CT 2898

United States Department of the Interior

BUREAU OF RECLAMATION
Central Valley Operations Office
3310 El Camino Avenue, Suite 300
Sacramento, California 95821

IN REPLY
REFER TO:

CVO-100
WTR.1-10

JUL 0 1 2004

7/29 due 7/24/04

Ms. Celeste Cantú
Executive Director
State Water Resources Control Board
P.O. Box 2000
Sacramento, California 95812-2000

Dear Ms. Cantú:

The Bureau of Reclamation (Reclamation) and the California Department of Water Resources (Department) are submitting for your approval the Joint Point of Diversion (JPOD) Water Quality Response Plan (WQRP) for JPOD stages 1 and 2. The WQRP addresses the requirements of State Water Resources Control Board Water Rights Decision1641 (D-1641) to develop and provide a response plan to ensure that water quality in the southern and central Delta will not be significantly degraded through operations of the JPOD to the injury of water users in the southern and central Delta.

To facilitate preparation of the WQRP, your staff clarified the requirements of the WQRP in a letter dated March 19, 2004. In the letter, you stated, "Significant degradation may occur in the absence of violations of water quality objectives in cases where degradation impairs a senior water right of water of a usable quality". To determine if such degradation (or salinity increase) occurs, you requested additional modeling analysis to demonstrate the likely effects to water quality by utilizing JPOD during periods when the Delta is in excess conditions. Enclosed with the WQRP is the requested analysis. It compares water quality conditions at key locations in the Delta resulting from operating to Decision 1485 to those conditions when operating to Decision 1641 with JPOD. In most cases, the analysis shows conditions to be as good or better than water quality conditions resulting from operating to D-1485. In the few instances where a rise in salinity occurs, it is either a slight rise or it does not raise the salinity to a level that makes it unusable to Contra Costa Water District. In either case, salinity remains well below the water quality standards for M&I use contained in D-1641. Any of the possible increases in salinity resulting from JPOD do not rise to the level of "injury" under the water code.

Reclamation and the Department have forwarded an electronic draft WQRP and supporting analysis materials to your staff and to Contra Costa Water District (CCWD) staff. CCWD staff reviewed the draft WQRP in a letter dated May 26, 2004 to Reclamation and the Department. Reclamation and the Department staff have reviewed CCWD comments and have incorporated some of their suggested changes to the final WQRP, however Reclamation and the Department.

Reclamation and the Department staff have reviewed CCWD comments and have incorporated some of their suggested changes to the final WQRP, however Reclamation and the Department have not incorporated all of CCWD requested changes. The following is a brief discussion of changes requested by CCWD that were not included in the final WQRP.

1. CCWD requested the first bullet under Action Items be modified as follows:

- *Reclamation and the Department will meet D-1641 standards required by their water right permits for western Delta agricultural beneficial uses and for Delta municipal and industrial beneficial uses. ~~Assuring that no change in water quality will rise to the level that would cause injury to water users in the southern and central Delta.~~*

CCWD's claim is that the SWRCB's March 19, 2004 letter states that, "Significant degradation may occur in the absence of violations of water quality objectives in cases where degradation impairs a senior water right of water of a usable quality." Therefore, CCWD states meeting standards is not sufficient to ensure water users are not injured.

Reclamation and the Department disagree with the claim that JPOD will degrade water quality significantly to the point of injury. Beneficial use standards are the measure for which water quality is satisfactory (non-injury) to meet the intended beneficial use. CCWD is a municipal and industrial user in the Delta and Reclamation and the Department will meet municipal and industrial beneficial use standards in the Delta.

To accept CCWD's claim would, in essence, create a new water quality standard in the Delta based on a delineation of water quality for CCWD's Los Vaqueros water rights, something not given in SWRCB D-1629. In SWRCB D-1629, CCWD applied for and received permits for a water supply and a water right, which did not include water at a given quality. Reclamation and the Department did not include the requested language change in the WQRP because to do so could affect any future new project in the central valley that utilizes surplus or excess water for beneficial use purposes by creating the need to protect water quality to a new water quality threshold associated with CCWD's Los Vaqueros water right diversion, not beneficial use standards.

2. CCWD also requested that the WQRP contain the following language:

- *Projects will prepare modeling forecasts for water quality prior to JPOD usage with and without JPOD. Whenever water quality modeling suggests that JPOD usage may cause degradation at CCWD intakes during excess conditions when CCWD's Los Vaqueros water right permit conditions are met, the Projects will provide the modeling results to CCWD and consult with CCWD prior to JPOD usage to ensure impacts are avoided.*

CCWD claims the provided modeling analysis illustrates significant degradation of water quality. Reclamation and the Department claim the analysis supports no significant degradation or injury. Salinity and chlorides are water quality constituents for which the SWRCB has set

expected changes in salinity are slight and remain well within the applicable salinity standards. Therefore, no "injury" occurs due to the JPOD approvals.

CCWD would like for the projects to model and forecast JPOD operations for potential changes to water quality prior to implementing JPOD during excess conditions and consult with CCWD prior to JPOD. The SWRCB staff asked for a long-term modeling comparison of water quality conditions under SWRCB D-1485 project operations and SWRCB D-1641 with JPOD, not a comparison of operations with and without JPOD. Municipal and Industrial beneficial use standards will be met under JPOD operations. Therefore, no significant injury can occur to CCWD water rights on the basis of water quality. A forecast is unnecessary by definition, time-consuming, and a basis for subjective speculation of impacts.

Modeling forecasts are a component of Reclamation and the Department's water level response plan for south delta water user interests. The need for forecasting water level concerns is to determine if JPOD operations are expected to induce lower water levels that interfere with south delta water users ability to access their water supplies for beneficial use purposes. If during the forecasted time period JPOD operations lower water levels below the analysis projections and interfere with south delta operations, an injury has potentially occurred and JPOD operations must be ceased or mitigated. Water quality for beneficial use purposes is protected by setting limits on the concentration of constituents in water bodies that are determined to satisfy basic beneficial uses. Therefore, Reclamation and the Department did not include in the WQRP a requirement to model or forecast water quality. Reclamation and the Department did include an action item to provide to CCWD seasonal forecasts of projected use of CVP and SWP Delta export facilities for JPOD and water transfers in order for CCWD to anticipate how project operations will likely operate in the Delta environment.

If you have any questions please contact Paul Fujitani at 916-979-2197 with Reclamation or Curtis Creel at 916-574-2722 with the Department.

Chester V. Bowling
Bureau of Reclamation
Operations Manager

Chester V. Bowling

for Carl A. Torgersen
Chief, SWP Operations Control Office
California Department of Water Resources

Enclosures

cc: Mr. Greg Gartrell
Assistant General Manager
Contra Costa Water District
P.O. Box H20
Concord, CA 94524

Mr. Michael Aceituno
Sacramento Area Office
NOAA Fisheries
650 Capitol Mall, Suite 8-300
Sacramento, CA 95814-4706

Mr. Russ Kanz
Environmental (Specialist)
State Water Resources Control Board
P.O. Box 2000
Sacramento, CA 95812-2000

Mr. Wayne White
Field Supervisor
U.S. Fish and Wildlife Service
2800 Cottage Way, Suite W-2605
Sacramento, CA 95825

Dr. Diana Jacobs
Deputy Director, Scientific Advisor
Department of Fish & Game
1416 9th Street
Sacramento, CA 95814

Mr. Alex Hildebrand
South Delta Water Agency
4255 Pacific Ave., Suite 2
Stockton, CA 95207

U.S. Bureau of Reclamation and California Department of Water Resources Water Quality Response Plan for use of Joint Points of Diversion under Water Right Decision 1641

The State Water Resources Control Board (SWRCB) Water Right Decision 1641 (D-1641) establishes three stages under which Joint Points of Diversion (JPOD) can be used by either the Department of Water Resources (Department) or the United States Bureau of Reclamation (Reclamation) for diversions of Delta water supplies at the State Water Project (SWP) Banks pumping plant and Central Valley Project (CVP) Tracy pumping plant, respectively. Stage 1 allows JPOD use for selected purposes including the recovery of export reductions taken to benefit fish. Stage 2 allows JPOD use for any authorized purpose up to the current regulatory capacity of these facilities. Stage 3 allows JPOD use up to the physical capacity of these facilities authorized under their water right permits. The use of the JPOD in each of these stages requires among other things the development of a Water Quality Response Plan (Plan).

This plan does not address stage 3 use of JPOD as such use is not contemplated at this time, however Reclamation and the Department acknowledge that stage 3 is subject to the D-1641 permit term,

> Permittee shall protect water levels in the southern Delta through measures to maintain water levels at elevations adequate for diversion of water for agricultural uses. This requirement can be satisfied through construction and operation of three permanent tidal barriers in the southern Delta or through other measures that protect water quality in the southern and central Delta and protect water levels at elevations adequate to maintain agricultural diversions. If construction and operation of tidal barriers is used as a basis for Stage 3 operation, such construction and operation shall be subject to certification of a project-level Environmental Impact Report by Permittee that discloses the impacts of tidal barriers. (Page 153)

Reclamation and the Department will need to submit to the Executive Director an operations plan consistent with Stage 3 requirements at a future date based on information and analysis to address permanent tidal barriers or other measures.

The use of JPOD for all stages is subject to several D-1641 terms and conditions relating to Contra Costa Water District's (CCWD) Los Vaqueros Project operations and CCWD water right Permits 20749 and 20750. The first term and condition in D-1641 reads (Page 150):

(1) Diversion by the USBR at Banks Pumping Plant is not authorized when the Delta is in excess condition and such diversion causes the location of X2 to shift upstream so far that:

(a) It is east of Chipps Island (75 river kilometers upstream of the Golden Gate Bridge) during the months of February through May, or
(b) It is east of Collinsville (81 kilometers upstream of the Golden Gate Bridge) during the months of January, June, July, and August, or
(c) During December it is east of Collinsville and delta smelt are present at Contra Costa Water District's point of diversion under Permits 20749 and 20750 (Application 20245).

A similar permit term applies for diversion by the Department at Tracy Pumping Plant.

Reclamation and the Department recognize that this permit term and condition has its genesis from conditions in the 1993 biological opinion by the U.S. Fish and Wildlife Service addressing the impact of the Los Vaqueros Project operations on delta smelt. Recently, at the request of CCWD, the applicable conditions in that biological opinion were modified for a three year trial period. The modification will bring the terms of the biological opinion into closer conformance with D-1641 criteria for X2. Therefore, the modified terms and conditions in the biological opinion for this trial period, CCWD may divert water to Los Vaqueros storage under less stringent X2 conditions than applies to JPOD under D-1641.

Reclamation and the Department recognize that JPOD export is not authorized, and will not pursue such an operation when the Delta is in excess conditions, until the location of X2 is west of Chipps Island in February through May, west of Collinsville in January, June, July, or August, or during December X2 is west of Collinsville and no delta smelt are present at CCWD's point of diversions under Permits 20749 and 20750 (Application 20245).

As you are aware, Reclamation and the Department monitor water quality at these locations and estimate the current location of X2. Reclamation and the Department will use EC measurements taken at their Collinsville and Mallard Slough continuous monitoring stations to determine when X2 is downstream of the permit term locations. Reclamation and the Department will comply with the permit term by monitoring when the daily average or 14-day running average EC at Collinsville is at or below 2.64 mmhos/cm, then X2 is west of Collinsville. Similarly, when the daily average or 14-day running average EC for Chipps Island (as estimated from the Mallard Slough station) is 2.64 mmhos/cm or less, then X2 is west of Chipps Island.

The second permit term and condition reads (Page 150):

(2) Any diversion by Permittee at the Banks Pumping Plant that causes the Delta to change from excess to balanced conditions shall be junior in priority to Permits 20749 and 20750 of the Contra Costa Water District.

A similar permit term applies to the use at Tracy Pumping Plant by the Department.

The plain meaning of this term is that the water right permits held by CCWD are senior in priority to the use of JPOD during the **transition period from excess to balanced conditions** in the Delta. Reclamation and the Department will coordinate with CCWD on a timely basis to determine the extent to which the quantities of water diverted by CCWD pursuant to its water service contract with Reclamation should be adjusted to recognize the senior priority of CCWD's permits during this transition period. Reclamation and the Department assert that there is no issue of priority between JPOD operation and CCWD permits 20749 and 20750 under excess conditions in the Delta.

Under the combination of all the below listed project operational conditions, an accounting adjustment is appropriate during the transition period from excess to balanced conditions in the Delta to recognize CCWD's senior water permits: (Refer to attached hypothetical scenario as an example illustration of project operations records and the water rights/contractual adjustment process)

(a) The Delta changes from excess conditions to balanced conditions in order to meet a D-1641 beneficial use standard and to account for the relative CVP and SWP water responsibilities in the Coordinated Operations Agreement (COA) process. (Generally, the COA directs which project needs to first modify reservoir releases or exports in order to continue meeting D-1641 beneficial use standards)
(b) CCWD continues to exercise water right permits 20749 and 20750 by diverting available water supplies to Los Vaqueros storage.
(c) JPOD export continues at a recorded rate per day.

An accounting adjustment is made to credit CCWD for LosVaqueros water right diversion under balanced conditions rather than CVP contract water on a daily basis for the minimum of either:

(a) The daily rate of JPOD export.
(b) The CCWD diversion to Los Vaqueros storage.

The water right crediting continues until one of the following conditions is met:

(a) JPOD has ceased on a daily basis.
(b) CVP or SWP reservoir release increases by an amount equal to or exceeding the JPOD export rate enter the Delta to support the JPOD under balanced water conditions.

The fifth term and condition of D-1641 reads (Page 150):

(3) Permittee shall develop a response plan to ensure that water quality in the southern and central Delta will not be significantly degraded through operations

> of the JPOD to the injury of water users in the southern and central Delta. Such a plan shall be prepared with input from the designated representative of the Contra Costa Water District (CCWD) and approved by the Chief, Division of Water Rights.

Reclamation and Department operations staff, have met with representatives of CCWD. The parties differ on the interpretation and determination of significant degradation to water quality and injury to legal users within the context of the 1995 Bay Delta Plan and D-1641 water quality standards for the protection of beneficial uses.

In addition to operating JPOD for the CVP and the SWP consistent with this Plan, Reclamation and the Department will also follow this Water Quality Response Plan when operating the Delta pumping facilities to facilitate potential water transfers of their own, and water transfers of third parties.

Delta Conditions Applicable to the Plan

The use of JPOD by the Department or Reclamation occurs during two distinct types of water balance conditions in the Delta:

(1) "excess conditions" when releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley inbasin uses plus exports. Inbasin uses in this definition include western Delta salinity standards and fishery beneficial use standards contained in D-1641.

(2) "balanced conditions" when both Projects agree that releases from upstream reservoirs plus unregulated flow approximately equal the water supply needed to meet inbasin uses (including D-1641 standards) plus exports.[1]

During excess conditions water quality in the Delta is by definition better than that required by D-1641 standards. Reclamation and the Department, per SWRCB staff request in a March 19th 2004 letter, modeled CVP-SWP operations under D-1485 criteria and D-1641 criteria with JPOD in use under excess conditions. Reclamation and the Department, also modeled water quality in the Delta for both operations. The results of the analysis are attached to this draft plan.

Additionally, Reclamation and the Department recognize that JPOD export is not authorized under excess conditions until the location of X2 is west of Chipps Island in February through May, west of Collinsville in January, June, July, or August, or during December X2 is west of Collinsville and no delta smelt are present at CCWD's point of diversions under Permits 20749 and 20750 (Application 20245).

[1] Excess and Balanced Conditions in the Delta are defined on page 4 of the Agreement between the U.S. and California for the Coordinated Operation of the CVP and SWP (Nov. 24, 1986).

The attached analysis shows that when JPOD is used (excess conditions, X2 location west of requirements), the water quality conditions in the interior Delta are well below the M&I beneficial use standard and therefore JPOD use would not cause significant injury to any other legal user including CCWD. Due to the X2 condition permit requirement, (genesis from the Los Vaqueros Project B.O.), the SWRCB has mandated that water quality conditions in the Delta be essentially identical for CCWD to utilize Permits 20749 and 20750 and for the projects to utilize JPOD under excess conditions.

During the transition from excess to balanced conditions, the applicable terms and conditions in D-1641 have protected CCWD from injury by requiring that any diversion by the Department and Reclamation for JPOD that causes a change from excess to balanced conditions is junior in priority to the CCWD Permits 20749 and 20750 (Los Vaqueros Project). Under balanced conditions, CCWD Permits 20749 and 20750 do not have an unappropriated water to support the permits. Although it is unlikely that JPOD would cause a distinct transition from excess to balanced conditions, if this occurred, Reclamation and the Department would meet with CCWD to agree on the water right adjustment associated with the quantity impact to CCWD's senior water rights. In such a transition period, CCWD would likely continue to divert water to Los Vaqueros storage, because the interior water quality is generally very good.

