargers as a result of the degradation that the Central Valley Water Board is allowing to occur. For example, if the Central Valley Water Board allows a discharger to operate a sub-standard facility that degrades a high-quality groundwater, dischargers situated downstream (for surface waters) or downgradient (for groundwater's) from that discharge would be discharging to a receiving water that lacks any capacity to assimilate additional waste loads. This may impose higher treatment costs on the downstream/downgradient discharger.

Ultimately, the Central Valley Water Board may allow degradation to occur following a demonstration that the degradation is consistent with the maximum benefit to the people of the state; the *State Anti-Degradation Policy* is not a no-growth or no-degradation policy. However, the Central Valley Water Board must justify why this degradation is beneficial not only to the discharger, but to others reliant on the water quality of the receiving water body.

<u>Step 8:</u> the Central Valley Water Board must ensure that discharges will not unreasonably affect present and anticipated beneficial use of such water, will not result in water quality less than that prescribed in relevant policies, and will not cause pollution or nuisance. The Water Code defines "pollution" to mean an alteration of the quality of the waters of the state by waste to a degree that unreasonably affects either the waters

for beneficial uses or the facilities that serve these beneficial uses, i.e., violation of water quality objectives. (Wat. Code, section 13050(1)). The term nuisance is defined as anything that is, (1) injurious to health, indecent or offensive to the senses, or an obstruction to the free use of property so as to interfere with the comfortable enjoyment of life or property; (2) affects an entire community or considerable number of persons; and (3) occurs during, or as a result of, the treatment or disposal of wastes. (Wat. Code, section 13050(m).). To constitute a nuisance, all three factors must be met.

The Central Valley Water Board ensures that this component of the *State Anti-Degradation Policy* is met by requiring a discharger to comply with water quality objectives designed to protect all designated beneficial uses, thereby protecting those who rely on the quality of groundwater and surface waters.

The State Anti-Degradation Policy as Applied to the Middle Basin Order
Steps 1-5 (Applied): There are no known historic shallow groundwater quality data available for the area of the proposed Mid Evaporation Basin (MEB) for 1968 or earlier. However, shallow groundwater quality was measured by the United States Geological Survey from wells situated approximately three miles to the north of the site in 1989, and electrical conductivity values are available from 1979 for shallow monitoring wells located approximately three miles south of the site (Table 3).

Historical shallow groundwater quality for the vicinity of the purposed facility (Table 3) has exceeded the primary MCL value for arsenic and secondary MCL values for conductivity (short term), TDS (short term), sulfate (short term), chloride (short term), aluminum, and manganese. While it is possible that shallow groundwater quality may have been somewhat better in 1968, it is improbable that it could have been usable as a source for drinking water during this period of time.

Table 3 - Historical Groundwater Quality

Analyte	Well at 23S/21E-8R sampled 28 June 1989	Well at 23S/22E-6R sampled 19 June 1989	Pre-Hacienda Basin Monitoring well 13-1A sampled 1979	Pre-Hacienda Basin Monitoring well 18-1A sampled 1979	Units[1]	California MCL	California Secondary MCL[2]	PHG[3]
Electrical Conductivity	11,400	10,500	14,500	14,600	umhos/cm		2,200	
Total Dissolved Solids	8,890	8,530			mg/L		1,500	
Chloride	1,400	3,100			mg/L		600	

Analyte	Well at 23S/21E-8R sampled 28 June 1989	Well at 23S/22E-6R sampled 19 June 1989	Pre-Hacienda Basin Monitoring well 13-1A sampled 1979	Pre-Hacienda Basin Monitoring well 18-1A sampled 1979	Units[1]	California MCL	California Secondary MCL[2]	PHG[3]
Nitrate + Nitrite as Nitrogen	<0.01[4]	0.58			mg/L	10		10
Sulfate	3,900	6,100			mg/L		600	
Bicarbonate	830	998			mg/L			
Aluminum	0.30	0.20			mg/L	1	0.2	0.6
Arsenic	0.014	0.024			mg/L	0.010		0.004
Barium	<0.1[4]	<0.1[4]			mg/L	1	2	2
Boron	6	2.5			mg/L			
Calcium	490	770			mg/L			
Chromium	<0.002[4]	<0.002[4]			mg/L	0.05		
Iron	3.8	3.4			mg/L			
Lead	NA[5]	NA[5]			mg/L	0.015[6]		0.0002
Magnesium	230	290			mg/L			
Manganese	7.2	9.6			mg/L			
Mercury (inorganic)	<0.001[4]	<0.001[4]			mg/L	0.002		1.2
Nickel	0.005	0.007			mg/L	0.1		0.012
Potassium	9.0	9.7			mg/L			
Selenium	<0.001[4]	<0.001[4]			mg/L	0.05		0.03
Silver	NA	NA			mg/L		0.1	
Sodium	2,200	1,600			mg/L			
Uranium (dissolved)	0.350	0.0074			ug/L[7]	20 pCi/L [c]	0.5	

1. Units - umhos/cm = micromhos per centimeter; mg/L = Milligrams per liter; ug/L = micrograms per liter; pCi/L = picocuries per liter.
2. The maximum contaminant level shown for EC, TDS, chloride, and sulfate are short term limits
3. PHG = Primary health goal. Action level only. Not a Maximum contaminant level.
4. < 0 01 = The less than symbol indicates the analyte was not detected above the laboratory reporting limit, which is the number shown to the right for the specific analyte.

