Friant
WATER AUTHORITY

Guidelines for Accepting Water into the Friant-Kern Canal

Draft

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Guidelines for Accepting Water into the Friant-Kern Canal

Overview

These Guidelines apply to all water introduced into the Friant-Kern Canal ("**FKC**") other than directly from Millerton Lake to the headworks of the FKC (collectively, "Non-Millerton water").

These Guidelines describe the Friant Water Authority's ("FWA") application review process, implementation procedures, and the responsibilities of water contractors and other parties authorized to introduce or receive Non-Millerton water into or from the FKC (collectively, "**Contractors**"). These Guidelines define the water quality thresholds and the required mitigation associated with introduced Non-Millerton water and corresponding water quality, as well as the methodologies and tools for monitoring and forecasting water quality in the FKC. These Guidelines are intended to ensure that water quality is protected for sustained domestic and agricultural use.

These Guidelines are applicable to all Non-Millerton water introduced or diverted into the FKC including but not limited to:

- Groundwater pump-ins (e.g., groundwater wells or previously banked water)
- Surface water diversions and pump-ins
- Recaptured and recirculated San Joaquin River Restoration Program Restoration Flows
- Water introduced at the FKC-Cross Valley Canal ("CVC") intertie and delivered via reverse flow on the FKC

A Water Quality Advisory Committee composed of Friant Division long-term contractors ("**Friant Contractors**") involved in either introducing or receiving Non-Millerton water to or from the FKC has been established to provide recommendations to FWA on operations and monitoring requirements of the FKC. The Water Quality Advisory Committee will operate under an established charter (see Attachment A). The Water Quality Committee will appoint a Monitoring Subcommittee to assist FWA in the implementation of the Guidelines.

These Guidelines are subject to review and modification by FWA if any of the following conditions occurs:

- A future regulatory cost or equivalent fee is imposed on Friant Contractors and a portion of such fee can reasonably be attributed to the incremental difference of water quality conditions in the FKC.
- When Friant Division Class 1 contract allocation is less than or equal to 25 percent, the Water Quality Advisory Committee will convene as outlined in Attachment A. In these years, mitigation will be accounted for as presented in these Guidelines, but will be deferred to a mutually agreed to later date unless those responsible for the put and take mutually agree to put and take the

mitigation in the critical year. All monitoring requirements will remain as presented in these Guidelines.

- There is a significant, regulatory change or scientifically based justification and three out of the following five Friant Contractors agree and work with the Water Quality Advisory Committee to recommend a change: (1) Arvin-Edison Water Storage District, (2) Shafter Wasco Irrigation District, (3) Delano-Earlimart Irrigation District, (4) South San Joaquin Municipal Utility District, and (5) Kern-Tulare Water District.

The Bureau of Reclamation (Reclamation) may also propose and/or require modifications to these Guidelines in coordination with FWA and reserves the right to implement additional water quality requirements as needed to protect water quality within the FKC. FWA will provide written notice of any proposed modification that are relevant to these Guidelines to all Contractors prior to adoption and implementation.

A. General Requirements for Discharge of Water into the Friant-Kern Canal

1. Guidelines Compliance Determination

A Contractor wishing to discharge Non-Millerton water into the FKC must, concurrent with its application for a contract or other applicable approval from Reclamation in such form and contents as may be required by Reclamation, obtain a determination from FWA as to compliance with the Guidelines or demonstrate to FWA and Reclamation that the proposed discharge will be subject to comparable and adequate alternative water quality mitigation measures. The application will not be approved until FWA has provided its determination that the applicant is compliant with the Guidelines or the provision of alternative mitigation measures is adequately demonstrated and incorporated into the proposed discharge project. Figure 1 shows the concurrent process that a Contractor must pursue to obtain these approvals. The Contractor will be responsible for securing all other requisite Federal, State or local permits.

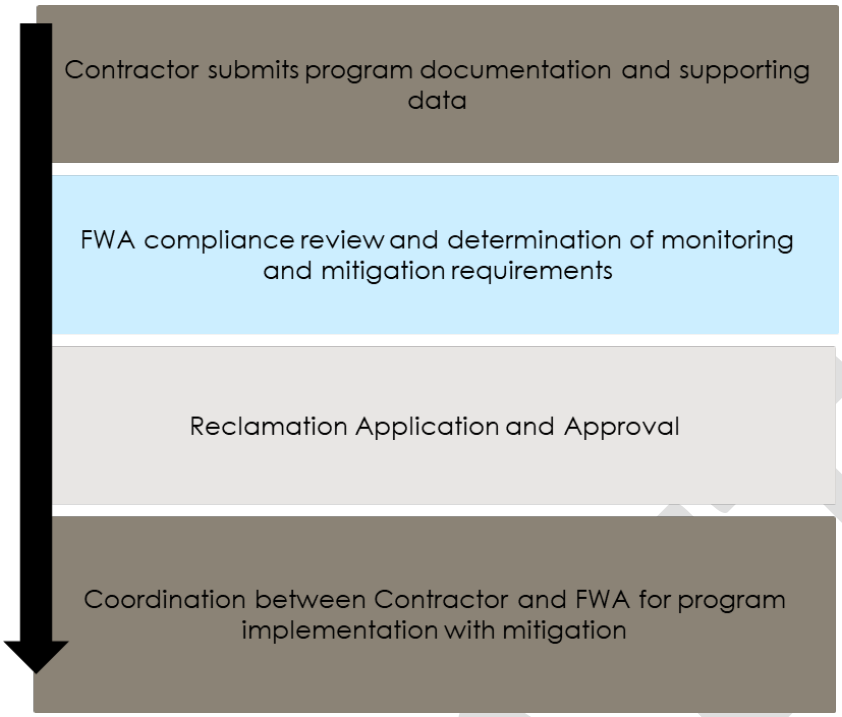


Figure 1. Approval Process Diagram

2. Discharge Facility Approval

The approvals for the erection and maintenance of each discharge facility into the FKC must be approved and documented in the manner required by Reclamation, in coordination with FWA.