During balanced conditions, Reclamation and the Department operate the CVP and SWP to meet the standards in D-1641. Under balanced conditions and during most of the summer/fall period when water quality concerns for M&I beneficial uses typically occur in the Delta, CCWD diverts water from the Delta under a water supply contract with Reclamation (Amendatory Contract No.I75r-3401) utilizing water rights held by Reclamation. The water supply contract does not guarantee any water quality better than that required by Reclamation's water right permits (ie. D-1641 standards). [2] Therefore, changes in water quality during balanced conditions and periods when CCWD obtains water under its contract with Reclamation will not affect CCWD's water rights or cause CCWD injury to their water rights.

Transfers by Third Parties

Reclamation and the Department coordinate and facilitate water transfers through the Delta to project export facilities, under balanced conditions. As part of CVP-SWP operations to meet water quality beneficial use standards, Reclamation and the Department assess a water cost to third party water transfers, known as "carriage water", in order to offset any added water costs of implementing the water transfer to the CVP-SWP water supplies in order to maintain compliance with water quality standards. When

[2] The actual operation of CCWD's Los Vaqueros Project is highly influenced by the availability of high quality water in the Delta at CCWD's Old River Intake, not just the water right permit under which the water is diverted. There will be times when CCWD will not divert under Permit 20749 because the salinity of the water at the Old River intake is not suitable to be used as blending water later in the year. There will be other times when CCWD will divert to Los Vaqueros storage under Reclamation water rights because the salinity is suitable to be used as blending water later in the year. The determination of water quality suitability of the available water supplies is at the discretion of CCWD.

Reclamation and the Department utilize each other's project facility under JPOD authority under balanced conditions, "carriage water" costs are met by the party using the JPOD.

Response Plan Actions

As discussed, some minor degradation in Delta water quality could be caused from JPOD operations during excess conditions when water quality is better than that required by D-1641 standards. However, during balanced conditions, Reclamation and the Department are responsible to maintain D-1641 water quality standards with or without the use of JPOD operations. Therefore, Reclamation and the Department will take the following actions to address JPOD and water transfers at the CVP and SWP in order to assure that these operations will not injure any legal user of water in the southern and central Delta and to meet requirements of D-1641 and Water Code Section 1702:

- Reclamation and the Department will meet D-1641 standards required by their water right permits for western Delta agricultural beneficial uses and for Delta municipal and industrial beneficial uses assuring that no change in water quality will rise to the level that would cause injury to water users in the southern and central Delta.

- Reclamation and the Department will assess carriage water costs to third parties for water transfers to maintain D-1641 water quality standards and to protect the SWP and CVP water supplies from the increased water costs associated with facilitating the transfer.

  (When JPOD operations is performed by Reclamation and the Department, the CVP and SWP supply the carriage water from their own resources to meet the cost of JPOD use.)

- Reclamation and the Department will provide to CCWD seasonal forecasts of use of CVP and SWP Delta export facilities for JPOD and water transfers.

- Reclamation and the Department will meet with CCWD to determine the extent to which the quantities of water diverted by CCWD pursuant to its water service contract with Reclamation should be adjusted.

Example - Hypothetical Adjustment to CCWD WR Permits Diversion Accounting
while JPOD is in use during an Excess to Balanced Delta Conditions transistion period.

Day	Delta Condition	JPOD Export Rate CFS	CCWD Permit to LV storage CFS	USBR Permit to LV storage CFS	Increased Reservoir Release to support Delta Exports CFS	Adjustment to CCWD Permit CFS
1	Excess	500	200	0	No	0
2	Excess	500	200	0	No	0
3	Balanced	300	0	200	No	200
4	Balanced	200	0	200	No	200
5	Balanced	100	0	200	No	100
6	Balanced	100	0	200	Yes-100	0
7	Balanced	500	0	200	Yes-500	0
8	Balanced	500	0	200	Yes-500	0
					Total Adjustment to CCWD WR Permit Use (TAF) =	1.0

Note: Days 3 & 4 diversion accounting are adjusted due to the senior priority of CCWD permit and JPOD continues at a rate greater than diversion to LV storage.

Note: Day 5 diversion accounting is adjusted to match JPOD diversion rate due to senior priority of CCWD permit.

Note: Days 6,7 & 8 diversion accounting are not adjusted due to CVP/SWP increasing reservoir releases to compensate for desired JPOD export under balanced conditions.

Technical Memorandum to address WQRSP issues as specified by SWRCB letter dated March 19, 2004.

> DWR and USBR in cooperation with CCWD are directed to conduct modeling analysis to determine the impacts on water at CCWD's intakes due to implementing JPOD at times when CCWD is authorized to divert under its own water rights. DWR and USBR should analyze the potential impacts by comparing hydrologic conditions absent JPOD under SWRCB Decision 1485 criteria to conditions that occurs with JPOD under D-1641 criteria. DWR and USBR are directed to use the information derived from the modeling analysis to prepare a draft Water Quality Response Plan with recommendations to the SWRCB regarding whether any modeled impacts would be significant and regarding the appropriate mitigation, if any, for the impacts. DWR and USBR are not required to propose mitigation for impacts that may occur to water quality when CCWD is diverting under its CVP contract or rediverting transferred water as long as water quality objectives will be met.

Based upon the direction given by the SWRCB in the letter, DWR and USBR staff reviewed recent collaborative modeling work in order to address the SWRCB requests. DWR and USBR staff agreed that modeling work done for the current CVP-SWP Operations Planning and Criteria (OCAP) and long-term biological opinion update process contained CALSIM modeling runs that would well represent the regulatory conditions and criteria described by the SWRCB letter. From the OCAP process, DWR and USBR staff selected two modeling runs to have DWR planning perform DSM2 studies for water quality information. The two OCAP modeling runs were performed to assess CVP-SWP project operations under the following set of general regulatory conditions.

- SWRCB D-1485, Upper Sacramento River Temperature Control, Trinity River management at 340 TAF per/yr, and 2001 level of development hydrology. This model run is to simulate CVP-SWP operation capabilities circa early 1990's regulatory requirements.
- SWRCB D-1641 with JPOD and EWA operations, CVPIA B2 implementation, Trinity River management at 369 to 452 TAF per/yr, and 2001 level of development hydrology. This model run is to simulate CVP-SWP operation capabilities circa early 2000's regulatory requirements.

DWR planning staff ran the two CALSIM simulation studies results through the DSM2 model to create the 16 water year (1976 -1991) water quality simulation traces. (See attached DWR memorandum for modeling assumptions and water quality traces). DWR and USBR operations staff requested monthly water quality information at the below locations for the WQRSP analysis.

- Chipps Island or Mallard Slough
- Collinsville
- Emmaton

- Antioch
- Jersey Point
- Bethel Island
- Holland Tract
- Rock Slough
- Los Vaqueros Intake

These key locations were selected for a variety of reasons which include;

- Chipps Island and Collinsville are compliance locations for X2 criteria and for JPOD X2 permit terms and conditions.
- Emmaton, Antioch, Jersey Point are compliance locations for Agricultural water quality beneficial use objectives in Reclamation/DWR water right permit terms and are actively monitored by CVP/SWP operations staff as key real-time Delta stations for the status of salinity in the western Delta environment.
- Bethel Island and Holland Tract are actively monitored by CVP/SWP operations staff as key real-time Delta stations for the status of salinity in the interior Delta environment.
- Rock Slough and Los Vaqueros Intake are CCWD's delta intake locations. Rock Slough Pumping Plant is a significant compliance location for M&I water quality beneficial use objectives in Reclamation/DWR water right permit terms. The water quality at these locations influences the performance of the overall performance of the CVP-SWP water project operation and the overall performance of CCWD's Los Vaqueros Project. These locations are reported in both EC and Chlorides.

The key information from the two CALSIM runs simulating CVP-SWP operations under D-1485 regulatory conditions and D-1641 with JPOD regulatory conditions is;

- Surplus Flows (Excess Conditions)
- CVP Tracy P.P. exports
- SWP Banks P.P. exports
- Federal San Luis Reservoir storage
- State San Luis Reservoir storage
- JPOD exports (CVP export at Banks P.P.)

From these simulations, the basic diversion patterns of the CVP and SWP can be examined under each regulatory framework. The general timing of when Surplus Flows or Excess conditions in the Delta could occur in each regulatory framework can be examined. The general timing of when the export capacity of each project is being fully utilized to fill their respective shares of San Luis Reservoir in each regulatory framework can be examined. And finally, in the D-1641 simulation, after State San Luis Reservoir is filled, and export capacity at Banks P.P. exists, and Surplus Flow exists, JPOD under Excess conditions would be simulated.

Analysis Process

Step 1 – Set up the datasets in a common time-series format.

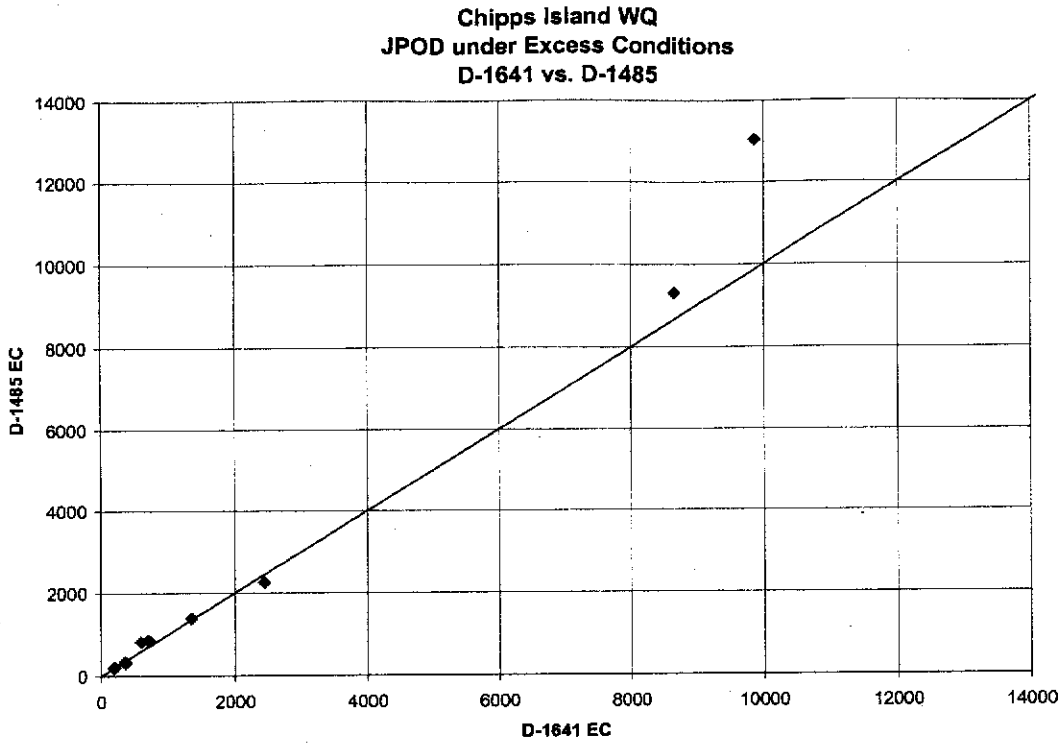
Based on the direction from the SWRCB letter, the operations and water quality simulation data was organized in a spreadsheet for the common 1976-1991 sequence.

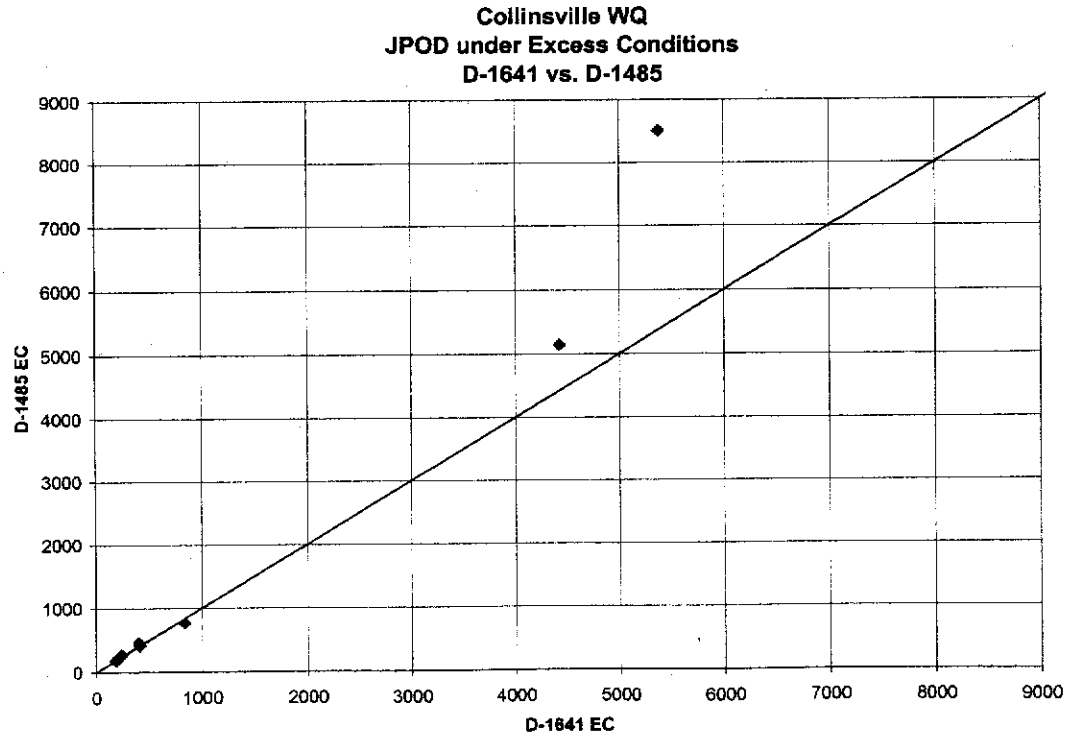
Step 2 – Filter the dataset for the D-1641 monthly timestep occurrences of JPOD under Excess conditions.

The operations data was filtered to highlight the monthly timestep occurrences of JPOD under Excess conditions in the D-1641 regulatory framework simulations. For the common 1976-1991 sequence, there were 12 monthly occurrences of JPOD under Excess conditions.

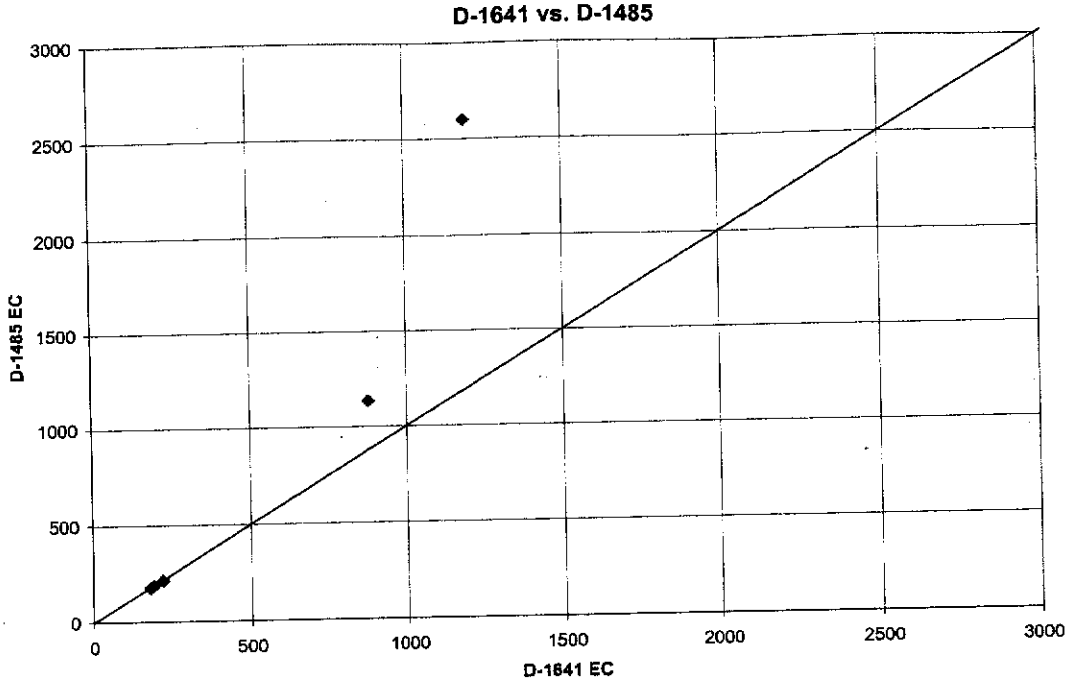
Step 3 – Illustrate graphically a comparison of water quality conditions for the 12 simulated monthly timestep occurrences of JPOD under Excess conditions under the D-1485 framework and the D-1641 framework.