5. NA = not analyzed.
6. Lead value is an action level, not a MCL
7. Federal MCL value for uranium is 30 ug/L; California MCL is 20 Picocuries per liter (pCi/L).

Current groundwater data (Tables 1 and 2) show that the water quality in all of the site wells and in the two tile drainage sumps exceeds the Primary MCL values for arsenic and uranium and Secondary MCLs for conductivity, TDS, and sulfate (the sole exception is for sulfate below the secondary MCL value in well 24-1B). Additionally, both tile drainage sumps contained water that exceeded the Primary MCL value for selenium and the sump at the northwest corner of Section 24 exceeded Primary MCL values for aluminum and lead. Based upon current and historic groundwater data, the quality of the shallow groundwater beneath the proposed facility is insufficient to support the Tulare Lake Basin Plan, Municipal and Domestic Supply (MUN) beneficial use. Therefore, this groundwater is not a high-quality water subject to the Anti-degradation Policy with respect to the MUN beneficial use.

Agricultural Supply (AGR) Beneficial Use
The Tulare Lake Basin Plan narrative description for the AGR beneficial use states, “uses of water for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.” Constituents of concern (COC’s) with respect to the agricultural beneficial use include: 1) Stock watering - TDS, EC, sulfate, nitrate, aluminum, arsenic, boron, sodium, calcium, chloride, cadmium, selenium, uranium and zinc; 2) Irrigation Water - TDS, EC, sulfate, boron, chloride, sodium, calcium, and magnesium.

In an effort to evaluate numeric limits for AGR, Kennedy/Jenks Consultants, for the CV-SALTS program, reviewed a variety of published guidelines that have been developed for livestock drinking water requirements, primarily by universities or industry groups. An assortment of these studies was utilized by Kennedy/Jenks Consultants to prepare guidelines that identify upper and lower ranges of tolerable limits for sensitive livestock (Table 4 below).

Table 4 – Kennedy/Jenks Consultants Proposed Livestock Drinking Water Limits

Constituent[1]	Lower Value[2]	Upper Value	Sensitive Stock
TDS	<2,000 mg/L	5,000 mg/L	Poultry, especially turkeys
EC	<3,000 umhos/cm	<7,500 umhos/cm	Poultry, especially turkeys
Sodium	1,000 mg/L	2,000 mg/L	Poultry
Chloride	1,500 mg/L	3,000 mg/L	Poultry, Horses
Sulfate	1,000 mg/L	2,000 mg/L	Cattle
Boron	5.0 mg/L	7.0 mg/L	All
Nitrate + nitrite as N	100 mg/L	300 mg/L	Ruminants and Horses
Nitrate as N	10 mg/L	30 mg/L	Ruminants and Horses

1. TDS + Total dissolved solids. EC = electrical conductivity, Nitrate + nitrite as N = Nitrate + Nitrite as nitrogen, Nitrate as N = Nitrate as nitrogen.
2. Units – mg/L = milligram per liter, umhos.cm = micromhos per centimeter.

Historic groundwater quality data (Table 3), values from the Kennedy/Jenks review (Table 4), and data from additional published stock watering studies has been used by Central Valley Water Board staff to construct Table 5 below.

Table 5 provides an evaluation of the region's historic groundwater quality data, the upper concentrations for each COC, and the animal that is reported to be the most tolerant at these concentrations.

Table 5 - Historical Groundwater Quality

	Wells					Literature Values	Animal	
Analyte	**Well at 23S/21E-8R sampled 28 June 1989**	**Well at 23S/22E-6R sampled 19 June 1989**	**Pre-Hacienda Basin Monitoring well 13-1A sampled 1979**	**Pre-Hacienda Basin Monitoring well 18-1A sampled 1979**	**Units[1]**	**Upper Value**	**Tolerant Animal Under Low Heat Stress Environment**	**Reference**
Electrical Conductivity	11,400	10,500	14,500	14,600	umhos /cm	11,000 – 16,000	Non-lactating older horses, swine and sheep	1, 2, 3, 17
Total Dissolved Solids Dissolved Salts	8,890	8,530			mg/L	7,000 - 10,000	Non-lactating older horses, swine and sheep	1, 2, 3, 4, 5, 6, 7, 8, 9, 14, 17, 18, 19
Nitrate + Nitrite as Nitrogen	<0.01	0.58			mg/L	100	General Livestock	2, 3, 4, 8, 11, 14, 17, 19
Sulfate	3,900	6,100			mg/L	2,500 – 3,500	Non-lactating older horses, swine and sheep	6, 9, 13, 16
Aluminum	0.30	0.20			mg/L	5.0	General Livestock	1, 3, 4, 8, 10, 14, 17
Arsenic	0.014	0.024			mg/L	0.2	General Livestock	1, 2, 3, 5, 8, 10, 14, 17, 19
Boron	6	2.5			mg/L	5.0	General Livestock	1, 3, 4, 5, 10, 11, 14, 17
Cadmium	NA	NA			mg/L	0.05	General	1, 2, 3, 5,