3. Other Discharge and Conveyance Requirements

The discharge of Non-Millerton water into the FKC may not in any way limit the ability of either FWA or Reclamation to operate and maintain the FKC for its intended purpose nor may it adversely impact existing water delivery contracts or any other water supply or delivery agreements. The discharge of Non-Millerton water into the FKC will be permissible only when there is capacity in the system as determined by FWA and/or Reclamation.

B. Water Quality Monitoring and Reporting Requirements

1. General Discharge Approval Requirements

Each source of Non-Millerton water discharged into the FKC must be correctly sampled, completely analyzed, and approved by FWA and Reclamation prior to introduction into the FKC. The Contractor must pay the cost of collection and analyses of the water required under these Guidelines. Other costs associated with the implementation of these Guidelines to be paid by the Contractors are described in Section E below.

2. Water Quality Monitoring and Management

The monitoring program requirements are detailed below. In addition, the requirements are summarized in a single table in Attachment B.

(a) Monitoring Requirements for Discharged Water

Prior to introduction to the FKC, all Non-Millerton water discharged into the FKC must be tested at the source (i.e., grab samples at each pump location for groundwater pump-ins or in-prism (i.e., in-situ) grab samples for water being introduced via other conveyances) and sampled by an appropriate party every three years for the complete list of water quality constituents listed in the then current version of Table 1. In addition, all Non-Millerton water discharged into the FKC must be tested and sampled by an appropriate party annually for the short list of water quality constituents listed in Table 4. The analytical laboratory must be a facility with Environmental Laboratory Accreditation Program (ELAP) certification. The laboratory analytical report and summary of water quality analytical results must be reported to FWA and Reclamation's Contracting Officer for review. All monitoring requirements are summarized in Attachment B.

If analytical results show an exceedance of 80% of the threshold for any water quality constituents, defined in Table 4, discharged Non-Millerton water will be tested weekly for the targeted constituents of concern until four consecutive grab samples show consistent water quality results. The appropriateness of the threshold buffer (i.e., 80% of the threshold) will be evaluated by the Water Quality Advisory Committee.

If the water quality analytical results show exceedance of any constituent above its threshold in Table 1, 3 or 4 (i.e., not the threshold buffer but the threshold itself), at the discretion of Reclamation such water may not be allowed to be introduced into the FKC. FWA will evaluate monitoring requirements on a case-by-case basis and may impose additional requirements including but not limited to monitoring of the discharge source and downstream in prism quality at the cost of the Contractor.

(b) In-Prism Water Quality Monitoring

FWA will cause to be implemented continuous, real-time monitoring of in-prism water quality conditions in the FKC. Conductivity meters (or sondes) will measure and record real-time in-prism electrical conductivity (EC), measured as microsiemens per centimeter (µS/cm), every 15 minutes at the FKC check structures and corresponding mileposts shown in Table 2. Collected EC data will be uploaded to FWA's Intellisite Operation System ("IOS") in real-time. These continuous, in-prism measurements of EC will provide real-time data on incremental water quality changes and mixing in the canal and will assist in water quality threshold management.

If the Friant Water Quality Model forecasts an in-prism exceedance of 80% of the threshold for any water quality constituents, defined in Table 4, water samples from the FKC will be collected each week by appropriate FWA staff until the sampled concentrations, supported through Friant Water Quality Model forecasted simulations, show four consecutive weeks below the 80% threshold. Each weekly collection will consist of one sample from each downstream check structure shown in Table 2 and where water quality changes are expected, plus one duplicate sample. FWA will deliver the samples to a laboratory with ELAP certification. FWA expenses for all water quality monitoring and sampling are subject to

reimbursement from Contractors through fees and charges. As was the case for the discharged water, the appropriateness of the threshold buffer will be evaluated by the Water Quality Advisory Committee.

Additional water quality sampling and analysis will be performed during specific FKC operations. FWA will cause to be measured EC using hand-held conductivity meters as needed, such as during:

- servicing of real-time monitoring equipment;
- unexpected real-time monitoring equipment outages;
- confirmation of real-time monitoring equipment measurements; and,
- targeted in-prism measurements.

(c) CVC In-Prism Water Quality Monitoring

Upon initiation of reverse-flow, pump-back activities and/or if it is anticipated that operations within the CVC will significantly change mixed water quality conditions (i.e., influence from California Aqueduct, Kern River, Kern Fan), grab samples will be collected by FWA within the CVC near the FKC/CVC Intertie, and provided to a third-party laboratory with ELAP certification for testing of water quality constituents listed in Table 1. In addition, during reverse-flow, pump-back operations, weekly water quality sampling will be performed within the CVC near the FKC/CVC Intertie. Grab samples will be collected by FWA and provided to a third-party, ELAP certified laboratory for testing. At a minimum, grab samples collected during reverse-flow pump-back operations will be analyzed for the short list of water quality constituents listed in Table 4.

The Water Quality Advisory Committee will evaluate water quality monitoring, sampling, and analysis requirements on a regular basis and provide recommendations for modification of the described requirements.

(d) In-Prism Water Quality Management

FKC in prism water quality will be managed per the following thresholds. If the below thresholds are exceeded, systematic cessation of pump-in or pump-back operations will occur.

1. Title 22. The Domestic Water Quality and Monitoring Regulations specified by the State of California Health and Safety Code (Sections 116270-116755), and Title 22 of the California Code of Regulations (Sections 6440 et seq.), as amended. In prism water quality constituent concentrations may not exceed the Maximum Contaminant Level ("**MCL**") as defined in Table 1, except those constituents listed in Table 3 and Table 4. Current State of California requirements at the time of sampling will prevail over those in the accepted version of this document if MCLs in Table 1 are changed in the future.