Step 4 – Eliminate the simulated monthly occurrences of JPOD which would not meet imposed SWRCB JPOD permit term conditions and re-illustrate the water quality comparisons.

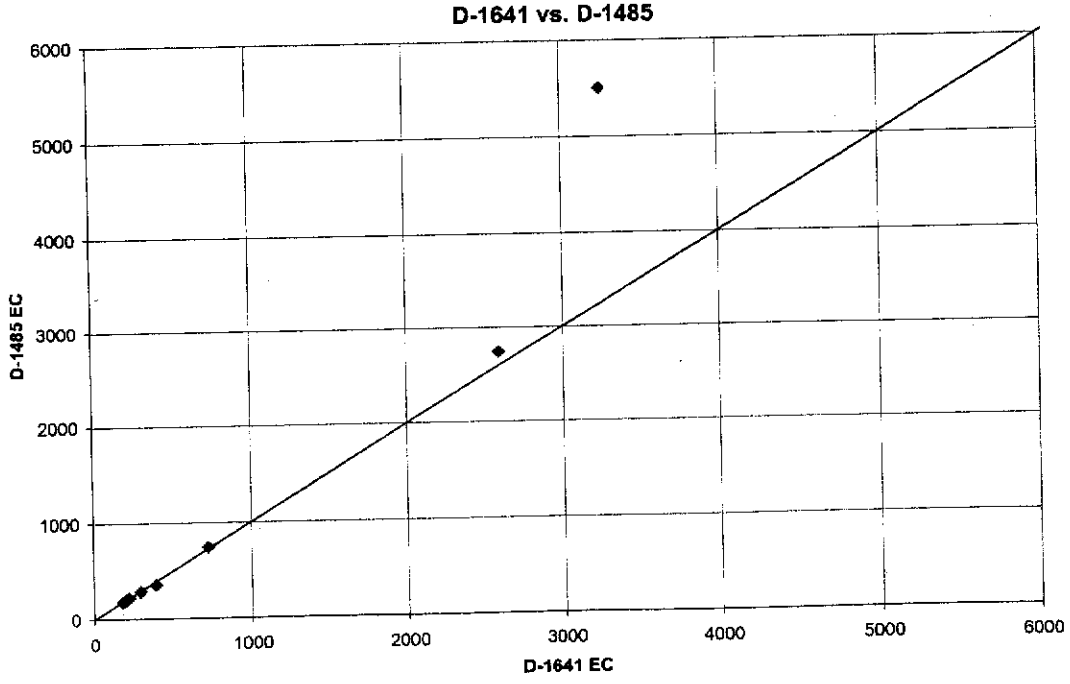

Chipps Island WQ
JPOD under Excess Conditions
D-1641 vs. D-1485
D-1485 EC
D-1641 EC
0
2000
4000
6000
8000
10000
12000
14000


Collinsville WQ
JPOD under Excess Conditions
D-1641 vs. D-1485
D-1485 EC
D-1641 EC
0
1000
2000
3000
4000
5000
6000
7000
8000
9000

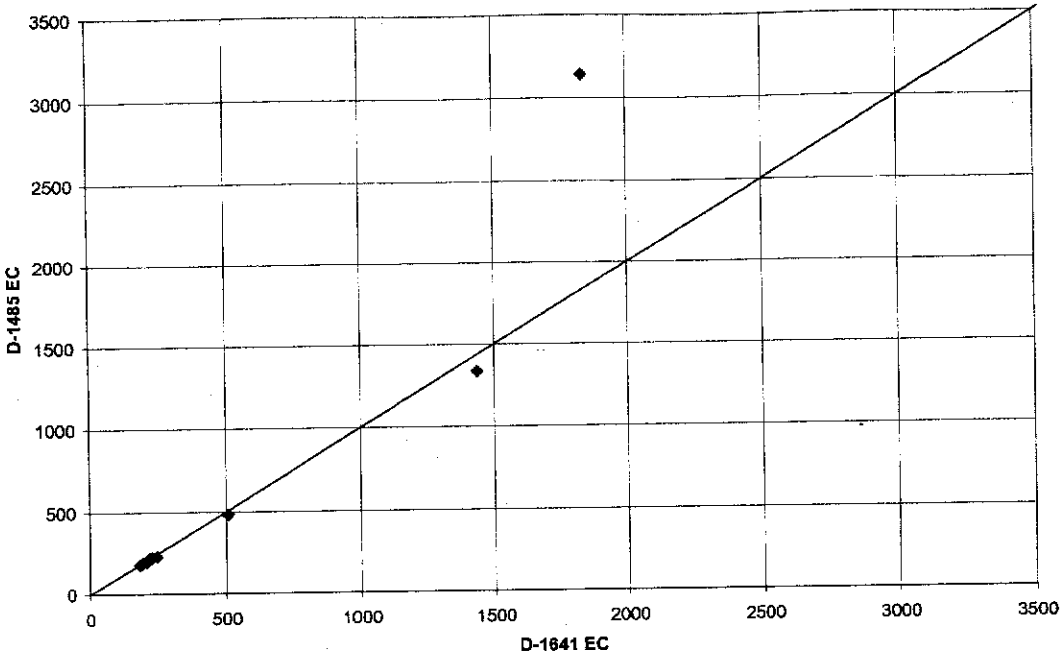
Emmaton WQ
JPOD under Excess Conditions
D-1641 vs. D-1485



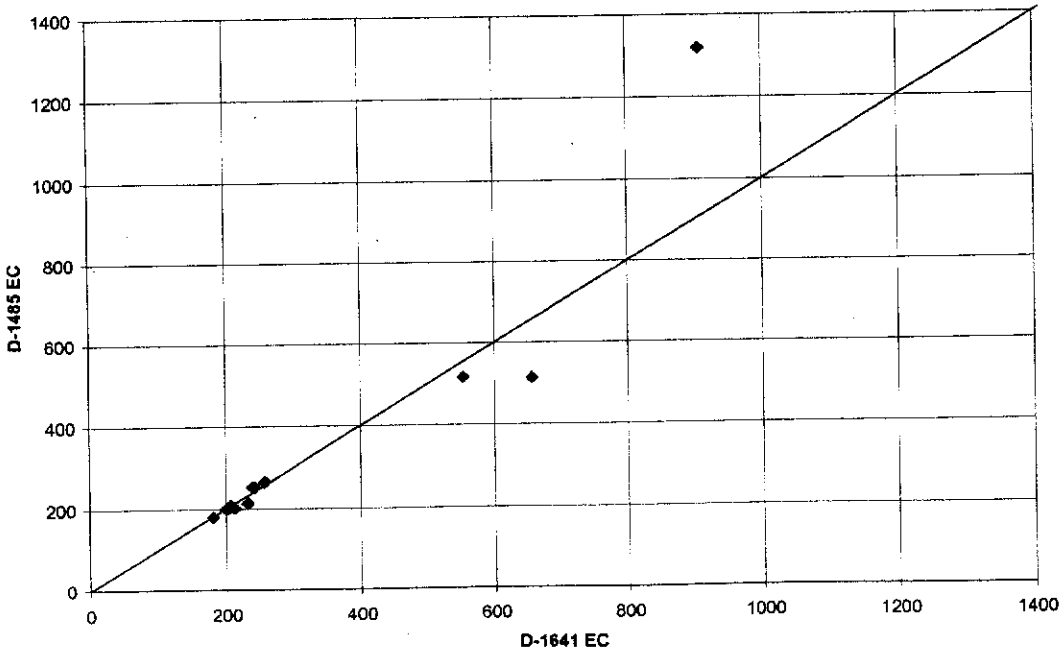
Antioch WQ
JPOD under Excess Conditions
D-1641 vs. D-1485

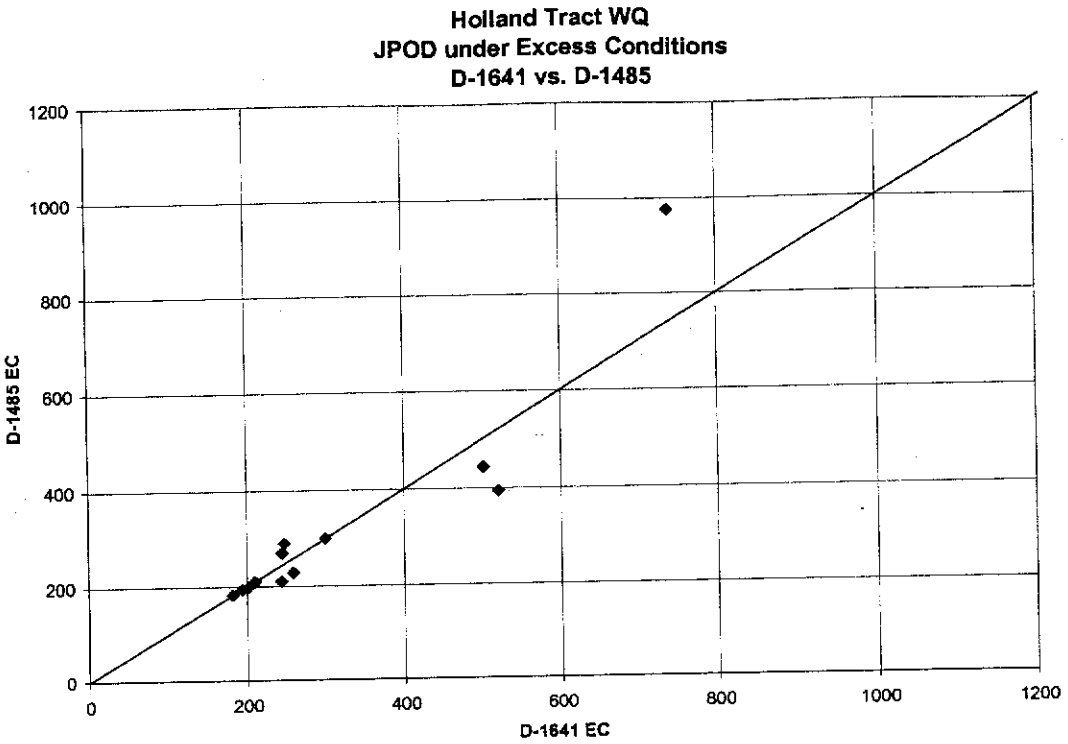


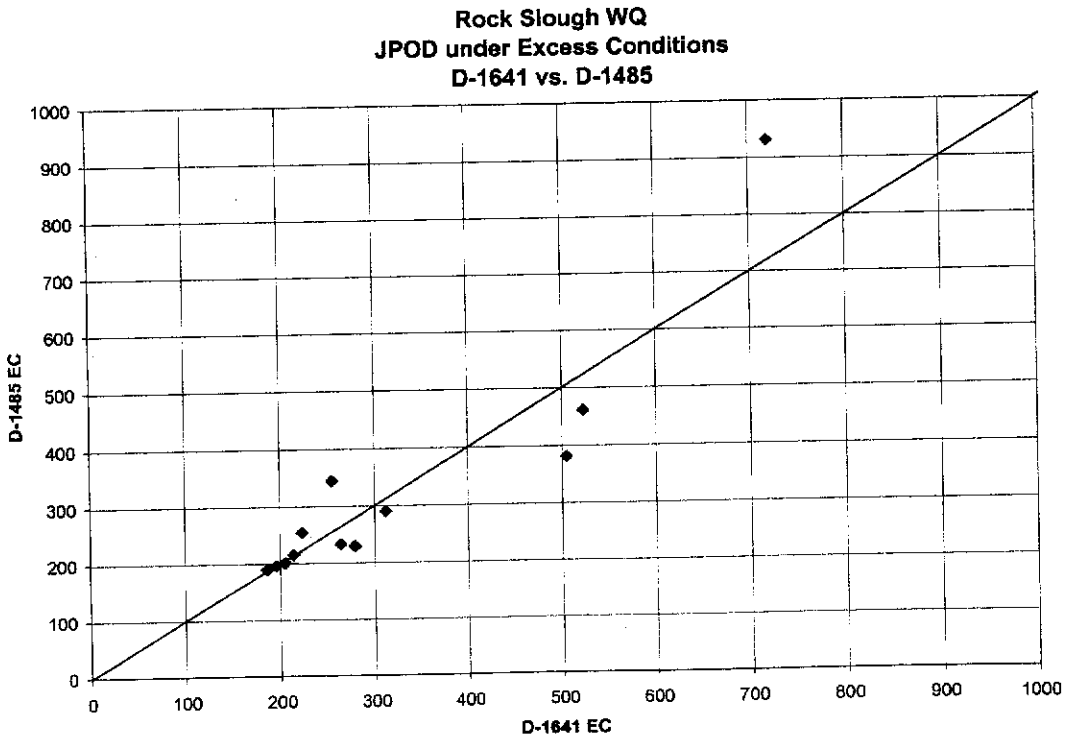
Jersey Point WQ
JPOD under Excess Conditions
D-1641 vs. D-1485



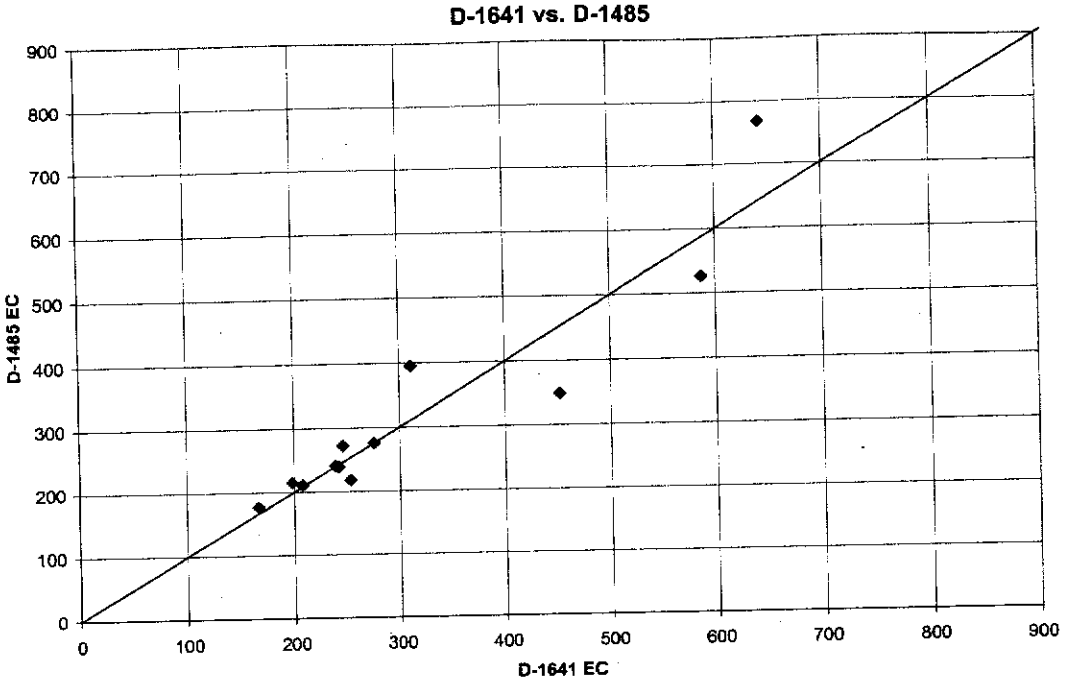
Bethel Island WQ
JPOD under Excess Conditions
D-1641 vs. D-1485



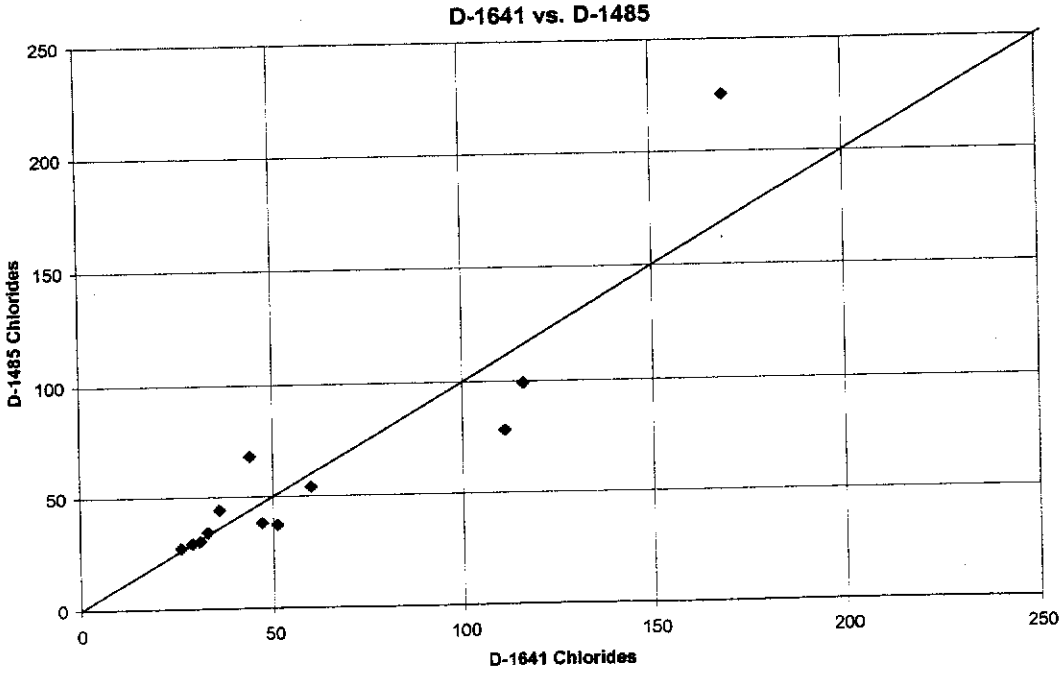

Holland Tract WQ
JPOD under Excess Conditions
D-1641 vs. D-1485
D-1485 EC
D-1641 EC
0
200
400
600
800
1000
1200