	Wells					Literature Values	Animal	
Analyte	**Well at 23S/21E-8R sampled 28 June 1989**	**Well at 23S/22E-6R sampled 19 June 1989**	**Pre-Hacienda Basin Monitoring well 13-1A sampled 1979**	**Pre-Hacienda Basin Monitoring well 18-1A sampled 1979**	**Units[1]**	**Upper Value**	**Tolerant Animal Under Low Heat Stress Environment**	**Reference**
							Livestock	8, 14, 17, 19
Calcium	490	770			mg/L	1,000	General Livestock	4, 11
Selenium	<0.001	<0.001			mg/L	0.05	General Livestock	1, 2, 3, 4, 10, 14, 17,
Sodium	2,200	1,600			mg/L	1,000 – 4,000	General Livestock	15

1. Units – mg/L = milligram per liter, umhos/cm = micromhos per centimeter.

Comparison of the values presented in Table 5 with groundwater quality data for three of the four site monitoring wells (Middle Basin 24-1A, 24-1B, and 25-1A) shows that all three wells had concentrations below the Upper Values for all of the constituents listed. Additionally, wells Middle Basin 24-1B and 25-1A had concentration of sodium, chloride, sulfate, boron, nitrate + nitrite as N, and nitrate as N below the Lower Values for sensitive livestock.

Assessment of the site data (Tables 1 and 2) and historic groundwater quality data (Table 3) with the upper limits for COC's for tolerant livestock usage reveals that: monitoring well 24-1A meets the water quality requirements for livestock watering; monitoring wells 24-1B and 25-1A meet all requirements, except for arsenic (range of detections is slightly above the 0.2 mg/L value). Based upon this analysis, the groundwater at the Middle Basin is suitable for livestock watering and as such is subject to the Anti-degradation Policy with respect to the livestock watering AGR beneficial use. After the District purged the sumps where the initial data was collected, the ECs exceeded the MUN and AGR Beneficial use requirements.

In addition to livestock watering, the AGR beneficial use specifies the use of water furnished for irrigation purposes. Review of available literature for the production of crops using high salinity groundwater (Ayers, R.S., and Westcot, D.W., 1985, *Water Quality for Agriculture*: FAO Irrigation and Drainage Paper # 29 Rev 1, Food and Agricultural Organization of the United Nations. Available at: http://www.fao.org/docrep/003/t0234e/t0234E00.htm) shows that barley, cotton, sorghum and wheat (crops that are currently grown in the area) could be produced using groundwater from monitoring wells Middle Basin 24-1A, 24-1B, and 25-1A.

Additionally, a variety of salt-tolerant crops may be grown using the historic groundwater quality depicted in Table 6 and the water quality of the tail water sumps reported on Table 2.

A selection of these salt-tolerant crops is presented in Table 6 along with their associated reference studies.

Table 6 – Salt Tolerant Crops

Crop	**Electrical Conductivity (umhos/cm)[1]**	**Total Dissolved Solids (mg/L)[2]**	**Boron (mg/L)[2]**	**Reference**
Jose Tall Wheatgrass	15,000	9,600	20	2, 4, 5, 9
Alfalfa (Azgerm Salt II)	15,000	9,600	26.2	5, 8
Bermuda grass	12, 700	8,128	15	1, 3, 5, 7
Nypa forage *Distichlis spicata*	15,000 to 40,000	9,600 to 25,600	NA	6

1. Umhos/cm = micromhos per centimeter.
2. mg/L = milligram per liter.

Step 6 (Applied): Given that the *State Anti-Degradation Policy* applies for AGR, the Central Valley Water Board must ensure that the Middle Basin Order requires the Discharger to implement BPTC measures to minimize the amount of degradation that will occur.

Best Practicable Treatment or Control Measures for Pond Construction

This Order requires the implementation of BPTC in the construction and operation of the Middle Basin. Specifically, with respect to construction, the Discharger is required to submit final engineering drawings prepared and signed by a California Registered Civil Engineer, or Engineering Geologist for the proposed ponds, control structures, and piping design for Central Valley Water Board staff review and for Executive Officer approval prior to construction. The submittal must also include a seismic stability analysis of the proposed levee design and a construction quality assurance/quality control plan (QA/QC Plan). The QA/QC Plan will describe the process of additional field review to be conducted at locations within the proposed pond bottoms where test borings and/or excavation pits indicate a significant presence of shallow sandy soil layers. Location specific analysis of these areas will be used to determine whether it is feasible to disc, regrade, and then compact said soil layer to reduce seepage losses versus removing and replacing it.

Levee construction (both perimeter and internal) will be performed using acceptable silt/clay fill material (per the QA/QC Plan) that is excavated from within ponds and placed in compacted lifts to the required levee height. Similar to the pond bottoms investigations, areas below the Middle Basin levees where the scarifying process identifies significant sandy intervals will be investigated for mitigation measures.

Drainage water collected by the subsurface tile drainage system will drain into drainage sumps that will be pumped back into the Middle Basin ponds.

Best Practicable Treatment or Control Measures for Pond Operations

The Middle Basin will be operated using two pump stations for delivery of drainage water to the ponds. Drain water would flow by gravity from the existing Main Pipeline into the pump sumps and the drainage water would then be pumped to the respective delivery points. Inlet #1 will be the primary or normal delivery point. Inlet #2 will provide operational flexibility to allow drainage water to continue to be diverted into the north half of the Middle Basin if for any reason there is a desire or need to dewater Ponds 1, 2, or 3 for operational purposes or necessary maintenance work. The use of Inlet #2 will only occur for short periods of time, as necessary, to accommodate maintenance operations. It will not be routinely used to fill the last three ponds.