2. Water quality thresholds defined in Table 3. Water quality thresholds are representative of constituent thresholds of sensitive crops; leaching requirements; and crop thresholds for regulated deficit irrigation practices that occur during almond hull split from July 1 through August 31; and

flexible thresholds in the second half of the contract year, from September 1 through February 28, depending on observed water quality in the first portion of the contract year.

i. Table 3 presents alternative water quality thresholds for Period 3 (September 1 – February 28) that are dependent on the measured water quality during Period 1 (March 1 – June 30). If the measured average chloride concentration for Period 1 exceeds 70 milligrams per liter (mg/L), the chloride threshold remains at 102 mg/L for Period 3a. If the measured average chloride concentrations for Period 1 are less than or equal to 70 mg/L, the allowable chloride concentration increases from 102 mg/L to 123 mg/L for Period 3b.

ii. It is estimated that an average of one week is required for in-prism water quality to turnover. Prior to the onset of the defined hull split period requirements (July 1), current FKC operations and water quality conditions will be evaluated to determine if this one-week period should be adjusted.

If water quality thresholds are exceeded, or based on modeling appear likely to be imminently exceeded, or operations in the FKC need to change per Guidelines requirements, FWA will immediately notify the Water Quality Advisory Committee, which must convene a meeting of the Monitoring Subcommittee within three days of receiving notification from FWA. The Monitoring Subcommittee and FWA will review operations and water quality data and will seek consensus on determining the best management actions to improve water quality; provided, however, the final operational decision will be made by FWA. In addition, the Monitoring Subcommittee will seek 1:1, unleveraged, and cost-neutral exchanges to limit potential Project water impacts. Notwithstanding the foregoing, FWA retains the right to determine and take immediate management actions with respect to groundwater pump-ins in accordance with the applicable approvals, but will work in good faith with the Water Quality Advisory Committee and Monitoring Subcommittee to evaluate options. If required, management actions including any reductions or cessation of pump-in volume must occur within three days of the meeting between FWA and the Monitoring Subcommittee. FWA will order any reduction in pump-in volume in order of greatest mass loading. Finally, the Monitoring Subcommittee will set an appropriate review period to assess if implemented management actions are working and, if not, will agree to reconvene to discuss additional actions necessary to improve water quality.

(e) Uncontrolled Season

Non-Millerton water may not be introduced to the FKC during the Friant Division uncontrolled season as declared by Reclamation unless:

- Deliveries are necessary due to FKC capacity constraints, and if the Non-Millerton water delivered from the CVC remains below the Shafter Check, or

- The Non-Millerton water is below the determined baseline EC threshold of 200 µS/cm and, therefore, does not require mitigation.

- Introduction of Non-Millerton does not impact Friant Division flood operations.

3. Water Quality Mitigation

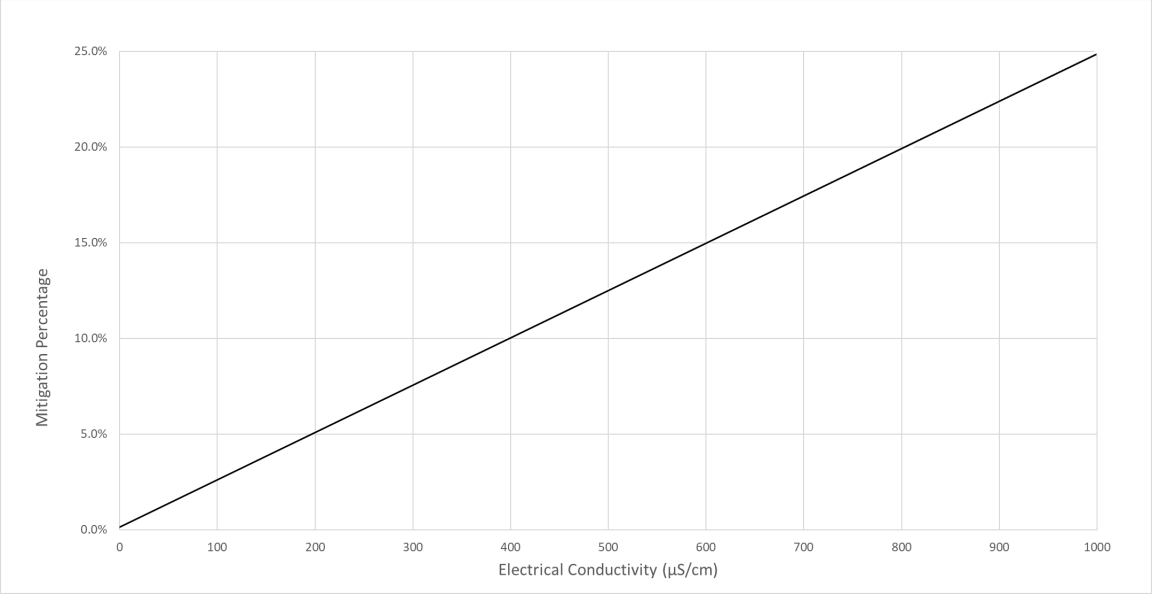
Mitigation for impacted water quality is quantified through use of the Water Quality Mitigation Ledger ("**Ledger**"). The Ledger tracks and accounts for all inflows into and diversions from the FKC in order to determine appropriate mitigation for impacted water quality (attributable to the introduced Non-Millerton water or "**Put**"[1]). The volume of additional surface water needed for mitigation, expressed as a percentage of the introduced water, or Put, is determined using an established mitigation rating curve. The mitigation rating curve is based on (1) constituent concentrations, and (2) agronomic principles that focus on leaching requirements to prevent constituent accumulation in the rootzone and resulting impacts on crops. This approach aims to balance concerns related to long-term groundwater quality with a multi-layered assessment of agronomic impacts as a durable solution. The process for developing the agronomic impacts evaluation and mitigation rating curve can be found in *Attachment C– Agronomic Impacts and Mitigation.*

The Ledger quantifies mitigation for Friant Contractors that have an expectation to receive water consistent with quality conditions of Millerton Lake. Specifically, mitigation applies to the "**Take**" (or delivery) of Friant Division Class 1, Class 2, Recovered Water Account (RWA [Paragraph 16b]), and Unreleased Restoration Flows supplies. Friant Contractors and/or other Contractors, including but not limited to third parties, whose supplies are not delivered to the headworks of the FKC are not eligible to receive mitigation.