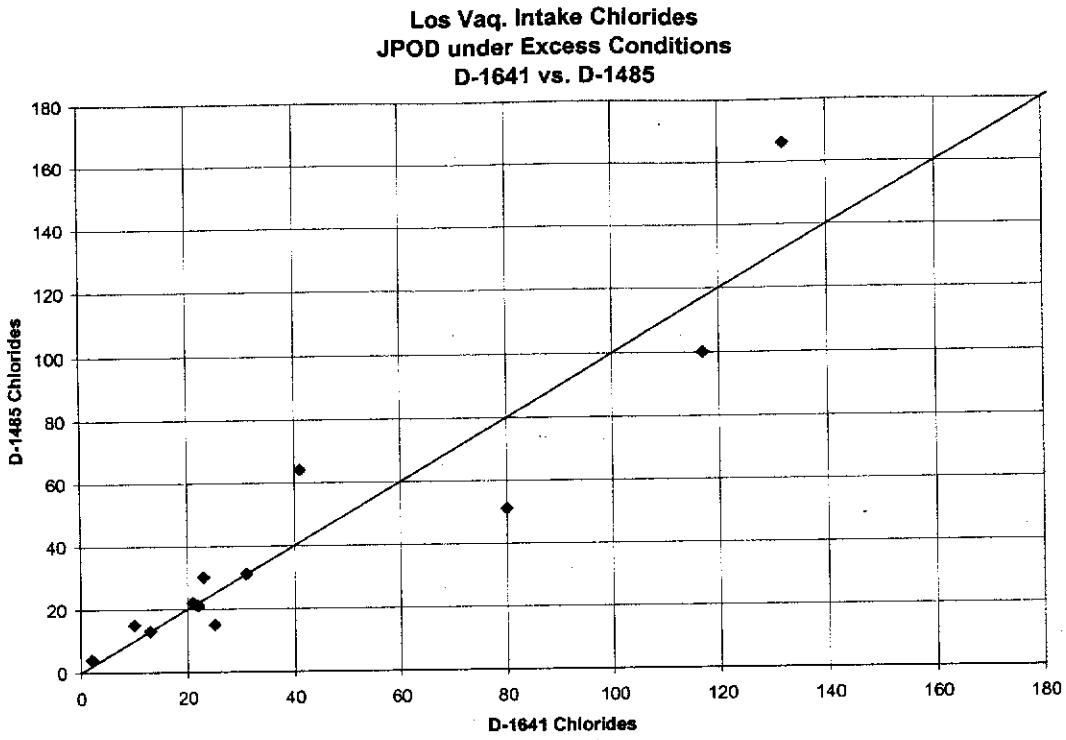

Rock Slough WQ
JPOD under Excess Conditions
D-1641 vs. D-1485
D-1485 EC
D-1641 EC
0
100
200
300
400
500
600
700
800
900
1000

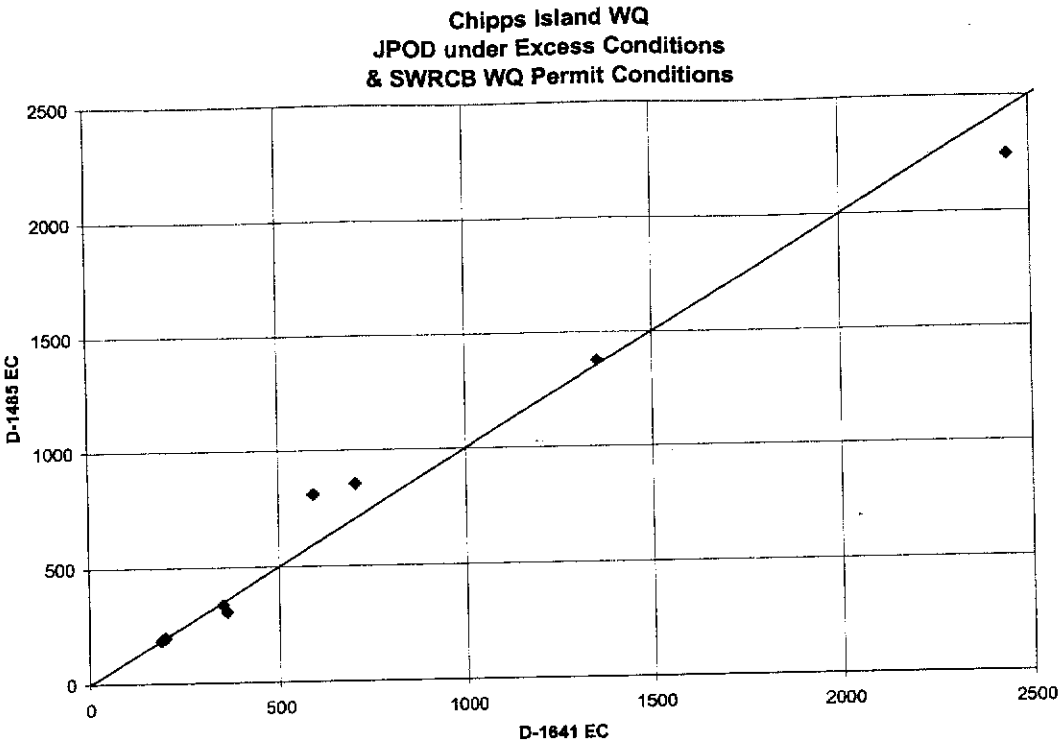
Los Vaqueros Intake WQ
JPOD under Excess Conditions
D-1641 vs. D-1485

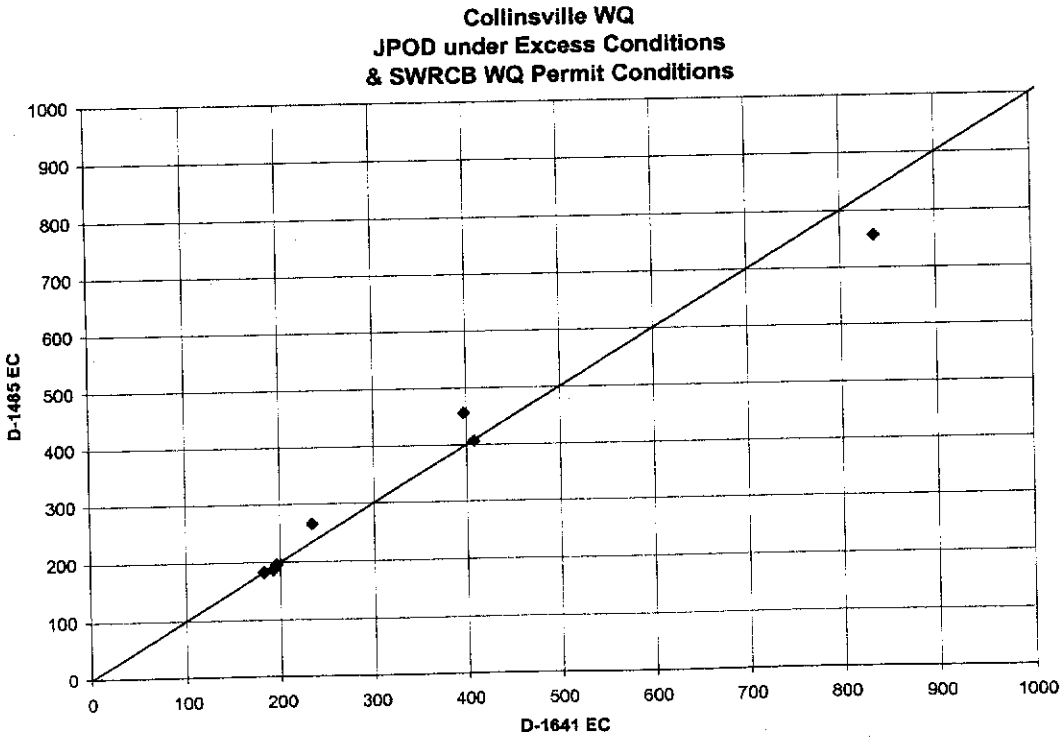


Rock Slough Chlorides
JPOD under Excess Conditions
D-1641 vs. D-1485

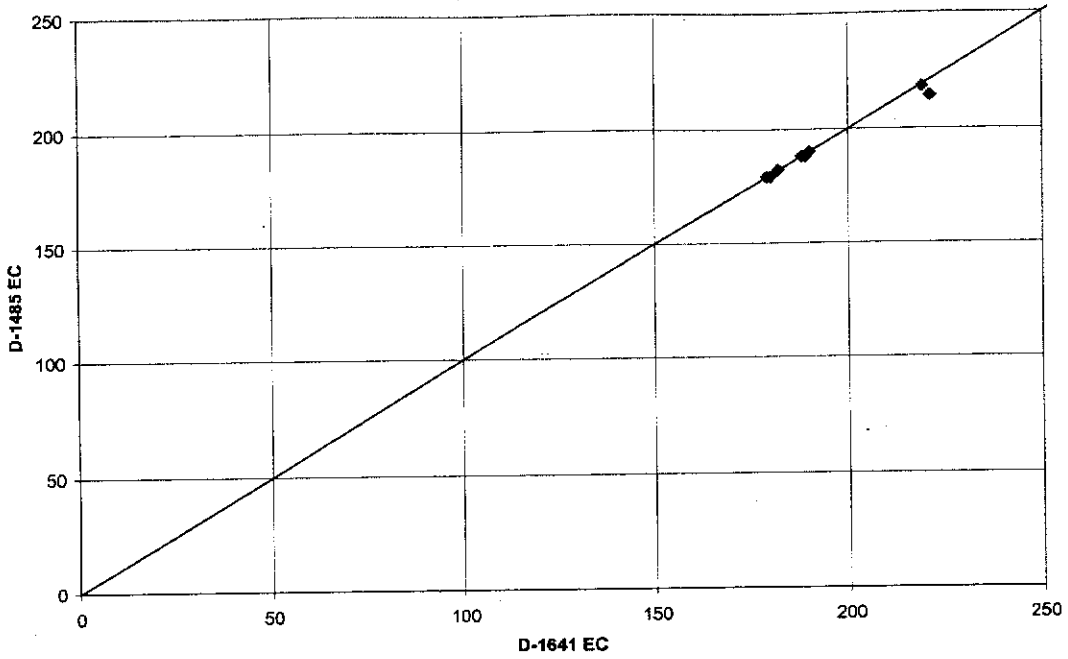



Los Vaq. Intake Chlorides
JPOD under Excess Conditions
D-1641 vs. D-1485
D-1485 Chlorides
D-1641 Chlorides
0
20
40
60
80
100
120
140
160
180

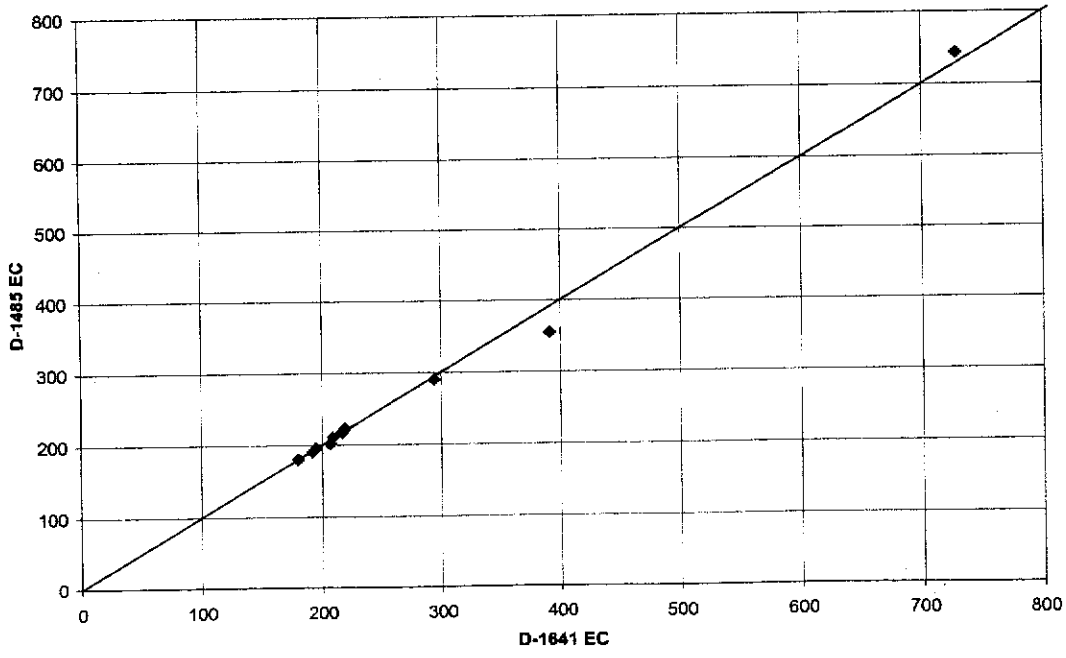

Chipps Island WQ
JPOD under Excess Conditions
& SWRCB WQ Permit Conditions
D-1485 EC
D-1641 EC
0
500
1000
1500
2000
2500


Collinsville WQ
JPOD under Excess Conditions
& SWRCB WQ Permit Conditions
D-1485 EC
D-1641 EC
0
100
200
300
400
500
600
700
800
900
1000

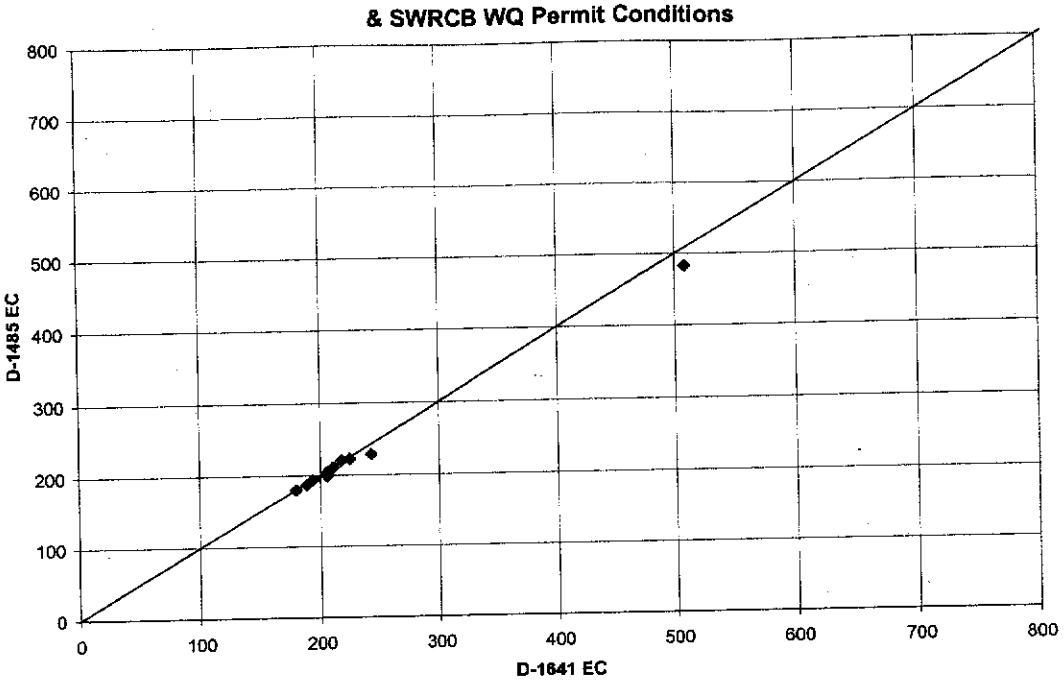
Emmaton WQ
JPOD under Excess Conditions
& SWRCB WQ Permit Conditions