Flow meters will be installed to measure the drainage water discharged into the Middle Basin at both inlets. Inlet pump flow rate will be controlled to insure the ponds are kept full (minimum depth above 2 feet up to approximately 5 feet with a required 2-foot freeboard). When drainage water is discharged at Inlet #1 it will begin filling Pond 1. Each pond will be approximately 310 acres in size. Two regulating structures will be installed in each pond to allow quicker dewatering and filling of the ponds. Each regulating structure will have an operational spill so once a pond is full water will begin spilling into the next pond. Each regulating structure will also have a control gate that can be opened to increase flows through the culvert between the ponds. This will provide the ability to quickly lower a pond water level if necessary. The gates to the ponds will normally be closed. The discharge at Inlet #1 will be delivered into Pond 1 and the flow will continue into this pond until the flow is allowed to spill at the regulating structures into the next pond.

During ongoing operations, drainage water will normally be discharged into Pond 1 and then allowed to gradually flow from pond to pond as the filling, flow through, and evaporation process occurs. A continuous review of pump operations and pond water level elevations (staff gauges will be set in each pond) will verify if acceptable water depths are being maintained. Water depths less than 2 feet can encourage certain avian species to wade and feed on the invertebrate organisms within the ponds. A minimum depth of 2 feet is required to minimize this possibility. The ponds will be able to fill to a depth of approximately 5 feet. This will provide operational flexibility to minimize shallow drainage water in the ponds. With the primary Inlet #1 pumps operating at a capacity of 70 cubic feet per second the spill from this flow into the next pond will fill a 2-foot depth of water in a 310 acre pond in approximately 2 days. With the ability to increase the water depth in each pond to nearly 5 feet, an upstream pond can be filled to a level significantly above the minimum 2-foot depth. When the canal gates at the control structures are opened the flow into the next pond can be increased even further reducing the time to fill the pond to a 2-foot depth. This will minimize avian species foraging opportunities in shallow waters. If the drainage flows diminish and the pond cannot be kept above a depth of 2 feet then the pond will be pumped dry with portable pumps until increased drainage flows occur and additional storage is needed.

The design water surface elevation in Pond 1 will be the highest with a small drop in water surface elevation at each successive regulating structure to allow for gravity flow through sequential ponds in the system. The regulating structures and pipes installed through levees to the next pond are to be sized to minimize the drop in water surface elevation. The resulting design will allow for a continual flow from pond to pond with the ability to vary water levels if there is a need to increase storage during peak drainage flow periods.

Studies on wildlife reproduction show potentially significant potential environmental impacts linked to the discharge of subsurface agricultural drainage water to evaporation basins, particularly the cumulative effect of all discharges of this nature. In order to address this issue, the Wildlife Protocols developed with the United States Department of Fish and Wildlife, the California Department of Fish and Wildlife and the District have been incorporated into this Order.

Step 7 (Applied): Allowing the Discharger to degrade high quality waters is consistent with maximum benefit to people of the State as long as that degradation does not result in detrimental impacts to beneficial uses over the long term. California's farming industry is important to the economic well-being of the small communities that exist in the vicinity of the Tulare Lake Bottom. Farms generate jobs in a variety of sectors, from employees on the farm, providers of farm services, transportation of farm products, and many others. According to the Districts analysis, the addition of 18,000 acres of subsurface agricultural drainage will result in the retention of 180 farm labor jobs and provide $6.8 million in economic activity. In addition, the increased crop tonnages that will result from the removal of salt from the soil will further increase the number of agricultural jobs in the cultivation, harvesting, processing, and marketing sectors.

Step 8 (Applied): In the case of the Middle Basin Order, allowing the maximum extent of degradation allowed by law (i.e., degradation up to the water quality objectives that are protective of the designated beneficial uses) would result in water quality somewhere between the "best water quality that has existed since 1968" and a numeric limit that is protective of all beneficial uses, the Central Valley Water Board acknowledge that their primary task lies in preventing pollution and protecting sensitive uses.

Verifying that the State Anti-Degradation Policy is Satisfied
The Central Valley Water Board recognizes that monitoring of the evaporation ponds and their effect on surface water and groundwater is needed to verify that water quality is adequately protected and the intent of the *State Anti-Degradation Policy* is met. Accordingly, the Order, in conjunction with its Monitoring and Reporting Program

(MRP), prohibits discharges from the evaporation basin to surface waters and requires that groundwater monitoring must be conducted by the Discharger. Should surface discharges of drainage water occur, the Order requires discharge monitoring and chemical analysis to determine if an exceedance of a water quality objective has occurred. Additionally, the MRP requires the Discharger to monitor the existing subsurface tile drainage system and first-encountered groundwater adjacent to the basin. The purpose of requiring monitoring of the area directly below the ponds and the first-encountered groundwater adjacent to the basin is to determine whether the operation of the Middle Basin is protective of groundwater quality at the most vulnerable points. Groundwater monitoring is necessary to: determine background groundwater quality, determine existing groundwater conditions near the ponds, determine whether additional pond operational practices need to be implemented, and confirm that any additional practices implemented have the desired result on groundwater quality.