Mitigation percentage is based on the EC of the Put above the established baseline. The established baseline is based on assumptions of current, minimum leaching practices by water users, or growers, in the region. Consistent with good agricultural practices, it is assumed that growers are currently applying at least a five percent (5%) leaching fraction. Under the mitigation rating curve shown in Figure 2, this corresponds to an approximate EC of 200 µS/cm. It is assumed that growers are already managing the effects of applied water quality conditions up to 200 µS/cm of EC, and mitigation is only required for water quality conditions with incremental EC that exceed the baseline EC threshold of 200 µS/cm. Note that the mitigation rating curve extends beyond the maximum EC and mitigation percentage shown in Figure 2 (i.e., at 1,000 µS/cm and 25%) at the same slope of 5% mitigation per 200 µS/cm of EC.

A mitigation volume is calculated based on the Put volume and corresponding mitigation percentage. Mitigation volumes for each Put are distributed to each Friant Contractor receiving an eligible Take, or "**Taker**," downstream based on the volumetric proportion of the Take on a weekly basis. Mitigation occurs in real time by the Contractor and offsets a like volume of each Taker's supply at the end of a reporting period. Additional mitigation is not required to account for the water quality conditions of the mitigation volumes. Water quality conditions and flows are tracked daily. The ledger and required mitigation volumes are balanced weekly and reported and transferred monthly. Accounting and reporting are detailed in *Attachment D – Standard Operating Procedures*.

[1] Existing FKC inlet drains are exempt from providing mitigation.



Key:
µS/cm = microsiemens per centimeter (1 µS/cm = 1 µmhos/cm = 1/1,000 dS/m)

Figure 2. Proposed Mitigation Rating Curve Based on Boron Sensitivity and Normalized to Electrical Conductivity

4. Critical Year Management

When Friant Division Class 1 contract allocation is less than or equal to 25 percent, the Water Quality Advisory Committee will convene as outlined in Attachment A. In these years, mitigation will be accounted for as presented in these Guidelines, but will be deferred to a mutually agreed later date unless those responsible for the Put and Take mutually agree to put and take the mitigation in the critical year. All monitoring requirements will remain as presented in these Guidelines.

C. Resolution of Disputes

In the event a Contractor is dissatisfied with the application or interpretation of these Guidelines by FWA staff or consultants, the following dispute resolution procedures will apply:

1. A Contractor may request FWA refer the dispute to Reclamation's Contracting Officer's Representative for initial review. FWA will prepare and deliver a written summary of the dispute for Reclamation's Contracting Officer's Representative, who will then confer with the parties and issue an advisory opinion regarding the dispute in a timely manner.

2. In addition to or in lieu of the meet and confer process with Reclamation's Contracting Officer's Representative above, a Contractor may submit a written appeal to be heard by the FWA Board of Directors. The written appeal must be submitted to the office of the Chief Executive Officer, who will then place the dispute on the agenda of the Board of Directors for a hearing at a board meeting no later than 60 days from the date of receipt. The decision of the Board of Directors will be final and FWA and the other party(ies) must promptly comply with such decision until the same is stayed, reversed, or modified by a decision of a court of competent jurisdiction.

The Cooperative Agreement between the Contractors and FWA provides additional dispute resolution procedures. In the event of any conflict between the dispute resolution procedures in these Guidelines and the Cooperative Agreement, the provisions in the Cooperative Agreement will control.

D. Water Quality Forecasting and Communications

1. Friant-Kern Canal Water Quality Model

Water quality monitoring and collection of water quality data will be evaluated using the FKC Water Quality Model, a volumetric mass-balance model of the entire FKC. The FKC Water Quality Model will serve as a predictive, water quality forecast tool to assist Friant Contractors and FWA in making real-time operation decisions. The weekly application of this model will require compilation of surface water quality data collected, as described above, as well as forecasts of water orders and periodic model updates.

2. Water quality reporting and communications

IOS will report real-time, continuous FKC in-prism EC measurements. In addition, FWA will cause to be provided a weekly summary report to Friant Contractors and Reclamation on:

- FKC current and forecasted operations;
- FKC current in-prism monitoring and forecasted water quality conditions; and,
- Pertinent pump-in programs' operations and water quality conditions.

E. Implementation Responsibilities and Costs

FWA will be responsible for the following actions:

- Maintain and calibrate conductivity meters
- Perform water quality sampling during pump-in operations
- Coordinate laboratory water quality testing
- Coordinate with Contractors on water quality data monitoring and analysis
- Manage in-prism water quality and manage operations database
- Perform weekly water quality reporting and forecasting using FKC Water Quality Model
- Perform weekly analysis to determine mitigation and distribution to respective Friant Contractors or any other Contractor party(ies) using the FKC Water Quality Mitigation Ledger
- Coordinate with Reclamation's SCCAO on water quality reporting, mitigation, and contractual requirements

- Coordinate and facilitate the work of Water Quality Advisory Committee and the Monitoring Subcommittee.

Costs for implementation and administration of these Guidelines will be initially paid out of the FWA Operation, Maintenance, and Replacement (OM&R) budget, and subsequently will be reimbursed by Contractors. The Contractor will pay a dollar per acre-foot ($/acre-foot) fee ("**Water Quality Fee**") for introduced Non-Millerton water, that will be credited to the FWA OM&R budget. The Water Quality Fee will be adopted by the FWA Board of Directors and will be based on an estimate of total annual costs divided by average annual deliveries of pump-in programs into the FKC. The Water Quality Fee will be applied to all introduced Non-Millerton water even if mitigation is not required

Annual costs and deliveries will be reassessed every year and compared to estimates provided in Attachment E to determine if any adjustments are required to the Water Quality Fee.