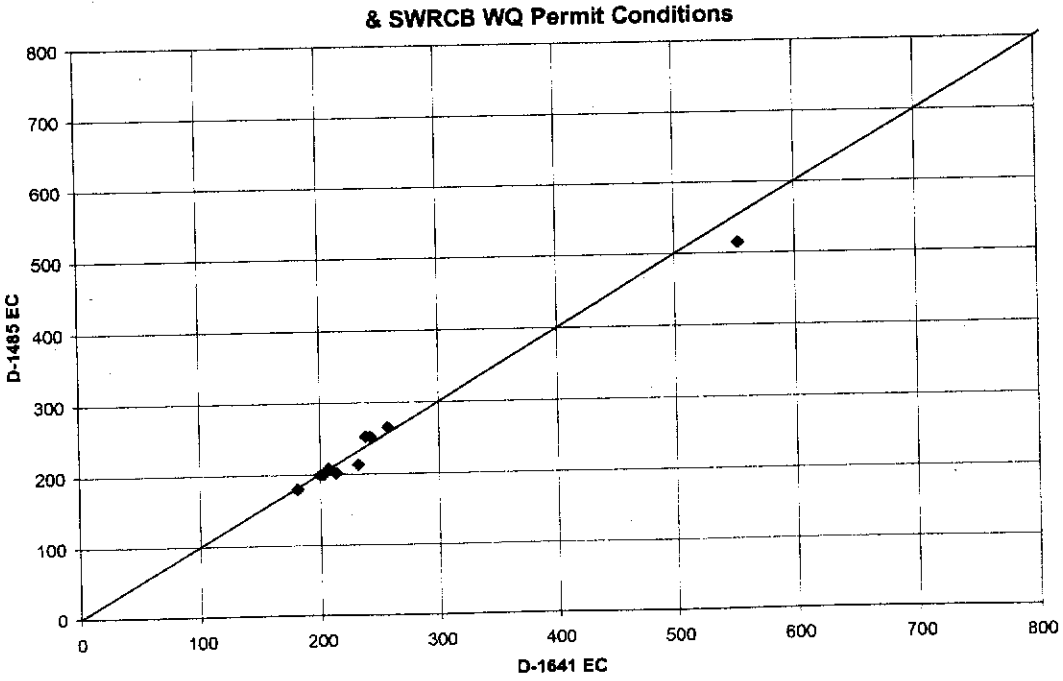
Antioch WQ
JPOD under Excess Conditions
& SWRCB WQ Permit Conditions



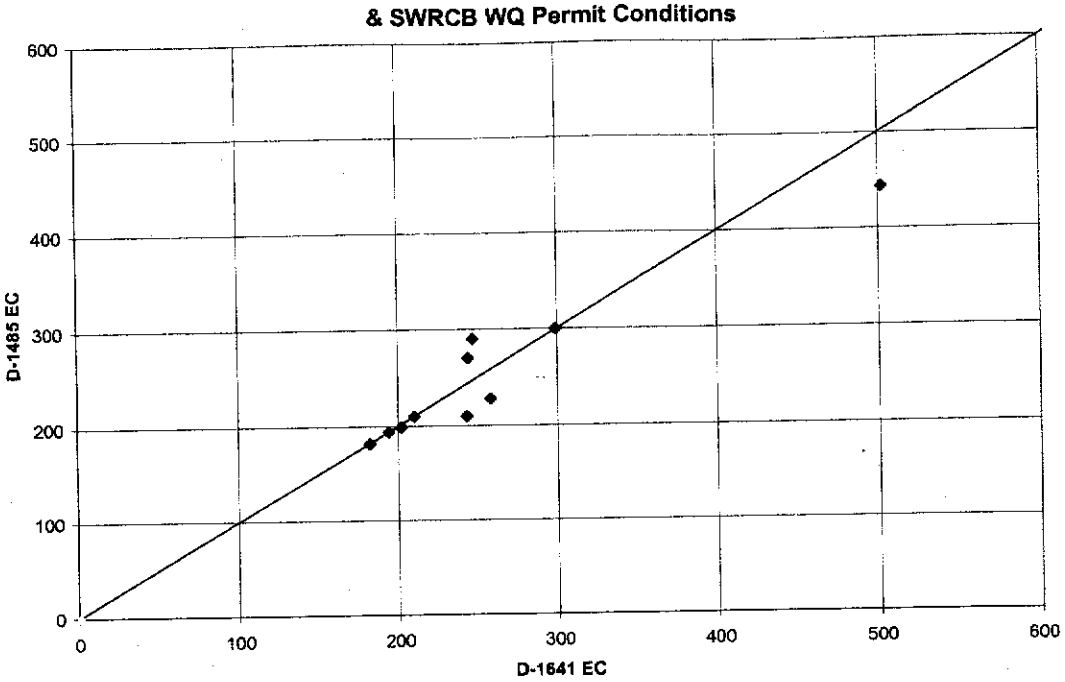
Jersey Point WQ
JPOD under Excess Conditions
& SWRCB WQ Permit Conditions



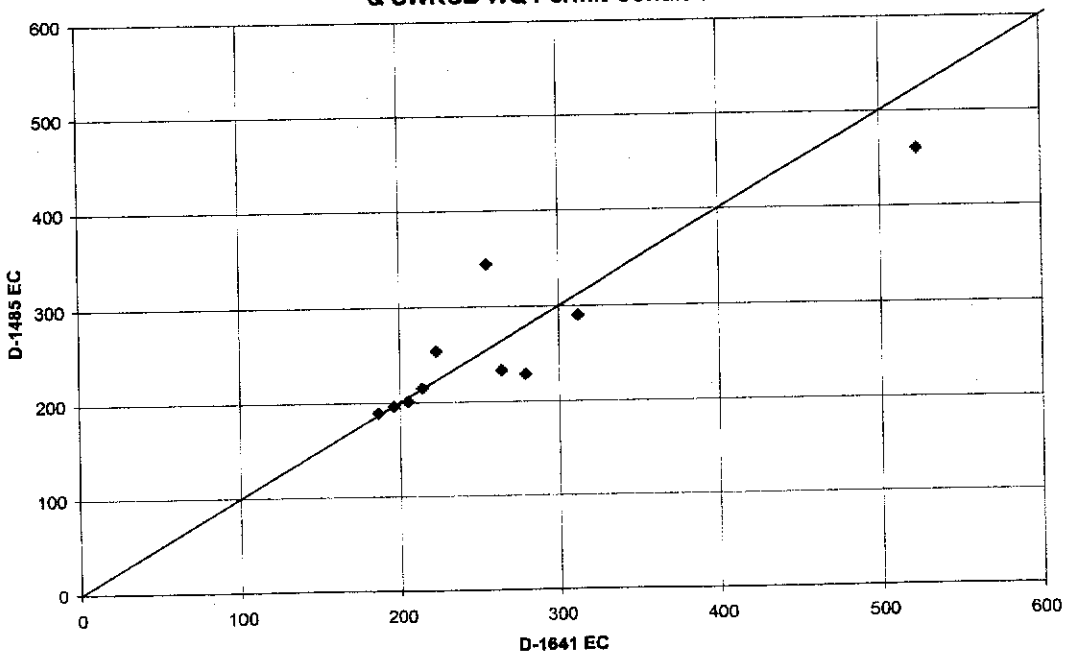
Bethel Island WQ
JPOD under Excess Conditions
& SWRCB WQ Permit Conditions



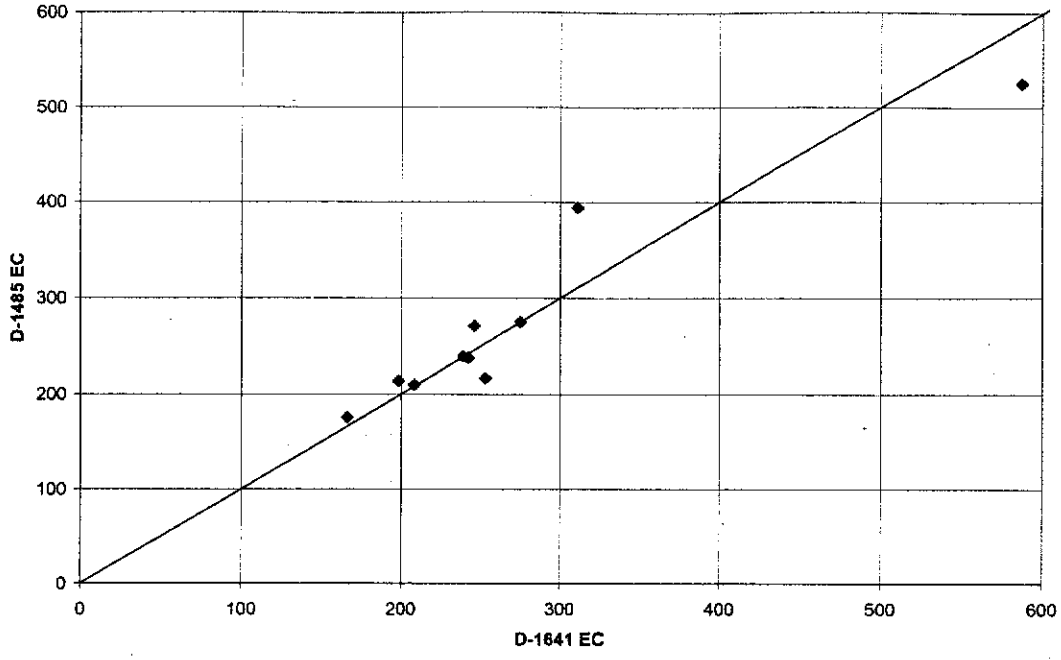
Holland Tract WQ
JPOD under Excess Conditions
& SWRCB WQ Permit Conditions



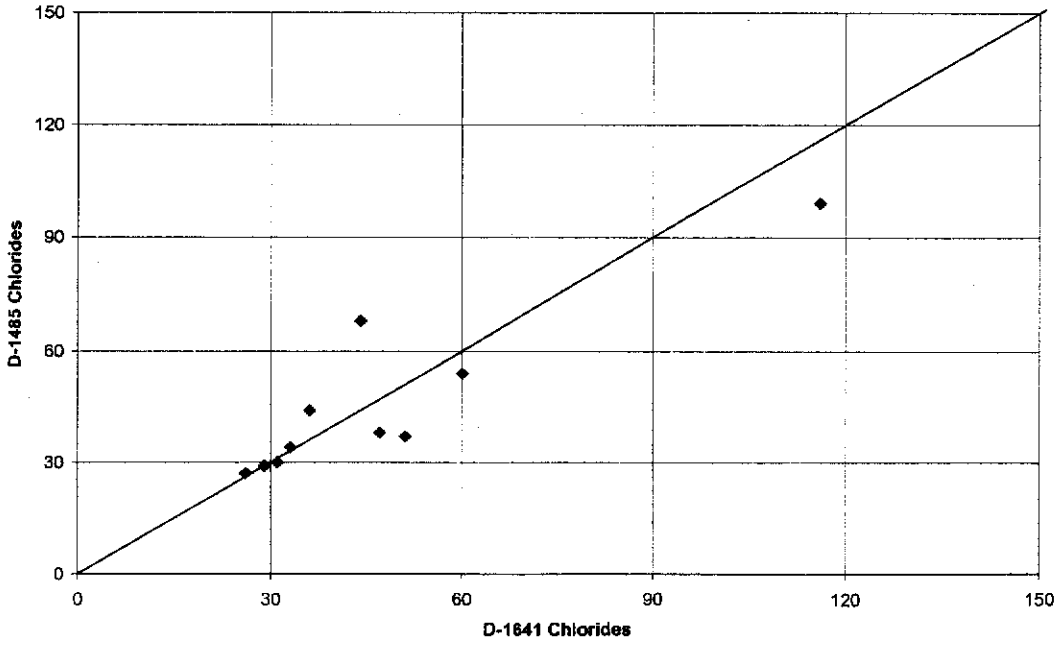
Rock Slough WQ
JPOD under Excess Conditions
& SWRCB WQ Permit Conditions

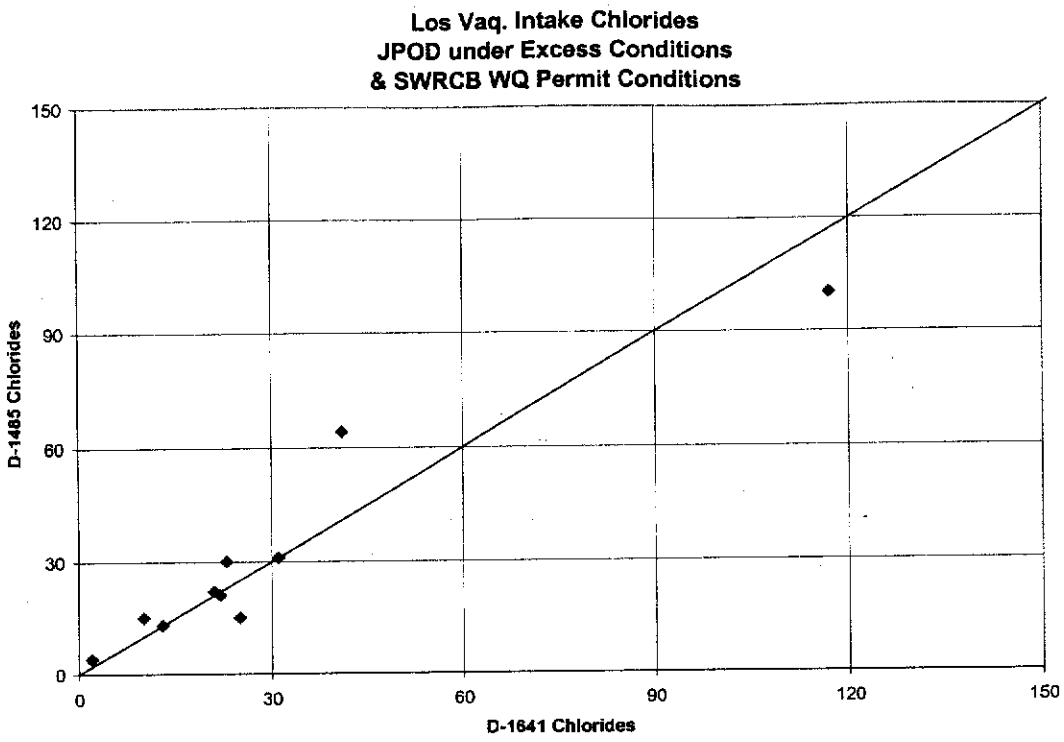


Los Vaqueros Intake WQ
JPOD under Excess Conditions
& SWRCB WQ Permit Conditions



Rock Slough Chlorides
JPOD under Excess Conditions
& SWRCB WQ Permit Conditions




Los Vaq. Intake Chlorides
JPOD under Excess Conditions
& SWRCB WQ Permit Conditions
150
120
90
60
30
0
D-1485 Chlorides
0
30
60
90
120
150
D-1641 Chlorides

Memorandum

Date: April 16, 2004

To: Parviz Nader-Tehrani
Cc: Andy Chu

From: Jamie Anderson
Min Yu
Delta Modeling
Bay Delta Office
Department of Water Resources

Subject: EC Results from 2001 OCAP DSM2 Simulations

This memo presents monthly EC results from the Delta Simulation Model 2 (DSM2) for two 2001 OCAP scenarios using temporary barrier operations. A 16-year simulation period from October 1975 through September 1991 (water years 1976-1991) was used.

Approach

Hydrology and operations input to the simulations were provided by monthly CALSIM results for two scenarios:

- 2001 OCAP D1485 dated 12-30-03
- 2001 OCAP D1641 dated 1-27-04

Both DSM2 simulations include the following characteristics:

- 2001 level of development
- Dredged geometry in Middle River from South Delta Improvement Project (SDIP)
- Temporary barriers operated using the same criteria as the SDIP project base case simulations
- Clifton Court Forebay operated at Priority 4 (gates always open)
- Monthly Sacramento and San Joaquin River flows from CALSIM were smoothed to daily values
- Monthly inflows and exports were used at all locations; there were no VAMP flows or exports during April and May since the D1485 and D1641 steps in CALSIM are prior to the B2 actions which include VAMP
- All Contra Costa exports were simulated at Rock Slough. DSM2 output is provided at the Los Vaqueros Intake location; however no water was exported from the system at that location in these simulations.