The deeper confined ground water below the proposed Middle Basin (beneath the "E" clay) is of good quality and can be beneficially used for municipal, agricultural, and industrial supply. It is anticipated that the operation of the subsurface tile drainage system in conjunction with the low permeability of the underling clayey soils, will result in little opportunity for vertical migration from the shallow unconfined or semi-confined groundwater into the deeper groundwater. In order to confirm this assumption, this Order requires the Discharger to install a series of deeper groundwater monitoring wells adjacent to the shallow first encountered monitoring system.

This Order requires the Discharger to report any noncompliance that endangers human health or the environment, or any noncompliance with the Prohibitions contained in the Order within 24 hours of becoming aware of its occurrence. This Order also requires the Discharger to submit annual monitoring reports that contain the analytical results of laboratory data, including all laboratory analyses (including Chain of Custody forms and laboratory QA/QC results) for surface and groundwater monitoring. Additionally, an annual assessment of groundwater monitoring is required. The assessment must include an evaluation of the groundwater monitoring program's adequacy to assess compliance with the Order, including whether the data provided are representative of conditions upgradient and downgradient of the Middle Basin.

<u>Waters that are Not High Quality: The "Best Efforts" Approach</u>
When the quality of a receiving water body exceeds or just meets the applicable water quality objective due to naturally-occurring conditions or due to prior Central Valley Water Board-authorized activities, it is not considered a high-quality water, and it is not subject to the requirements of the *State Anti-Degradation Policy*. However, where a groundwater constituent exceeds or just meets the applicable water quality objective, the Central Valley Water Board must set limitations no higher than the objectives set forth in the Basin Plan. This rule may be relaxed if the Central Valley Water Board can show that "a higher discharge limitation is appropriate due to system mixing or removal of the constituent through percolation through the ground to the aquifer" (State Water Board Order No. WQ 81-5). However, the Central Valley Water Board should set

limitations that are more stringent than applicable water quality objectives if the more stringent limitations can be met through the use of "best efforts." (State Water Board Order No. WQ 81-5)(*City of Lompoc*). The "best efforts" approach involves the establishment of requirements that require the implementation of reasonable control measures. Factors that are to be analyzed under the "best efforts" approach include the water quality achieved by other similarly situated dischargers, the good faith efforts of the discharger to limit the discharge of the constituent, and the measures necessary to achieve compliance (*City of Lompoc*, at p. 7.). The State Water Board has applied the "best efforts" factors in interpreting BPTC (see State Water Board Order Nos. WQ 79-14 and WQ 2000-07). Additionally, per the Basin Plan and the *Sources of Drinking Water Policy* (Resolution No. 88-63), where the Central Valley Water Board finds that one of the exceptions applies, it may remove the MUN designation for the particular water body through a formal Basin Plan amendment that includes a public hearing. The District via Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) is in the process of conducting a hydrologic evaluation for the purposes of delisting of the MUN and AGR beneficial uses for a portion of the general footprint of the Tulare Lakebed that includes the proposed Middle Basin location.

In summary, the Central Valley Water Board may establish requirements more stringent than applicable water quality objectives even outside the context of the *State Anti-Degradation Policy*. The "best efforts" approach must be taken where a water body is not "high quality" and the antidegradation policies are accordingly not triggered.

California Environmental Quality Act (CEQA)
On 20 December 2012 the District filed a draft Mitigated Negative Declaration (MND), Initial Study, and Environmental Checklist with the State Clearinghouse, Office of Planning & Research (SCH Number: 2012121057) for the proposed construction and operation of the Mid-Evaporation Basin for management and disposal of sub-surface agricultural drain water. The review period for the environmental documents ended on 22 January 2013. Comments were received from the California Department of Conservation, CDF&W, Region 4, and the Native American Heritage Commission. Both the CDF&W (23 January 2013) and the Central Valley Water Board (9 May 2013) submitted late comments. CDF&W's comments were addressed in the final EIR that was received at the State Clearinghouse on 22 May 2013 and a Notice of Determination filed on the same day.

Central Valley Salinity Alternatives for Long-Term Sustainability
The CV-SALTS initiative has the goal of developing sustainable solutions to the increasing salt and nitrate concentrations that threaten achievement of water quality objectives in Central Valley surface waters and groundwater. The Central Valley Water Board intends to coordinate all such actions with the CV-SALTS initiative. The District and the Tulare Lake Basin Water Storage District are currently engaged in such an action with CV-SALTS (an evaluation of the MUN and AGR beneficial uses in the Tulare Lake Bottom area). This is the first step in the process of potentially recommending de-designation of these beneficial uses from a segment of the groundwater beneath a

portion of the Tulare Lake Bed. The de-designation of a beneficial use is a multipart process that involves a significant commitment of time and resources. Should such an effort prove successful, this Order can be amended in the future to implement any policies or requirements established by the Central Valley Water Board as a result of the CV-SALTS process.

REQUIREMENTS AND ENFORCEMENT OF THE ORDER

What are the wastes to be discharged to the Middle Basin, and what are their potential impacts to water quality?