Definitions

Contractors: Water contractors and other parties authorized to introduce or receive Non-Millerton water into or from the FKC.

Cooperative Agreement: The agreement between FWA and the participating Contractors regarding the establishment, implementation and management of these Guidelines.

CVC: Cross Valley Canal

EC: Salinity measured as electrical conductivity

ELAP: Environmental Laboratory Accreditation Program

Friant Contractors: Friant Division contractors with long-term contracts with Reclamation.

FWA: Friant Water Authority, a California joint powers agency.

IOS: Intellisite Operation System

Ledger: The Water Quality Mitigation Ledger that tracks and accounts for all inflows into and diversions from the FKC in order to determine appropriate mitigation for impacted water quality attributable to the introduced Non-Millerton water.

Maximum Contaminant Level (MCL): Usually reported in milligrams per liter (parts per million) or micrograms per liter (parts per billion).

Non-Millerton Water: All water introduced into the Friant-Kern Canal other than directly from Millerton Lake to the headworks of the FKC.

OM&R: Operation, Maintenance and Replacement

Put: The introduction of Non-Millerton water into the FKC.

Project: The Friant Division of the Central Valley Project, specifically the Friant-Kern Canal.

Reclamation: U.S. Department of the Interior, Bureau of Reclamation.

SCCAO: Reclamation's South-Central California Area Office.

Take: The delivery of Friant Division Class 1, Class 2, Recovered Water Account (RWA [Paragraph 16b]), and Unreleased Restoration Flows supplies.

Taker: A Friant Contractor receiving an eligible Take.

Title 22: The Domestic Water Quality and Monitoring Regulations specified by the State of California Health and Safety Code (Sections 116270-116755), and California Code of Regulations (Sections 6440 et seq.), as amended.

Water Quality Fee: The fee established by FWA for introduced Non-Millerton water to fund this water quality program.

Tables

Table 1. Water Quality Constituents

Table 2. Check Structure Locations for Real-Time Measurements of Electrical Conductivity

Table 3. Friant-Kern Canal In-Prism Water Quality Thresholds

Table 4: Friant-Kern Canal Water Quality Constituents Short List.

Attachments

Attachment A: Water Quality Advisory Committee Charter

Attachment B: Monitoring Program Summary

Attachment C: Agronomic Impacts and Mitigation

Attachment D: Ledger Standard Operating Procedures

Attachment E: FKC Water Quality Guidelines Cost Allocation

The non-Project water discharged into Federal Facilities must comply with the California Drinking Water standards (Title 22)[2] listed in Table 1. However, selenium thresholds cannot exceed 2 micrograms per liter as defined in Table 4.

Table 1 Title 22 Water Quality Standards

Constituent	Units	MCL	Detection Limit for Reporting	CAS Registry Number	Recommended Analytical Method
Primary					
Aluminum	mg/L	1 (1)	0.05 (2)	7429-90-5	EPA 200.7
Antimony	mg/L	0.006 (1)	0.006 (2)	7440-36-0	EPA 200.8
Arsenic	mg/L	0.010 (1)	0.002 (2)	7440-38-2	EPA 200.8
Asbestos	MFL	7 (1)	0.2 MFL>10µm (2)	1332-21-4	EPA 100.2
Barium	mg/L	1 (1)	0.1 (2)	7440-39-3	EPA 200.7
Beryllium	mg/L	0.004 (1)	0.001 (2)	7440-41-7	EPA 200.7
Cadmium	mg/L	0.005 (1)	0.001 (2)	7440-43-9	EPA 200.7
Chromium, total	mg/L	0.05 (1)	0.01 (2)	7440-47-3	EPA 200.7
Copper	mg/L	1.3	0.050 (2)	7440-50-8	EPA 200.7
Cyanide	mg/L	0.15 (1)	0.1 (2)	57-12-5	EPA 335.2
Fluoride	mg/L	2.0 (1)	0.1 (2)	16984-48-8	EPA 300.1
Hexavalent Chromium	mg/L	0.010 (1)	0.001 (2)	18540-29-9	EPA 218.7
Lead	mg/L	0.015 (9)	0.005 (2)	7439-92-1	EPA 200.8
Mercury	mg/L	0.002 (1)	0.001 (2)	7439-97-6	EPA 245.1
Nickel	mg/L	0.1 (1)	0.01 (2)	7440-02-0	EPA 200.7
Nitrate (as nitrogen)	mg/L	10 (1)	0.4 (2)	7727-37-9	EPA 300.1
Nitrate + Nitrite (sum as nitrogen)	mg/L	10 (1)		14797-55-8	EPA 353.2
Nitrite (as nitrogen)	mg/L	1 (1)	0.4 (2)	14797-65-0	EPA 300.1
Perchlorate	mg/L	0.006 (1)	0.004 (2)	14797-73-0	EPA 314/331/332
Selenium	mg/L	0.002 (10)	0.001	7782-49-2	EPA 200.8
Thallium	mg/L	0.002 (1)	0.001 (2)	7440-28-0	EPA 200.8
Thiobencarb	mg/L	0.07		28249-77-6	EPA 527
Secondary					
Aluminum	mg/L	0.2 (6)		7429-90-5	EPA 200.7
Chloride	mg/L	500 (7)		16887-00-6	EPA 300.1
Color	units	15 (6)			EPA 110
Copper	mg/L	1.0 (6)	0.050 (8)	7440-50-8	EPA 200.7
Iron	mg/L	0.3 (6)		7439-89-6	EPA 200.7
Manganese	mg/L	0.05 (6)		7439-96-5	EPA 200.7
Methyl-tert-butyl ether (MTBE)	mg/L	0.005 (6)		1634-04-4	EPA 502.2/524.2
Odor -threshold	units	3 (6)			SM 2150B
Silver	mg/L	0.1 (6)		7440-22-4	EPA 200.7
Specific Conductance	µS/cm	1,600 (7)			SM 2510 B