Boundary Conditions

Output from CALSIM studies provided monthly average boundary flows, exports and Delta Cross Channel operations for the 2001 OCAP DSM2 simulations. Values for the major boundary conditions and Net Delta Outflow (NDO) are presented in this memo:

Boundary conditions for DSM2 2001 OCAP studies:

- ❑ Sacramento River (Figure 2, Table 1 and Table 2)
- ❑ San Joaquin River (Figure 3, Table 3 and Table 4)
- ❑ Central Valley Project (CVP) Exports (Figure 4, Table 5 and Table 6)
- ❑ State Water Project (SWP) Exports (Figure 5, Table 7 and Table 8)
- ❑ Delta Cross Channel (DCC) Operations (Figure 6, Table 9 and Table 10)
- ❑ Net Delta Outflow (NDO) (Figure 7, Table 11 and Table 12)

Note that the Delta Cross Channel was operated differently for the D1485 and D1641 scenarios. The Net Delta Outflow (NDO) is a representation of the sum of the inflows minus the exports from the system. The NDO values presented here are output from the CALSIM, and are not directly input into DSM2 since DSM2 requires the individual inflows and exports as boundary conditions.

Temporary Barrier Operations

For the 2001 OCAP simulations, four temporary barriers were simulated (Figure 1): the fish barrier at Head of Old River, and three agricultural barriers (Middle River, Grant Line Canal, and Old River).

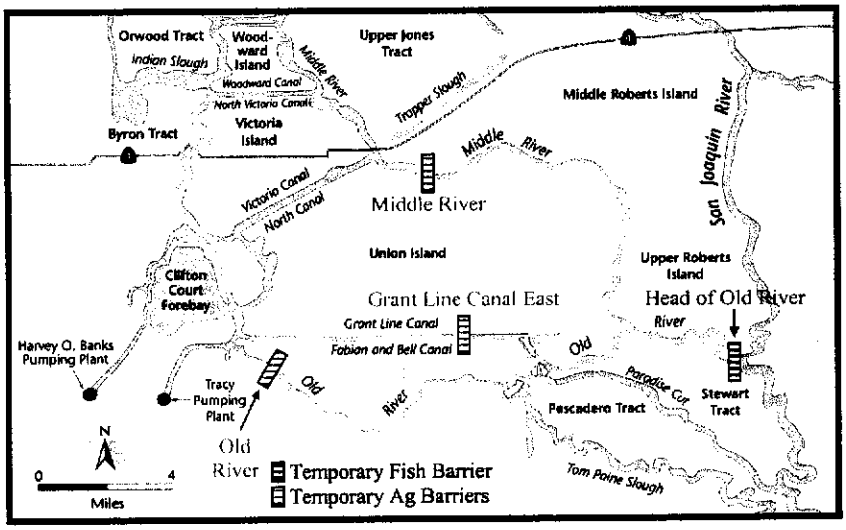


Figure 1: Temporary Barrier Locations

The temporary barrier operations for the 2001 OCAP simulations were based on the temporary barrier operation criteria for the SDIP project. Typically time of year and San Joaquin River flow determine when the barriers are operated. The temporary barrier operations criteria are summarized below. Note that although VAMP flows were not simulated in the 2001 OCAP

studies (D1485 and D1641), the temporary barrier operations continued to use the VAMP period criteria to determine barrier operations.

Temporary Barrier Operations Criteria:

- Head of Old River Fish Barrier
  - Installed from April 16-May 15 when San Joaquin River flows fall below 5,000 cfs
  - Installed from Sept 16-Nov 30 when San Joaquin River flows fall below 5,000 cfs
  - Removed when San Joaquin River flows exceed 8,500 cfs
  - Spring (April 16-May 15) barrier installation depends on VAMP flows[1]
    - Installed at 10 ft msl if VAMP flow ≤7,500 cfs (dry, below normal, normal years)
    - Installed at 11 ft msl if VAMP flow > 7,5000 cfs (wet years)
  - Fall (Sept 16-Nov 30) barrier installation includes a 32 foot notch at 0.0 ft msl
- Agricultural Barriers (Middle River, Old River at Tracy Rd, Grant Line Canal East)
  - Agricultural barriers may be installed from April 16-Nov 30
  - No agricultural barriers are installed when San Joaquin River flows exceed 18,200 cfs
  - No agricultural barriers are installed from April 16-May 15 if head of Old River barrier is not installed
  - If the head of Old River barrier is not installed, the spring agricultural barriers are not installed until the San Joaquin River flow drops below 12,000 cfs
  - During the fall (Sept 16-Nov 30) a 20 foot notch is cut into each agricultural barrier.
  - The fall notch configuration for the Old River at Tracy Rd barrier changes when the San Joaquin River flow is above 5,500 cfs
  - Agricultural barriers are removed if the head of Old River barrier is removed due to Vernalis flows exceeding 8,500 cfs unless the barriers are need to maintain 0.0 ft msl minimum water levels at three key locations

Temporary barrier operations for the 2001 OCAP studies are summarized in Table 13 through Table 16. Note that the barrier operations differ for the D1485 and D1641 scenarios. For all four barriers, operations are different between the two scenarios for the May 1979 VAMP period (May 1-15), the April 1981 VAMP period (April 16-30), and the April and May 1984 VAMP periods (April 16-May 15). Additionally for the Old River temporary agricultural barrier, operations differ between the two scenarios for October 1980 (October water year 1981). The D1641 Head of Old River, Middle River and Grant Line Canal temporary barrier operations are identical to the SDIP base case temporary barrier operations. Typically differences in barrier operations are due to San Joaquin River flows triggering an operation in one case and not in the other, e.g. in May 1979 the SJR river flow is below 5,000 cfs for the D1485 case which triggers the HOR barrier to be installed, but the SJR river flow was above 5,000 cfs for the D1641 case and no barrier was installed for that scenario (see Table 3 and Table 4).

Monthly Average EC Results

Monthly average simulated EC results for both scenarios are presented for nine Delta locations as requested by Jeff Sandberg at USBR (Figure 8 and Table 17). Monthly average simulated EC

[1] Note that although VAMP flows were not simulated in the 2001 OCAP studies (D1485 and D1641), the barrier operations continued to use the VAMP period criteria to determine barrier operations.

values for the two scenarios are compared in Figure 9 though Figure 17. Monthly average simulated EC values are presented in Table 18 through Table 35.

Monthly Average Chloride Results

Monthly average chloride concentrations at Contra Costa Pumping Plant #1 (near Rock Slough) and Los Vaqueros intake were determined by converting monthly average simulated EC to chlorides using equations from Suits (2001).

For Costa Pumping Plant #1:

$$\text{Chloride}_{\text{Contra Costa Pumping Plant\#1}} = (\text{EC}_{\text{Old River at Rock Slough}} - 89.6) / 3.73 \qquad \text{Eqn 1.}$$

For Los Vaqueros Intake:

$$\text{Chloride} = (\text{EC} - 160.6) / 3.66 \qquad \text{Eqn 2.}$$

Monthly average computed chloride values for the two scenarios are compared in Figure 18 and Figure 19. Monthly average computed chloride values are presented in Table 36 through Table 39. Note that all of the Contra Costa exports were simulated at Rock Slough. Although EC and chloride data are presented for Los Vaqueros Intake, no water was withdrawn at that location in these DSM2 simulations.

The maximum concentration of chlorides at Old River at Rock Slough of 250 mg/l (Water Quality Control Plan of May 1995) is indicated on the chloride figures and tables for Old River at Rock Slough (Figure 18, Table 36, and Table 37). For the 16-year study period (wy1976-1991), the monthly average EC at Old River at Rock Slough exceeded the standard during 6 months for the D1485 study [Feb 76, Nov 76 (wy77), Sep 77, Sep 84, Mar 90, and Feb 91], and during 3 months for the D1641 study [Oct 76 (wy77), Oct 77 (wy78), and Oct 90 (wy91)].

References

Suits, Bob. 2001. "Relationships between EC, chloride, and bromide at Delta export locations ", Technical Memo, Delta Modeling Section, California Dept. of Water Resources, May 29, 2001.

Figure 2: Monthly Average Sacramento River Flows for 2001 OCAP Studies

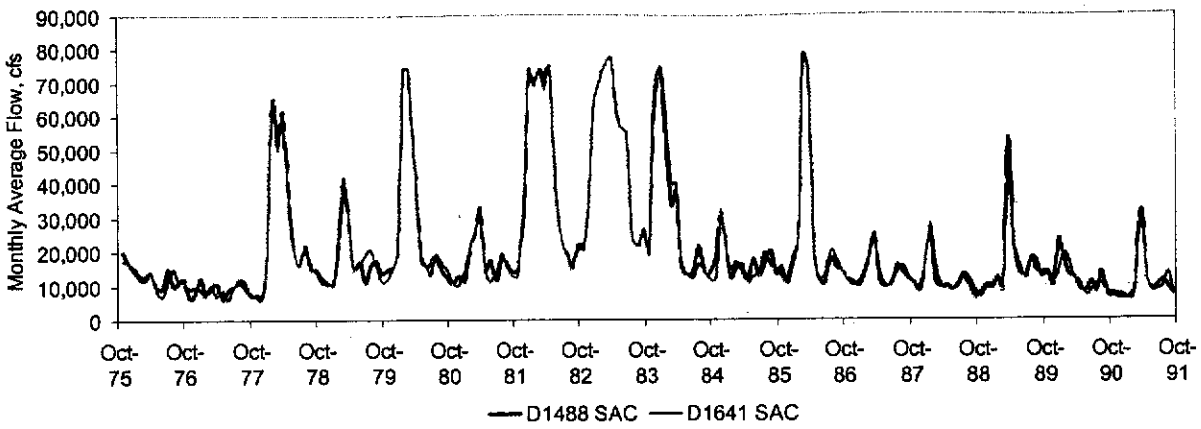


Table 1: Monthly Average Sacramento River Flows (cfs) 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	19,918	6,436	7,180	12,324	14,684	10,505	14,303	20,936	19,624	18,245	15,439	11,582	10,471	6,759	13,112	6,933
Nov	16,718	7,919	6,451	10,965	15,687	12,821	32,147	36,190	61,118	31,556	10,526	10,974	8,702	9,164	10,224	6,228
Dec	14,415	12,646	14,727	10,545	19,688	11,911	73,410	64,412	74,917	22,562	15,952	10,016	16,584	9,371	23,459	6,109
Jan	12,156	7,508	64,154	21,317	73,978	20,893	69,507	71,087	50,709	12,326	24,091	12,746	27,086	12,203	17,766	6,277
Feb	12,237	9,275	51,014	39,947	74,074	25,499	73,597	74,868	33,438	15,232	77,914	19,279	10,942	8,619	12,967	8,167
Mar	14,252	10,547	61,380	29,947	45,488	32,701	71,839	77,317	37,835	16,439	74,673	24,496	9,593	53,369	12,257	31,577
Apr	9,759	5,932	35,301	14,641	18,782	14,273	74,533	61,837	15,288	11,482	18,951	10,862	10,021	22,060	9,003	11,969
May	9,358	8,751	20,401	16,990	15,825	17,329	35,292	56,257	13,134	17,679	11,539	9,420	8,523	15,832	8,257	8,647
Jun	15,085	9,905	15,447	11,138	16,527	11,810	23,302	55,329	14,060	12,805	10,622	10,804	9,688	12,027	10,943	9,304
Jul	10,196	11,020	21,368	15,995	19,000	17,679	19,302	24,159	21,719	16,003	17,827	14,390	13,375	17,617	7,752	11,453
Aug	10,867	9,354	14,947	17,287	14,141	16,720	15,031	21,374	14,244	20,050	15,149	15,509	11,466	16,932	13,529	9,180
Sep	12,066	7,379	14,636	13,556	12,282	13,864	21,854	26,816	13,325	13,397	14,548	12,117	8,019	12,469	6,666	7,074

Table 2: Monthly Average Sacramento River Flows (cfs) 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	17,571	9,157	7,751	11,130	11,660	10,468	12,471	20,434	19,547	11,808	12,487	11,554	10,149	7,779	14,133	7,742
Nov	16,511	9,971	7,137	10,466	15,082	9,914	36,293	36,202	64,445	31,748	10,924	9,825	9,835	10,102	10,967	7,222
Dec	15,487	8,543	14,702	10,205	19,936	14,612	73,815	64,395	75,012	22,469	17,759	11,140	16,807	10,255	13,510	6,652
Jan	13,238	6,885	63,397	23,868	74,113	20,818	68,678	71,230	59,019	14,290	23,479	13,885	28,142	12,442	19,459	5,836
Feb	13,285	10,353	49,763	41,797	74,158	26,116	73,762	74,897	39,631	16,993	78,416	19,318	16,331	9,193	17,102	7,424
Mar	14,293	6,993	60,154	31,000	45,052	29,778	67,860	77,286	40,065	14,258	74,192	23,475	8,893	44,979	11,817	29,732
Apr	9,354	8,538	31,968	14,779	17,428	14,455	74,431	61,443	16,248	10,768	18,266	13,685	9,342	21,843	10,871	12,477
May	6,936	5,798	20,412	16,559	15,871	10,922	35,439	56,407	12,923	12,477	12,041	9,630	8,466	13,081	6,991	8,408
Jun	11,180	9,426	15,442	18,726	12,955	14,012	23,325	55,397	12,177	13,093	12,475	11,878	11,050	12,798	8,426	8,396
Jul	15,219	12,066	21,921	20,828	19,187	19,539	19,018	24,153	16,270	19,552	19,871	16,242	12,663	17,901	10,398	9,302
Aug	11,629	11,284	15,714	16,180	16,433	15,774	14,848	21,369	14,768	15,963	17,799	13,299	9,190	13,810	10,344	13,769
Sep	11,451	6,772	14,107	11,363	14,187	12,917	21,032	26,813	11,960	14,758	14,514	11,397	5,944	13,689	8,003	8,034

Figure 3: Monthly Average San Joaquin River Flows for 2001 OCAP Studies

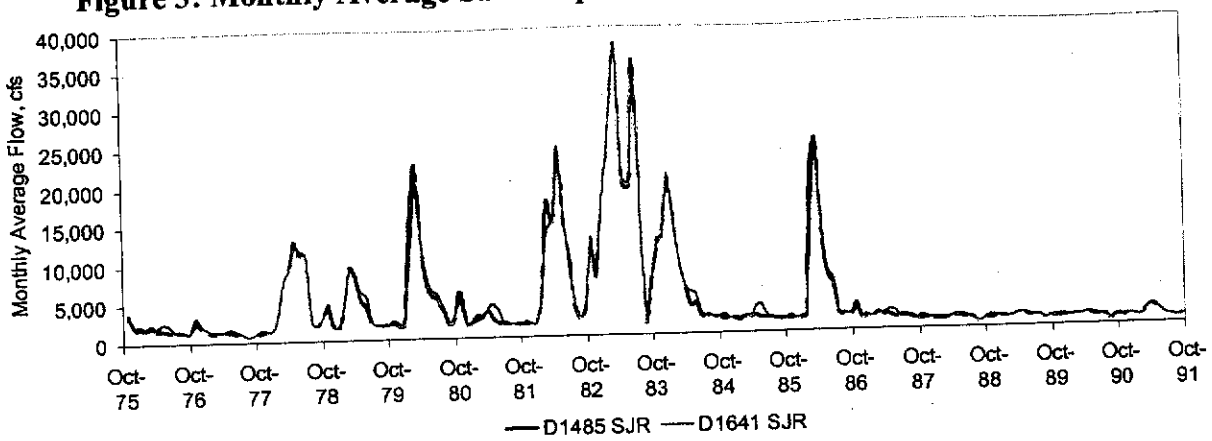


Table 3: Monthly Average San Joaquin River Flows (cfs) 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	3,579	2,652	1,225	4,116	2,157	6,000	1,650	12,751	12,078	1,805	1,631	2,952	1,146	1,106	1,125	1,047
Nov	2,183	2,043	1,340	1,602	1,679	1,758	1,617	7,860	12,955	1,857	1,617	1,563	1,285	1,192	1,233	1,174
Dec	2,143	1,636	1,513	1,744	1,908	2,073	1,670	18,306	20,747	1,906	1,697	1,722	1,242	1,299	1,164	1,130
Jan	1,827	1,187	3,728	4,339	16,305	2,856	7,299	23,464	14,521	1,730	2,033	1,604	1,190	1,188	1,199	1,034
Feb	2,267	1,265	7,845	9,353	22,592	2,751	17,416	31,140	9,693	2,153	21,015	2,134	1,250	1,372	1,392	1,149
Mar	1,679	1,275	8,990	8,602	13,044	3,522	14,909	37,411	6,124	2,068	24,807	1,878	1,266	1,608	1,331	2,403
Apr	1,703	1,407	12,450	5,521	6,991	2,521	24,219	19,502	3,746	2,188	11,315	1,792	1,467	1,610	1,462	2,149
May	1,491	1,228	11,476	4,171	5,478	1,843	15,523	19,208	3,988	1,858	7,235	1,588	1,273	1,341	1,213	1,607
Jun	1,501	1,235	11,248	2,155	5,226	1,759	10,291	35,683	2,273	1,790	6,033	1,629	1,310	1,333	1,169	1,117
Jul	1,428	850	2,542	1,896	3,495	1,725	3,347	17,724	2,264	1,693	2,207	1,617	1,226	1,371	1,166	1,081
Aug	1,411	678	1,902	1,793	1,802	1,650	2,192	2,071	2,154	1,598	2,124	1,499	700	848	717	768
Sep	1,192	1,006	2,659	1,900	2,677	1,595	4,024	6,371	1,986	1,603	2,044	1,235	1,063	1,187	1,097	1,040