For the purposes of this Order, agricultural drainage-water wastes includes, but is not limited to, EC, TDS, chloride, nitrate as $N0_3$, sulfate as $S0_4$, arsenic, boron, cadmium, calcium, copper, hardness as CaCO3, lead, magnesium, manganese (inorganic), potassium, selenium, sodium, uranium and pesticides (those pesticides listed in 22 CCR section 64431). This list of COC's includes those previously identified above for the AGR beneficial use, constituents specified as being of primary concern in the Final Report of the San Joaquin Valley Drainage Program (1990) and constituents on Tables 1 and 2 that exceeded one half of their respective MCL values. A variety of the COC's identified for monitoring are specified as drinking water contaminants in 22 CCR section 64431. These drinking water contaminants have been included given the existing MUN designation for the groundwater beneath the Tulare Lake Bed. Should the MUN designation be removed, the Orders MRP will be modified to reflect a reduced list of COC's.

Surface water can be degraded and polluted by both the type and high concentrations of pollutants contained in agricultural drainage-water. High salinity, trace element contaminants (i.e. arsenic, boron, lithium, molybdenum, and selenium), and atypical ratios of major ions (i.e. sulfate, magnesium, sodium, chloride, calcium) in the waste are toxic to aquatic life. In addition, nitrogen and phosphorus compounds in the waste can cause excessive algal growth in surface waters, resulting in lower oxygen levels and that in turn causes fish and other organisms to die. The presence of pathogens in the waste can create a public health threat through human contact with affected waters.

This Order includes prohibitions, specifications, and provisions for the construction and operation of the Middle Basin that are consistent with state regulations. Consistent with Title 27, this Order prohibits the direct or indirect discharge of waste from the Middle Basin to surface water. This Order also prohibits discharges that cause pollution or nuisance, or that causes or contributes to exceedances of any water quality objective in the Basin Plan or water quality criteria set forth in the California Toxics Rule and the National Toxics Rule.

How Will the Central Valley Water Board Regulate the Discharge of These Wastes?

Prohibitions: The Middle Basin Order includes a number of prohibitions to protect surface and groundwater quality, and to ensure that waste discharges not regulated by this Order are prohibited unless otherwise regulated by another Order of the Central Valley Water Board.

Discharge Specifications: The Order includes a number of Discharge Specifications that require the Discharger to: operate and maintain effective interceptor systems to minimize lateral seepage from the basins; operate and maintain the subsurface tile drainage system to minimize vertical seepage; rapid filling of ponds to attain the minimum water depth (2 feet) or drain to zero (0) feet as quickly as possible; conduct avian species monitoring and hazing program coupled with the operation of compensation habitat as approved by the United States Department of Fish and Wildlife and California Department of Fish and Wildlife; and operated and maintain ponds to prevent inundation or washout due to floods with up to a 100-year return period.

Evaporation Pond Specifications: The Middle Basin Order requires that the basins be designed, constructed, and operated to maintain a minimum freeboard of 2 feet unless levees are certified in writing by a registered civil engineer or geotechnical engineer as structurally sound and capable of preventing overtopping at a specific lesser freeboard. Specifically, the level of waste in retention ponds shall be kept a minimum of two feet from the top of each aboveground embankment. Ponds shall not have small coves and irregularities around the perimeter of the water surface. Ponds shall have interior side slopes at 3:1 or steeper. Weeds shall be minimized in all ponds through control of water depth, harvesting, or other appropriate method, and dead algae, vegetation, and debris shall not be allowed to accumulate on the water surface.

Closure Provisions*:* This Order requires annual submittal of a Closure Plan and Financial Assurance Plan and includes a provision that the Discharger must maintain coverage under this Order or a subsequent revision to this Order until all drainage water is removed or evaporated and final grading and disposal of sediments containing elevated levels of minerals and trace elements have been completed. Solids removed from the basins shall be disposed of in a manner that is consistent with title 27 and approved by the Executive Officer.

These closure requirements ensure compliance with the provisions of the *State Anti-Degradation Policy*.

Receiving Water Limitations*:* This Order includes Groundwater Limitations that require the discharge of waste at the Middle Basin not cause the underlying groundwater to exceed water quality objectives, unreasonably affect beneficial uses, or cause a condition of pollution or nuisance.

How Will the Central Valley Water Board Evaluate the Effectiveness of Management Practices?

This Order includes a provision that requires compliance with the MRP, and future revisions thereto, as specified by the Central Valley Water Board or the Executive Officer. The MRP requires:

- daily inspections of the pond areas
- influent wastewater monitoring
- individual cell monitoring (wastewater and sediment)
- groundwater monitoring
- seepage monitoring including subsurface tile drain water and interceptor drain monitoring
- monitoring of surface water and discharges to surface water
- wildlife monitoring
- quarterly and annual reporting of monitoring data
- annual reporting of groundwater monitoring

Specifically, the Middle Basin Order requires the Discharger to monitor first encountered groundwater upgradient and downgradient of the waste retention ponds, and to monitor the deeper groundwater to ensure that vertical seepage will not adversely impact the semi-confined and/or confined ground water below the proposed Middle Basin. The purpose of the groundwater monitoring program is to determine that pond operations do not cause receiving waters to exceed applicable groundwater objectives and confirm compliance with the requirements of this order.