[2] California Code of Regulations, Title 22. The Domestic Water Quality and Monitoring Regulations specified by the State of California Health and Safety Code (Sections 4010 4037), and Administrative Code (Sections 64401 et seq.), as amended https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/dw_regulations_2019_03_28.pdf

Constituent	Units	MCL	Detection Limit for Reporting	CAS Registry Number	Recommended Analytical Method
Sulfate	mg/L	500 (7)		14808-79-8	EPA 300.1
Thiobencarb	mg/L	0.001 (6)		28249-77-6	EPA 527
Total Dissolved Solids	mg/L	1,000 (7)			SM 2540 C
Turbidity	units	5 (6)			EPA 190.1/SM2130B
Zinc	mg/L	5.0 (6)		7440-66-6	EPA 200.7
Other Required Analyses					
Boron	mg/L	2.0 (13)		7440-42-8	EPA 200.7
Molybdenum	mg/L	0.01 (11)		7439-98-7	EPA 200.7
Sodium	mg/L	200 (12)		7440-23-5	EPA 200.7
Radioactivity					
Gross alpha*	pCi/L	15 (3)			SM 7110C
Organic Chemicals					
(a) Volatile Organic Chemicals (VOCs)					
Benzene	mg/L	0.001 (4)	0.0005 (5)	71-43-2	EPA 502.2/524.2
Carbon Tetrachloride	mg/L	0.0005 (4)	0.0005 (5)	56-23-5	EPA 502.2/524.2
1,2-Dichlorobenzene.	mg/L	0.6 (4)	0.0005 (5)	95-50-1	EPA 502.2/524.2
1,4-Dichlorobenzene.	mg/L	0.005 (4)	0.0005 (5)	106-46-7	EPA 502.2/524.2
1,1-Dichloroethane	mg/L	0.005 (4)	0.0005 (5)	75-34-3	EPA 502.2/524.2
1,2-Dichloroethane	mg/L	0.0005 (4)	0.0005 (5)	107-06-2	EPA 502.2/524.2
1,1-Dichloroethylene	mg/L	0.006 (4)	0.0005 (5)	75-35-4	EPA 502.2/524.2
cis-1,2-Dichloroethylene	mg/L	0.006 (4)	0.0005 (5)	156-59-2	EPA 502.2/524.2
trans-1,2-Dichloroethylene	mg/L	0.01 (4)	0.0005 (5)	156-60-5	EPA 502.2/524.2
Dichloromethane.	mg/L	0.005 (4)	0.0005 (5)	75-09-2	EPA 502.2/524.2
1,2-Dichloropropane.	mg/L	0.005 (4)	0.0005 (5)	78-87-5	EPA 502.2/524.2
1,3-Dichloropropene.	mg/L	0.0005 (4)	0.0005 (5)	542-75-6	EPA 502.2/524.2
Ethylbenzene.	mg/L	0.3 (4)	0.0005 (5)	100-41-4	EPA 502.2/524.2
Methyl-tert-butyl ether	mg/L	0.013 (4)	0.003 (5)	1634-04-4	EPA 502.2/524.2
Monochlorobenzene	mg/L	0.07 (4)	0.0005 (5)	108-90-7	EPA 502.2/524.2
Styrene.	mg/L	0.1 (4)	0.0005 (5)	100-42-5	EPA 502.2/524.2
1,1,2,2-Tetrachloroethane	mg/L	0.001 (4)	0.0005 (5)	79-34-5	EPA 502.2/524.2
Tetrachloroethylene (PCE)	mg/L	0.005 (4)	0.0005 (5)	127-18-4	EPA 502.2/524.2
Toluene	mg/L	0.15 (4)	0.0005 (5)	108-88-3	EPA 502.2/524.2
1,2,4-Trichlorobenzene	mg/L	0.005 (4)	0.0005 (5)	120-82-1	EPA 502.2/524.2
1,1,1-Trichloroethane	mg/L	0.200 (4)	0.0005 (5)	71-55-6	EPA 502.2/524.2
1,1,2-Trichloroethane	mg/L	0.005 (4)	0.0005 (5)	79-00-5	EPA 502.2/524.2
Trichloroethylene (TCE)	mg/L	0.005 (4)	0.0005 (5)	79-01-6	EPA 502.2/524.2
Trichlorofluoromethane	mg/L	0.15 (4)	0.005 (5)	75-69-4	EPA 502.2/524.2
1,1,2-Trichloro-1,2,2-Trifluoroethane	mg/L	1.2 (4)	0.01 (5)	76-13-1	SM 6200B
Vinyl Chloride	mg/L	0.0005 (4)	0.0005 (5)	75-01-4	EPA 502.2/524.2
Xylenes	mg/L	1.750* (4)	0.0005 (5)	1330-20-7	EPA 502.2/524.2
(b) Non-Volatile Synthetic Organic Chemicals (SOCs)					
Alachlor	mg/L	0.002 (4)	0.001 (5)	15972-60-8	EPA 505/507/508
Atrazine	mg/L	0.001 (4)	0.0005 (5)	1912-24-9	EPA 505/507/508
Bentazon	mg/L	0.018 (4)	0.002 (5)	25057-89-0	EPA 515.1
Benzo(a)pyrene	mg/L	0.0002 (4)	0.0001 (5)	50-32-8	EPA 525.2
Carbofuran	mg/L	0.018 (4)	0.005 (5)	1563-66-2	EPA 531.1
Chlordane	mg/L	0.0001 (4)	0.0001 (5)	57-74-9	EPA 505/508
2,4-D	mg/L	0.07 (4)	0.01 (5)	94-75-7	EPA 515.1