Shaded values indicate months in which barrier operations were different for D1485 and D1641

Table 4: Monthly Average San Joaquin River Flows (cfs) 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	3,904	3,164	1,448	4,616	2,267	4,985	2,065	12,773	12,635	2,286	2,071	3,452	1,638	1,528	1,409	1,028
Nov	1,801	2,098	1,353	1,649	1,795	1,741	1,703	7,490	12,586	1,916	1,699	1,757	1,333	1,283	1,322	1,216
Dec	1,906	1,691	1,526	1,827	1,930	1,881	1,754	18,309	20,750	1,964	1,778	1,793	1,289	1,389	1,253	1,130
Jan	1,718	1,302	3,728	4,402	12,144	2,099	7,118	23,373	14,430	1,784	2,183	1,674	1,286	1,182	1,193	1,033
Feb	1,952	1,376	7,847	9,361	21,133	2,582	13,669	31,140	9,693	2,198	15,684	2,038	1,336	1,359	1,378	1,149
Mar	1,789	1,273	9,106	8,695	13,104	3,675	14,949	37,456	6,161	2,208	23,517	1,976	1,255	1,604	1,323	2,395
Apr	2,455	1,702	12,992	6,432	7,691	4,417[2]	24,448	20,186	5,553	3,268	12,007	2,488	1,722	1,753	1,589	2,272
May	2,271	1,580	11,070	5,500	6,115	3,587	16,021	19,706	5,158	3,546	7,745	2,310	1,592	1,461	1,332	1,725
Jun	1,479	1,229	11,248	2,205	5,675	1,696	9,784	34,535	2,636	1,774	6,633	1,567	1,265	1,291	1,169	1,110
Jul	1,403	806	2,542	1,838	3,850	1,649	3,712	17,724	2,202	1,674	2,382	1,542	989	1,298	1,071	1,072
Aug	1,372	676	1,902	1,748	1,984	1,591	2,192	2,071	2,107	1,584	2,145	1,216	688	790	717	766
Sep	1,160	978	2,616	1,853	2,784	1,548	4,140	6,480	1,947	1,532	2,154	1,191	1,031	1,157	1,079	1,020

[2] Although the monthly average SJR flow in April 1981 was less than 5,000 cfs, the processor that determines temporary barrier operations considered the flow as being ~2,950 cfs April 1-14 and ~5,700 cfs April 15-30 (avg ~4400cfs). Since the flow exceeded 5,000 cfs in the VAMP period, the temporary barriers were not installed.

Shaded values indicate months in which barrier operations were different for D1485 and D1641

Figure 4: Monthly Average CVP Exports for 2001 OCAP Studies

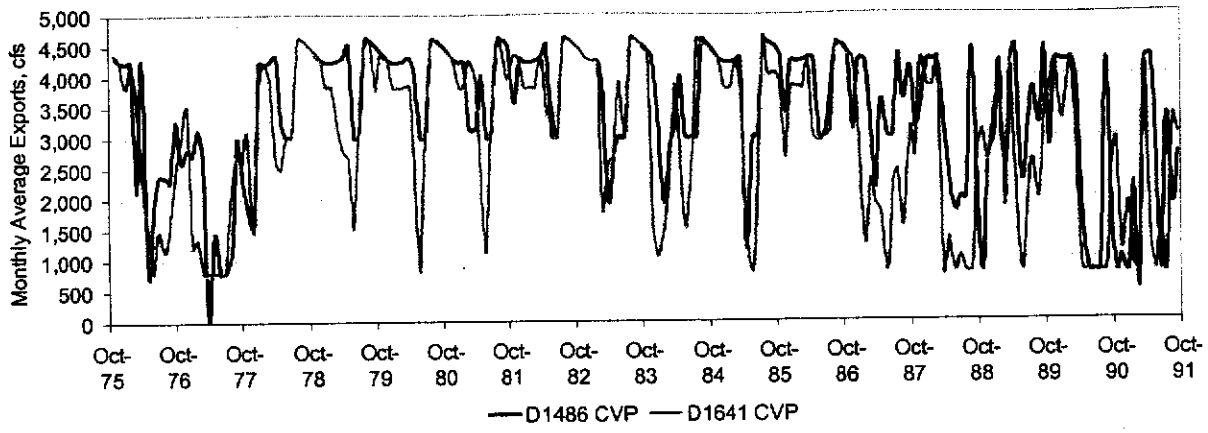


Table 5: Monthly Average CVP Exports (cfs) 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	4,362	2,596	1,886	4,391	4,391	4,391	3,568	4,391	4,391	4,391	4,317	4,347	3,144	800	2,837	800
Nov	4,256	2,810	1,549	4,265	4,265	4,265	4,265	4,265	4,265	4,265	3,395	3,104	3,507	2,562	4,243	1,030
Dec	4,224	2,702	4,210	4,227	4,227	4,227	4,227	4,227	3,259	4,227	4,224	4,222	4,223	2,998	4,220	800
Jan	4,229	3,115	4,212	4,232	4,232	4,232	4,232	4,232	1,919	4,232	4,228	4,227	4,227	4,216	4,224	2,204
Feb	2,130	2,692	4,221	4,254	4,252	3,153	4,254	3,888	2,869	4,254	4,247	3,299	4,245	1,862	4,240	540
Mar	4,243	2	4,319	4,318	4,321	3,152	4,321	1,955	3,144	4,296	4,285	2,153	3,292	4,217	3,765	4,229
Apr	800	1,416	3,232	4,496	4,044	4,027	4,496	2,687	4,004	1,183	4,265	3,567	2,388	4,459	1,684	4,290
May	1,799	800	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	1,798	2,318	800	3,000
Jun	2,362	800	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	2,004	3,000	800	800
Jul	2,356	1,088	4,595	4,600	4,600	4,600	4,600	4,600	3,009	4,592	3,736	4,328	1,973	3,801	800	3,317
Aug	2,285	2,931	4,578	4,578	4,578	4,578	4,578	4,578	4,578	4,545	4,452	3,595	4,446	3,219	4,247	1,886
Sep	3,264	2,349	4,494	4,494	4,494	4,494	4,494	4,494	4,494	4,477	4,471	4,132	2,044	4,458	1,695	2,681

Table 6: Monthly Average CVP Exports (cfs) 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	4,354	2,927	3,052	4,391	4,355	4,369	4,343	4,391	4,391	4,353	3,840	4,332	2,660	3,090	3,776	2,915
Nov	4,253	3,467	1,441	4,265	4,254	4,258	4,250	4,265	1,503	4,253	2,652	4,246	4,236	2,606	4,203	1,149
Dec	3,817	1,214	3,803	3,820	3,817	3,818	3,816	4,227	1,039	3,817	3,816	3,199	3,812	3,459	3,266	1,897
Jan	4,228	1,340	4,212	3,825	3,821	3,823	3,820	4,232	1,513	3,821	3,820	1,241	3,815	3,806	3,814	853
Feb	3,569	800	3,971	3,288	3,819	4,250	3,794	1,801	2,435	4,246	3,795	2,268	4,236	1,918	4,234	800
Mar	2,447	800	2,583	2,741	3,838	3,936	4,300	2,592	3,848	3,718	4,273	1,874	800	4,217	2,420	4,229
Apr	1,399	800	2,454	2,650	2,365	2,197	3,357	2,687	2,684	1,621	2,999	1,747	1,333	2,397	800	1,229
May	800	800	3,029	1,500	800	1,125	3,486	3,892	1,500	800	2,923	800	800	800	800	800
Jun	1,454	800	3,000	3,000	3,000	3,000	3,000	3,000	2,650	2,475	3,000	2,274	1,038	1,837	800	1,708
Jul	1,121	2,104	4,600	4,588	4,600	4,573	4,600	4,600	4,585	4,576	3,057	2,447	800	2,609	800	800
Aug	1,587	2,774	4,578	4,543	4,557	4,356	4,578	4,578	4,541	4,028	4,520	1,528	800	2,007	800	3,293
Sep	2,407	2,492	4,494	3,759	4,483	3,935	4,494	4,494	4,474	4,042	4,463	3,128	2,796	3,512	2,481	2,999

Figure 5: Monthly Average SWP Exports for 2001 OCAP Studies

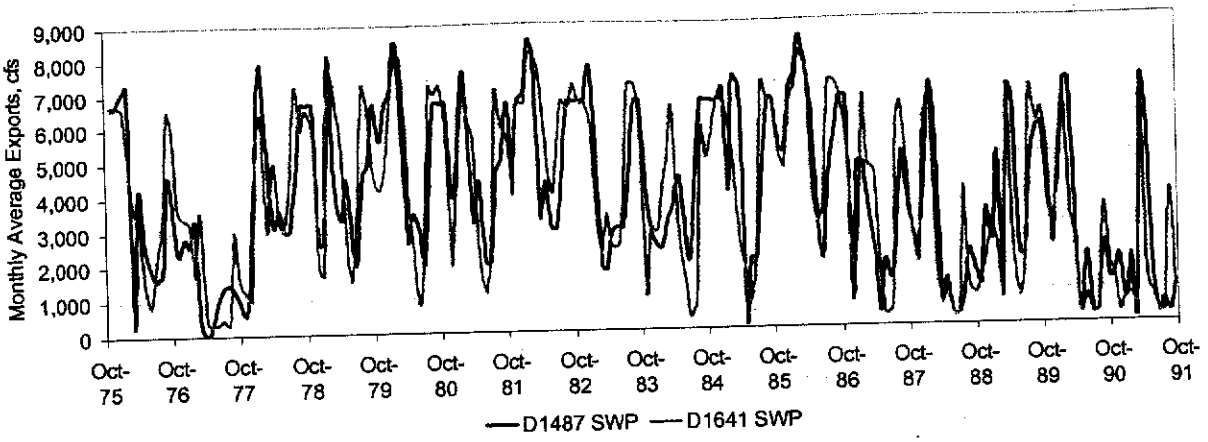


Table 7: Monthly Average SWP Exports (cfs) 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	6,680	2,337	594	6,680	5,601	6,680	4,831	6,680	4,063	6,680	5,195	6,680	2,668	1,177	3,744	1,459
Nov	6,680	2,787	2,013	2,620	6,680	3,952	6,680	6,680	2,911	6,680	5,135	748	2,316	3,325	2,909	1,900
Dec	7,072	2,581	6,131	2,668	7,029	4,700	6,985	7,678	2,439	7,028	6,990	4,737	4,493	2,505	4,677	700
Jan	7,289	3,247	7,923	8,126	8,500	7,632	8,500	4,928	2,402	4,000	7,358	4,702	7,077	5,014	7,080	1,947
Feb	300	300	5,430	4,370	6,121	5,564	8,136	1,857	3,186	7,398	8,500	3,644	5,213	1,641	7,144	300
Mar	4,165	0	3,124	3,278	2,698	3,178	3,379	1,757	3,596	7,014	7,561	2,209	703	6,939	3,071	7,068
Apr	2,519	300	3,567	4,463	3,426	4,358	4,342	2,848	4,450	317	6,045	419	1,152	6,680	303	6,097
May	1,946	942	3,000	3,000	3,000	2,000	3,000	3,000	3,000	2,000	3,000	1,888	300	2,000	2,006	1,280
Jun	1,612	1,327	3,000	2,000	2,000	2,000	3,000	3,000	2,000	2,000	2,000	1,395	300	2,000	300	300
Jul	1,827	1,475	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	2,749	843	4,600	300	616
Aug	4,504	1,264	6,680	4,878	6,680	5,005	6,680	6,680	6,680	6,577	5,613	4,994	2,132	5,760	2,301	300
Sep	3,601	946	6,680	6,680	6,680	6,680	6,680	6,680	6,680	6,680	6,680	3,970	1,651	5,843	1,300	1,093

Table 8: Monthly Average SWP Exports (cfs) 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	6,680	3,592	1,152	5,976	4,099	5,898	3,918	6,680	1,060	5,616	4,921	5,517	2,481	1,348	5,077	1,433
Nov	6,680	3,331	1,000	1,851	4,829	1,939	6,680	6,680	2,911	6,680	4,678	1,920	1,898	1,927	2,264	300
Dec	6,605	3,225	5,725	1,699	6,612	4,199	6,594	5,995	2,846	6,632	6,597	2,538	5,891	2,711	5,327	800
Jan	5,091	1,672	6,354	7,741	8,093	6,973	8,093	2,932	4,160	6,025	7,001	6,686	6,702	2,333	6,671	800
Feb	3,569	3,542	2,968	7,157	7,986	6,074	8,050	2,244	5,035	4,781	8,050	4,687	1,927	882	3,318	590
Mar	3,422	319	4,966	5,578	4,412	5,631	7,561	3,356	6,465	2,405	7,561	4,465	609	6,939	2,420	7,066
Apr	1,399	300	3,208	2,650	2,571	2,197	5,669	2,419	2,684	1,621	3,879	1,747	1,333	2,397	300	1,284
May	800	300	3,061	1,500	800	1,125	4,005	2,416	1,500	800	3,068	300	300	800	800	800
Jun	1,894	458	4,301	3,195	2,886	2,391	5,275	4,126	300	2,195	3,451	519	300	2,114	302	300
Jul	3,365	300	7,180	7,180	7,180	6,956	6,680	7,180	833	7,180	7,180	5,915	3,990	6,844	300	300
Aug	6,474	2,962	5,910	6,537	6,949	5,987	6,492	7,180	5,825	6,680	7,180	6,492	1,200	5,885	3,388	3,820
Sep	5,987	1,560	6,512	4,666	7,174	5,587	7,180	6,061	4,983	6,680	6,845	4,718	853	6,246	1,761	1,083

Figure 6: Number of Days per Month DCC Gates are Open for 2001 OCAP Studies

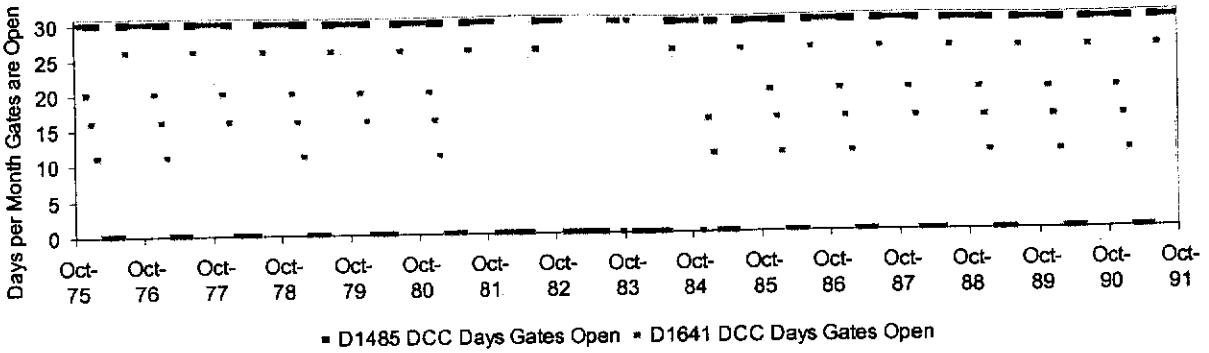


Table 9: Number of Days per Month DCC Gates are Open for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Nov	30	30	30	30	30	30	0	0	0	0	30	30	30	30	30	30
Dec	30	30	30	30	30	30	0	0	0	30	30	30	30	30	30	30
Jan	30	30	0	30	0	30	0	0	0	30	30	30	0	30	30	30
Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
May	30	30	30	30	30	30	0	0	30	30	30	30	30	30	30	30
Jun	30	30	30	30	30	30	30	0	30	30	30	30	30	30	30	30
Jul	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Aug	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Sep	30	30	30	30	30	30	30	0	30	30	30	30	30	30	30	30

Gray shading indicates months in which the DCC gates were operated.

Table 10: Number of Days per Month DCC Gates are Open for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Nov	20	20	20	20	20	20	0	0	0	0	20	20	20	20	20	20
Dec	16	16	16	16	16	16	0	0	0	16	16	16	16	16	16	16
Jan	11	11	0	11	0	11	0	0	0	11	11	11	0	11	11	11
Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun	26	26	26	26	26	26	26	0	26	26	26	26	26	26	26	26
Jul	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Aug	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Sep	30	30	30	30	30	30	30	0	30	30	30	30	30	30	30	30

Gray shading indicates months in which the DCC gates were operated.