The Middle Basin Order contains significant requirements for evaporation basin operations that are designed to be protective of surface and groundwater quality while also being practicable and economically feasible. These include: collection of vertical and lateral pond seepage waters; implementation of testing and measurement of pond water, pond sediment, subsurface drainage water, and groundwater; and wildlife monitoring and hazing operations.

How Will This Order Be Enforced?

The State Water Board's Water Quality Enforcement Policy (Enforcement Policy) establishes a process for using progressive levels of enforcement, as necessary, to achieve compliance. It is the goal of the Central Valley Water Board to enforce this order in a fair, firm, and consistent manner. Violations of this order will be evaluated on a case-by-case basis with appropriate enforcement actions taken based on the severity of the infraction and may include issuance of administrative civil liabilities. Progressive enforcement is an escalating series of actions that allows for the efficient and effective use of enforcement resources to: 1) assist cooperative dischargers in achieving compliance; 2) compel compliance for repeat violations and recalcitrant violators; and 3) provide a disincentive for noncompliance. Progressive enforcement actions may begin with informal enforcement actions such as a verbal, written, or electronic communication between the Central Valley Water Board and the Discharger. The purpose of an informal enforcement action is to quickly bring the violation to the discharger's attention and to give the discharger an opportunity to return to compliance as soon as possible. The highest level of informal enforcement is a Notice of Violation.

The Enforcement Policy recommends formal enforcement actions for the highest priority violations, chronic violations, and/or threatened violations. Violations of the Middle Basin Order that will be considered as high priority violations include, but are not limited to:

1. Any discharge of waste and/or storm water from the ponds to surface waters.
2. Failure to submit notification of a discharge to surface water in violation of the Order.
3. Falsifying information or intentionally withholding information required by applicable laws, regulations or an enforcement order.
4. Failure to pay annual fee, penalties, or liabilities.
5. Failure to monitor as required.
6. Failure to submit required reports on time.

References Cited

Atwater, B.F., Adam, D.P., Brandbury, J.P., Forester, R. M., Mark, R.K., Lettis, W.R., Fisher, G.R., Gobalet, K.W., and Robinson, S.W.,1986, *A Fan Dam for Tulare Lake, California, and Implications for the Wisconsin Glacial History of the Sierra Nevada*: *Geological Society of America Bulletin* 1986;97, no. 1; pp 97-109.

Croft, M.G., 1972, *Subsurface Geology of the Late Tertiary and Quaternary Water-Bearing Deposits of the Southern Part of the San Joaquin Valley, California*: United States Geological Survey Water-Supply Paper 1999-H.

Croft, M.G., and Gordon, G.V., 1968, *Geology, Hydrology, and Quality of Water in the Hanford-Visalia Area, San Joaquin Valley, California*: United States Geological Survey Open-File Report 68-67.

Lettis, W.R., 1982*, Late Cenozoic Stratigraphy and Structure of the Western Margin of the Central San Joaquin Valley, California*: United States Geological Survey Open-File Report 82-526.

Page, R.W., 1986, *Geology of the Fresh Ground-Water Basin of the Central Valley, California, with Texture Maps and Sections*: United States Geological Survey Professional Paper 1401-C.

Table 5 References

1. Ayers, R.S., and Westcot, D.W., 1985, *Water Quality for Agriculture*: FAO Irrigation and Drainage Paper # 29 Rev 1, Food and Agricultural Organization of the United Nations. Available at: http://www.fao.org/docrep/003/t0234e/t0234E00.htm

2. Bagley, C.V., Kotuby-Amacher, J., and Farrell-Poe, K., 1993, *Analysis of Water Quality for Livestock*: Utah State University Extension, Animal Health Sheet, AH/Beef/28.

3. Dunbar, J.R., and Miller, R.O., 1993, *Drought Tip 92-30 Assessing Water Quality for Livestock Under Drought Conditions*: publication series developed as a cooperative effort by the following organizations:
California Department of Water Resources, Water Conservation Office
University of California (UC)
UC Department of Land, Air and Water Resources
USDA Drought Response Office
USDA Soil Conservation Service
USDI Bureau of Reclamation, Mid-Pacific Region

4. Dupchak, Karen, June 2004, *Evaluating Water Quality for Livestock*: Manitoba Agriculture, Food and Rural Initiatives.

5. Faries, F.C., Jr, Sweeten, J.M., and Reagor, J.C., June 1998, *Water Quality: Its Relationship to Livestock*: AgriLife Extension, Texas A&M System.

6. German, D., Thiex, N., and Wright, C., 2008, *Interpretation of Water Analysis for Livestock Suitability*: South Dakota State University.

7. Hairston, J.E., 2001, *Drinking Water for Livestock and Poultry*: Alabama Cooperative Extension System, Alabama A&M and Auburn Universities, ANR-790-2.6, Last Modified 09/06/01.

8. Hersom, M., and Crawford, S., 2008, *Water Nutrition and Quality Considerations for Cattle*: Animal Sciences Department, University of Florida, Institute of Food and Agricultural Sciences Extension.

9. Heugten, E.V., *Guidelines for Water Quality in Pigs*: Animal Science Facts, Extension Swine Husbandry, North Carolina State University, ANS-00-811S.