Constituent	Units	MCL	Detection Limit for Reporting	CAS Registry Number	Recommended Analytical Method
Dalapon	mg/L	0.2 (4)	0.01 (5)	75-99-0	EPA 515.1
Dibromochloropropane	mg/L	0.0002 (4)	0.00001 (5)	96-12-8	EPA 502.2/504.1
Di(2-ethylhexyl)adipate	mg/L	0.4 (4)	0.005 (5)	103-23-1	EPA 506
Di(2-ethylhexyl)phthalate	mg/L	0.004 (4)	0.003 (5)	117-81-7	EPA 506
Dinoseb	mg/L	0.007 (4)	0.002 (5)	88-85-7	EPA 5151-4
Diquat	mg/L	0.02 (4)	0.004 (5)	85-00-7	EPA 549.2
Endothall	mg/L	0.1 (4)	0.045 (5)	145-73-3	EPA 548.1
Endrin	mg/L	0.002 (4)	0.0001 (5)	72-20-8	EPA 505/508
Ethylene Dibromide	mg/L	0.00005 (4)	0.00002 (5)	106-93-4	EPA 502.2/504.1
Glyphosate (Roundup)	mg/L	0.7 (4)	0.025 (5)	1071-83-6	EPA 547
Heptachlor.	mg/L	0.00001 (4)	0.00001 (5)	76-44-8	EPA 508
Heptachlor Epoxide	mg/L	0.00001 (4)	0.00001 (5)	1024-57-3	EPA 508
Hexachlorobenzene	mg/L	0.001 (4)	0.0005 (5)	118-74-1	EPA 505/508
Hexachlorocyclopentadiene	mg/L	0.05 (4)	0.001 (5)	77-47-4	EPA 505/508
Lindane (gamma-BHC)	mg/L	0.0002 (4)	0.0002 (5)	58-89-9	EPA 505/508
Methoxychlor	mg/L	0.03 (4)	0.01 (5)	72-43-5	EPA 505/508
Molinate	mg/L	0.02 (4)	0.002 (5)	2212-67-1	EPA 525.1
Oxamyl	mg/L	0.05 (4)	0.02 (5)	23135-22-0	EPA 531.1
Pentachlorophenol	mg/L	0.001 (4)	0.0002 (5)	87-86-5	EPA 515.1-3
Picloram	mg/L	0.5 (4)	0.001 (5)	1918-02-1	EPA 515.1-3
Polychlorinated Biphenyls	mg/L	0.0005 (4)	0.0005 (5)	1336-36-3	EPA 130.1
Simazine	mg/L	0.004 (4)	0.001 (5)	122-34-9	EPA 505
Thiobencarb (Bolero)	mg/L	0.07 (4)	0.001 (5)	28249-77-6	EPA 527
Toxaphene	mg/L	0.003 (4)	0.001 (5)	8001-35-2	EPA 505
1,2,3-Trichloropropane	mg/L	0.000005 (4)	0.000005 (5)	96-18-4	SRL 524M
2,3,7,8-TCDD (Dioxin)	mg/L	3×10^{-8} (4)	5×10^{-9} (5)	1746-01-6	EPA 130.3
2,4,5-TP (Silvex)	mg/L	0.05 (4)	0.001 (5)	93-72-1	EPA 515.1
Other Organic Chemicals					
Chlorpyrifos	µg/L	0.015 (11)		2921-88-2	EPA 8141A
Diazinon	µg/L	0.10 (11)		333-41-5	EPA 8141A

Sources:

- Recommended Analytical Methods: https://www.nemi.gov/home/
- Maximum Contaminant Levels (MCL): Title 22. The Domestic Water Quality and Monitoring Regulations specified by the State of California Health and Safety Code (Sections 4010-4037), and Administrative Code (Sections 64401 et seq.), as amended.

(1) Title 22. Table 64431-A Maximum Contaminant Levels, Inorganic Chemicals
(2) Title 22. Table 64432-A Detection Limits for Reporting (DLRs) for Regulated Inorganic Chemicals
(3) Title 22. Table 64442 Radionuclide Maximum Contaminant Levels (MCLs) and Detection Levels for Purposes of Reporting (DLRs)
(4) Title 22. Table 64444-A Maximum Contaminate Levels, Organic Chemicals
(5) Title 22. Table 64445.1-A Detection Limits for Purposes of Reporting (DLRs) for Regulated Organic Chemicals
(6) Title 22. Table 64449-A Secondary Maximum Contaminant Levels "Consumer Acceptance Contaminant Levels"
(7) Title 22. Table 64449-B Secondary Maximum Contaminant Levels "Consumer Acceptance Contaminant Level Ranges"
(8) Title 22. Table 64678-A DLRs for Lead and Copper
(9) Title 22. Section 64678 (d) Lead Action level
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/dw_regulations_2019_03_28.pdf

- California Regional Water Quality Control Board, Central Valley Region, Fourth Edition of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins. Revised June 2015

(10) Basin Plan, Table III-1 (ug/L) (selenium in Grasslands water supply channels)
(11) Basin Plan, Table III-2A. 4-day average (chronic) concentrations of chlorpyrifos & diazinon in San Joaquin River from Mendota to Vernalis
https://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/delta_op_pesticide/

- Ayers, R. S. and D. W. Westcot, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations - Irrigation and Drainage Paper No. 29, Rev. 1, Rome (1985).

(12) Ayers, Table 1 (mg/L) (sodium)
(13) Ayers, Table 1 (mg/L) (boron)
http://www.fao.org/3/T0234E/T0234E00.htm

- (14) Requested by State Water contractors, no MCL specified.