10. Higgins, S.F., Carmen, T.A., and Gumbert, A.A., 2008, *Drinking Water Quality Guidelines for Cattle*: University of Kentucky, College of Agriculture, Cooperative Extension Service, ID-170.

11. Kennedy/Jenks Consultants, 20 May 2013, *Salt and Nutrients: Literature Review for Stock Drinking Water Final Report*: Prepared for CV-SALTS. http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&cad=rja&ved=0CCQQFjAA&url=http%3A%2F%2Fwww.cvsalinity.org%2Findex.php%2Fcomponent%2Fdocman%2Fdoc_view%2F2276-stock-drinking-water-final-report-03-25-13.html%3FItemid%3D280&ei=47oUU5CBO4nxoATbjoCIAg&usg=AFQjCNFg6e7z7DYSWVaKHJ6dLdlqm7mJ9g

12. Nyachoti, M., and Kiarie, E., 2011*, Water in Swine Production: a Review of its Significance and Conservation Strategies*: University of Manitoba in a paper presented at the Manitoba Swine Seminar 2010.

13. Patterson, T., and Johnson, P., 2003, *Effects of Water Quality on Beef Cattle*: Range Beef Cow Symposium, Paper 63, Animal Science Department, Digital Commons, University of Nebraska – Lincoln.

14. Pfost, D.L., and Fulhage, C.D., May 2001, *Water Quality for Livestock Drinking*: University of Missouri Extension, EQ381.

15. Raisbeck, M.F., S.L. Riker, C.M. Tate, R. Jackson, M.A. Smith, K.J. Reddy, and J.R. Zygmunt. 2008. *Water Quality for Wyoming Livestock and Wildlife: A Review of the Literature Pertaining to Health Effects of Inorganic Contaminants*: B 1183. Laramie, Wyo.: University of Wyoming Dept. of Veterinary Sciences : UW Dept. of Renewable Resources : Wyoming Game and Fish Dept. : Wyoming Dept. of Environmental Quality.

16. Sigler, A.W., and Bauder, J., 2005, *Well Educated Full Domestic Analysis Fact Sheet*: Montana State University Extension Water Quality Program, Department of Land Resources and Environmental Sciences.

17. Soltanpour, P.N., and Raley, W.L., 1993, *Livestock Drinking Water Quality No. 4.908*: Colorado State University Cooperative Extension, October 1993, Reviewed March 1999.

18. Yiasoumi, W., Evans, L., and Rogers, L., April 2005, *Farm Water Quality and Treatment*: New South Wales, Agfact AC.2, 9^{th} edition, AGDEX 753.

19. Zhang, H., and Payne, J., 2011, *Livestock and Poultry Drinking Water Quality: Understanding Your Water Test Report*: Oklahoma Cooperative Extension Service, Oklahoma State University, L-256.

Table 6 References

1. Alonso, M.F., Corwin, D.L., Oster, J.D., Maas, J., and Kaffka, S.R., 2013, *Modeling a Sustainable Salt Tolerant Grass-Livestock Production System under Saline Conditions in the Western San Joaquin Valley of California*: Sustainability 2013, vol. 5, pp.3839-3857.

2. Barrett, E., and Moore, G., 2006, *Tall Wheat Grass* in *Perennial Pastures for Western Australia*: Moore, G., Sanford, P. and Wiley, T. (eds), Department of Agriculture and Food, Western Australia, Bulletin 4690.

3. Corwin, D., 2012, *Field-scale monitoring of the long-term impact and sustainability of drainage water reuse on the west side of California's San Joaquin Valley*: Journal of Environmental Monitoring, DOI: 10.1039/c2em10796a.

4. Grattan, S., and Diaz, F., *Salinity - Boron Interactions on Production and Forage Quality of Tall Wheatgrass (Thinopyrum ponticum, cv. 'Jose'): Implications on Ruminant Mineral Nutrition*: University of California, Center for Water Resources, accessed 7 March 2014.

5. Grattan, S., Grieve, C., Poss, J., Robinson, P., Suarez, D., and Benes, S., 2002, *Reuse of Saline-Sodic Drainage Water for Irrigation In California: Evaluation of Potential Forages*: paper 110, in Abstracts, Vol III., Symposia 22-36, of 17th World Congress of Soil Science, Bangkok, Thailand, 14-21 August 2002, pp.110-1 to110-10.

6. ICBA Annual Report 2010. International Center for Biosaline Agriculture, Dubai, United Arab Emirates, 2011.

7. Kaffka, S., Oster, J., Maas, J., and Corwin, D., (2004), *Forage production and soil reclamation using saline drainage water*: Pg 247-253 IN: (ANON). Proceedings of the 2004 National Alfalfa Symposium, San Diego, California, Dec.13-15. 387pg.

8. Putman, D.H., Benes, S.E., and Chahal, I., 2013, *Potential for Alfalfa Production Under Saline Conditions*: in; American Society of Agronomy, 2014 Conference Proceedings *Building Resiliency in California Agriculture,* February 4 & 5, 2014.

9. Scheinost, P.,Tilley, D., and Stannard, M., October 2008, *Tall Wheatgrass*, *Thinopyrum ponticum* :(Podp.) Z. –W. Liu & R. –C. Wang, United States Department of Agriculture, Natural Resources Conservation Service, Plant Guide.