- California Regional Water Quality Control Board. PFAS Per-and Polyfluoroalkyl Substances. (15) Testing Methods in California Drinking Water https://www.waterboards.ca.gov/pfas/

Table 2. Check Structure Locations for Real-Time Measurements of Electrical Conductivity

Check Structure	Milepost
Little Dry Creek	5.50
Kings River	28.52
Sand Creek	46.04
Dodge Ave	61.03
Kaweah River	71.29
Rocky Hill	79.25
Fifth Ave	88.22
Tule River	95.67
Deer Creek	102.69
White River	112.90
Reservoir (Woollomes)	121.51
Poso Creek	130.03
Shafter	137.20
Kern River	151.81

Table 3. Friant-Kern Canal In-Prism Water Quality Thresholds

Period	Salinity expressed as EC (µS/cm)	Chloride (mg/L)	Boron (mg/L)[1]	Turbidity (NTU)[6]	Total Suspended Solids (ppm)[6]	SAR[7]	Sodium (mg/L)[7]
Period 1 March 1 – June 30	1,000[2]	102[3]	0.4	40	20	3	69
Period 2 July 1 – August 31	500[4]	55[4]	0.4	40	20	3	69
Period 3a September 1 – February 28	1,000[2]	102[3]	0.4	40	20	3	69
Period 3b September 1 – February 28	1,000[2]	123[5]	0.4	40	20	3	69

Notes:

Thresholds adapted from Grieve, C.M., S.R. Grattan and E.V. Maas. 2012. Plant salt tolerance. In. (W.W. Wallender and K.K. Tanji, eds). Agricultural Salinity Assessment and Management (2nd edition). ASCE pp 405-459; and Ayers, R.S. and D.W. Westcot 1985. Water quality for agriculture. FAO Irrigation and Drainage Paper 29 (rev 1). Food and Agriculture Organization of the United Nations. Rome

For addition detail, see Attachment C – Agronomic Impacts and Mitigation.

When Friant-Kern Canal in-prism water quality conditions in this table are exceeded, Friant Division Long-Term Contractors will work together to seek 1:1, unleveraged, and cost-neutral exchanges for pump-in and pump-back programs. This does not apply to spot-market or third-party exchanges.

[1] Grapes are used as a representative crop for boron sensitivity and are prevalent in the Friant Division. They are used as a surrogate for many other sensitive crop types such as apricots, figs, and grapefruits. Threshold assumes conventional irrigation with minimum 20 percent leaching fraction applied.

[2] Threshold assumes minimum of 20 percent leaching requirement applied and adjusted to account for regulated deficit irrigation during almond hull split period (July 1 – August 31) to not exceed maximum EC_{et}. Almonds on Nemaguard rootstock are used as a representative crop for salinity sensitivity and are prevalent in the Friant Division. They are used as a surrogate for many other sensitive crop types such as apples, cherries, pears, pistachios, and walnuts.

[3] Threshold assumes minimum of 20 percent leaching requirement applied and then adjusted to account for regulated deficit irrigation during almond hull split period (July 1 – August 31) to not exceed maximum Cl-et. Almonds on Nemaguard rootstock used as a representative crop for chloride sensitivity. They are used as a surrogate for other sensitive crops including cherries, pistachios, and walnuts. If the measured average chloride concentration for Period 1 exceeds 70 mg/L, the chloride threshold remains at 102 mg/L.

[4] Threshold applies to almond hull split period when regulated deficit irrigation is applied to avoid hull rot. This threshold is used assuming irrigation applications are reduced to 50 percent of the tree water requirement and subsequently thresholds applied for the remainder of the year have been adjusted to account for additional salt accumulation. This threshold was developed with consideration of existing program operations, historical water quality data, and absolute water quality thresholds.

[5] If the measured average chloride concentration in Period 1 (March 1 – June 30) is less than or equal to 70 mg/L, the allowable chloride threshold for Period 3 (September 1 – February 28) is increased to 123 mg/L.

[6] Applied TSS and turbidity thresholds from section 3 of the Final Initial Study/Negative Declaration for: Warren Act Contract and License, and Operation and Maintenance Agreement to Introduce Floodwaters from Reclamation District 770 into the Friant-Kern Canal, March 2017. Additional detail provided in Attachment C – Agronomic Impacts and Mitigation

[7] SAR and Sodium are managed together. If the measured SAR value exceeds 3 AND the measured sodium concentration exceeds a threshold of 69 mg/L, management will be necessary. SAR is derived from Ayers Table 1 and assumes surface irrigation. The sodium threshold is also derived from Ayers Table 1 and suggests that irrigation waters <3 meq/L (69 mg/L) is suitable for crops that are sprinkler irrigated.

Key:

µS/cm = microsiemens per centimeter (1 µS/cm = 1 µmhos/cm = 1/1,000 dS/m)
ASCE = American Society of Civil Engineers
Cl^-_{et} = maximum chloride threshold of the saturated soil paste
EC = electrical conductivity of applied water
EC_{et} = Soil salinity threshold for a given crop
FAO = Food and Agriculture Organization of the United Nations
Friant Division = Friant Division of the Central Valley Project
mg/L = milligrams per liter
SAR = sodium adsorption ratio
TDS = total dissolved solids

Table 4: Friant-Kern Canal Water Quality Constituents Short List

Constituent	Units	Thresholds
1,2,3 TCP	(µg/L)	0.005
Arsenic	(mg/L)	0.010
Bicarbonate	(mg/L)	--
Boron	(mg/L)	See Table 3
Bromide	(mg/L)	--
Calcium	(mg/L)	--
Chloride	(mg/L)	See Table 3
Chromium, total	(mg/L)	0.05
Hexavalent chromium	(mg/L)	0.010
Iron	(µg/L)	300
Magnesium	(mg/L)	--
Manganese	(µg/L)	50
Nitrate	(mg/L)	10
pH		--
SAR		See Table 3
Salinity (as EC)	(µS/cm)	See Table 3
Selenium	(µg/L)	2
Sodium	(mg/L)	See Table 3
Sulfate	(mg/L)	500
TDS	(mg/L)	-- *
Total Organic Carbon	(mg/L)	--
TSS	(ppm)	See Table 3
Turbidity	(NTU)	See Table 3
Gross alpha	pCi/L	15

Notes:
Thresholds are Title 22 MCLs unless otherwise noted.
Constituent with threshold denoted as "--" do not have an established MCL.
Refer to Table 1 and Notes for Table 1 for additional details.
*TDS MCL not listed for the purposes of these Guidelines. TDS and EC are both a measure of salinity and the EC thresholds shown in Table 3 are controlling.