Figure 7: Net Delta Outflow for 2001 OCAP Studies

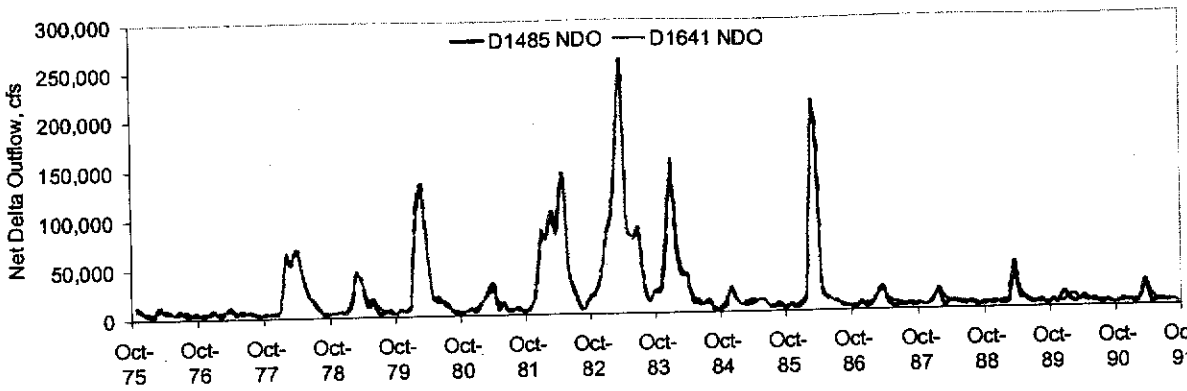


Table 11: Net Delta Outflow (cfs) for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	11,725	3,000	4,569	4,000	5,965	4,397	6,784	21,938	22,075	9,499	6,540	2,500	4,749	4,631	6,526	4,403
Nov	7,316	3,575	3,500	5,024	5,697	5,946	23,905	37,433	74,028	24,064	3,500	7,960	3,628	3,785	3,500	3,500
Dec	4,500	8,204	6,042	4,500	10,768	4,500	78,688	80,447	153,910	13,561	6,980	2,500	9,004	4,602	14,769	4,907
Jan	2,580	2,500	63,459	17,131	109,303	13,626	75,449	103,081	69,993	6,600	16,861	5,907	18,850	4,343	8,227	3,083
Feb	12,109	7,061	53,648	45,868	132,609	19,846	103,723	177,326	39,722	6,354	208,618	15,274	2,500	6,571	3,385	8,290
Mar	6,485	10,824	68,126	32,885	58,230	31,161	88,629	254,977	38,043	8,357	155,031	22,910	6,032	45,433	6,264	24,698
Apr	6,634	3,526	42,992	11,050	18,165	7,116	141,264	86,621	10,000	11,048	20,247	6,600	6,630	11,089	6,904	2,500
May	3,760	6,479	24,237	13,862	15,019	11,859	46,557	74,804	9,404	11,918	12,178	3,171	5,486	10,365	5,562	4,113
Jun	7,963	4,606	16,385	3,600	14,000	3,600	25,401	85,126	7,656	4,844	9,095	3,472	4,466	4,119	6,417	5,718
Jul	2,900	4,706	10,000	4,069	10,000	5,416	10,000	30,279	12,226	3,985	7,649	4,486	6,799	5,546	3,070	3,918
Aug	3,494	2,951	2,500	6,773	2,581	5,969	4,045	10,900	2,561	7,832	4,522	5,573	2,500	5,935	4,642	4,842
Sep	5,199	3,609	4,556	2,500	2,907	2,767	14,570	22,089	2,500	2,500	4,549	3,518	3,642	2,500	3,001	2,500

Table 12: Net Delta Outflow (cfs) for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	9,721	4,622	3,691	4,000	4,591	4,000	5,498	21,475	25,573	4,685	4,792	4,000	5,592	3,492	5,537	3,172
Nov	6,738	4,457	5,384	5,354	7,142	4,750	28,148	37,114	79,786	24,656	5,206	4,689	4,500	6,201	5,003	6,067
Dec	6,196	4,928	6,889	5,609	11,740	7,888	84,042	82,137	156,497	14,194	9,681	6,580	8,190	4,926	5,186	4,334
Jan	5,745	5,282	64,309	20,335	102,140	13,599	75,258	105,118	76,881	6,813	17,053	8,124	20,812	7,695	10,735	5,189
Feb	8,103	6,891	55,031	45,836	130,097	18,590	101,249	179,262	44,518	10,751	209,381	15,306	11,186	7,851	11,400	7,038
Mar	9,196	6,191	67,098	33,278	56,684	25,104	80,627	252,561	36,779	11,541	145,182	19,987	7,883	37,153	7,796	23,018
Apr	7,683	7,100	41,501	16,005	20,303	13,473	140,708	87,442	16,077	9,875	23,854	10,899	7,220	17,464	9,867	11,192
May	4,176	4,539	23,622	17,718	20,060	9,865	45,663	75,097	13,361	11,731	13,252	7,813	6,712	10,360	5,673	6,642
Jun	4,650	5,074	15,119	10,077	10,029	5,378	22,698	82,982	8,263	5,440	9,256	6,129	6,825	5,909	4,000	4,000
Jul	7,681	5,949	8,000	6,500	8,000	5,000	8,000	27,748	8,975	5,000	8,000	5,000	4,000	5,000	5,738	4,728
Aug	3,000	3,446	4,071	4,028	4,845	4,229	4,000	10,478	4,000	4,186	5,593	3,678	5,068	3,784	4,091	4,723
Sep	3,000	3,000	4,160	3,000	4,472	3,414	13,384	22,850	3,000	4,237	4,486	3,000	3,000	4,022	3,000	3,000

Table 13: 2001 OCAP Head of Old River Temporary Barrier Operations

a) D1485

Water Yr	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1976							CTO*	CTO*				
1977							CTO*	CTO*				
1978												
1979								CTO*				
1980												
1981							CTO*	CTO*				
1982												
1983												
1984							CTO*	CTO*				
1985							CTO*	CTO*				
1986												
1987							CTO*	CTO*				
1988							CTO*	CTO*				
1989							CTO*	CTO*				
1990							CTO*	CTO*				
1991							CTO*	CTO*				

CTO=Culverts Tied Open

b) D1641 (operations identical to SDIP base cases)

Water Yr	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1976							CTO*	CTO*				
1977							CTO*	CTO*				
1978												
1979												
1980												
1981								CTO*				
1982												
1983												
1984												
1985							CTO*	CTO*				
1986												
1987							CTO*	CTO*				
1988							CTO*	CTO*				
1989							CTO*	CTO*				
1990							CTO*	CTO*				
1991							CTO*	CTO*				

CTO=Culverts Tied Open

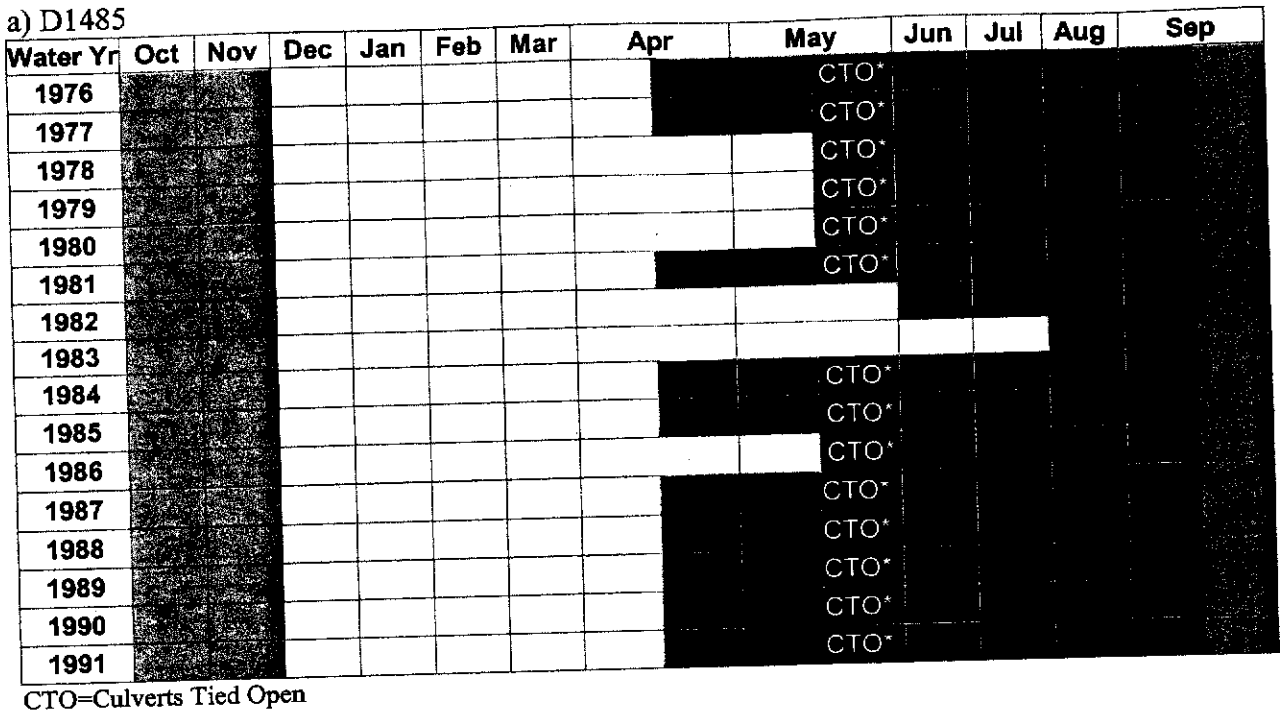
Legend

No barrier in place

Barrier in place
Notched weir in barrier

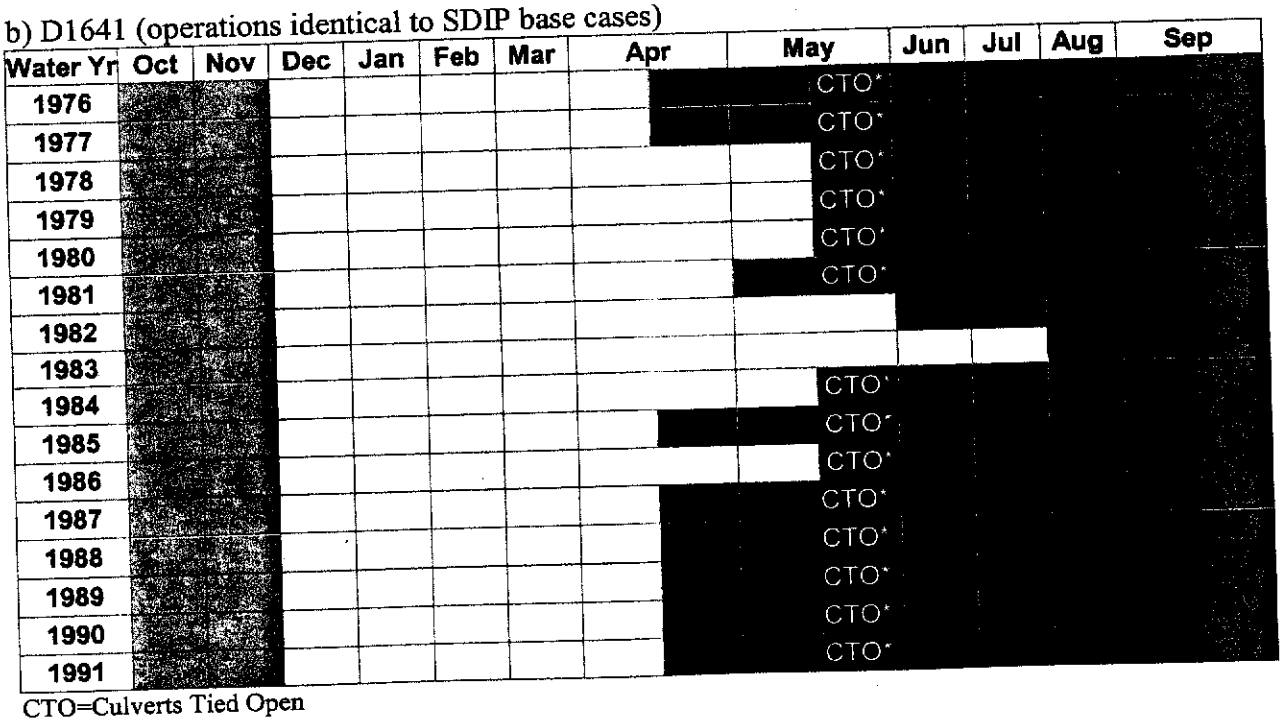
Table 14: 2001 OCAP Middle River Temporary Agricultural Barrier Operations

a) D1485



CTO=Culverts Tied Open

b) D1641 (operations identical to SDIP base cases)



CTO=Culverts Tied Open

Legend

No barrier in place

Barrier in place
Notched weir in barrier

Table 15: 2001 OCAP Grant Line Canal East Temporary Agricultural Barrier Operations

a) D1485

Water Yr	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1976								CTO*				
1977								CTO*				
1978								CTO*				
1979								CTO*				
1980								CTO*				
1981								CTO*				
1982												
1983												
1984								CTO*				
1985								CTO*				
1986								CTO*				
1987								CTO*				
1988								CTO*				
1989								CTO*				
1990								CTO*				
1991								CTO*				

*CTO=Culvert Tied Open

b) D1641 (operations identical to SDIP base cases)

Water Yr	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1976								CTO*				
1977								CTO*				
1978								CTO*				
1979								CTO*				
1980								CTO*				
1981								CTO*				
1982												
1983												
1984								CTO*				
1985								CTO*				
1986								CTO*				
1987								CTO*				
1988								CTO*				
1989								CTO*				
1990								CTO*				
1991								CTO*				

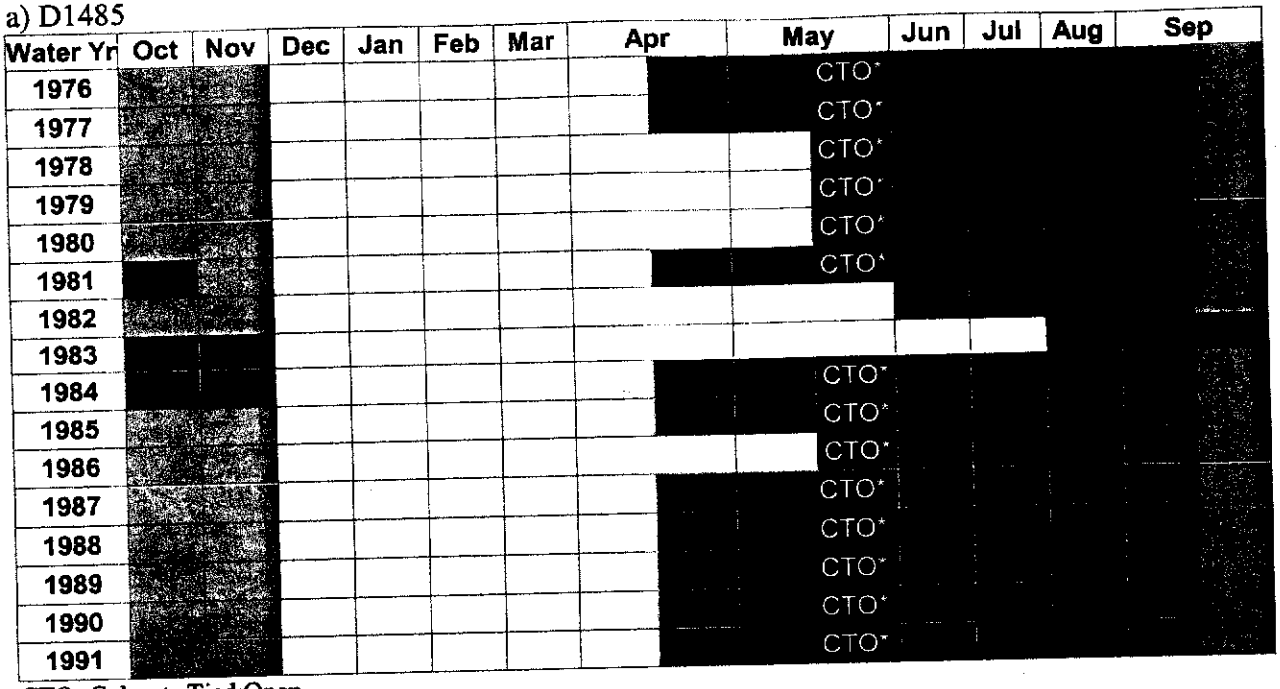
*CTO=Culvert Tied Open

Legend

No barrier in place
Boat ramp in place
Barrier in place
Notched weir in barrier

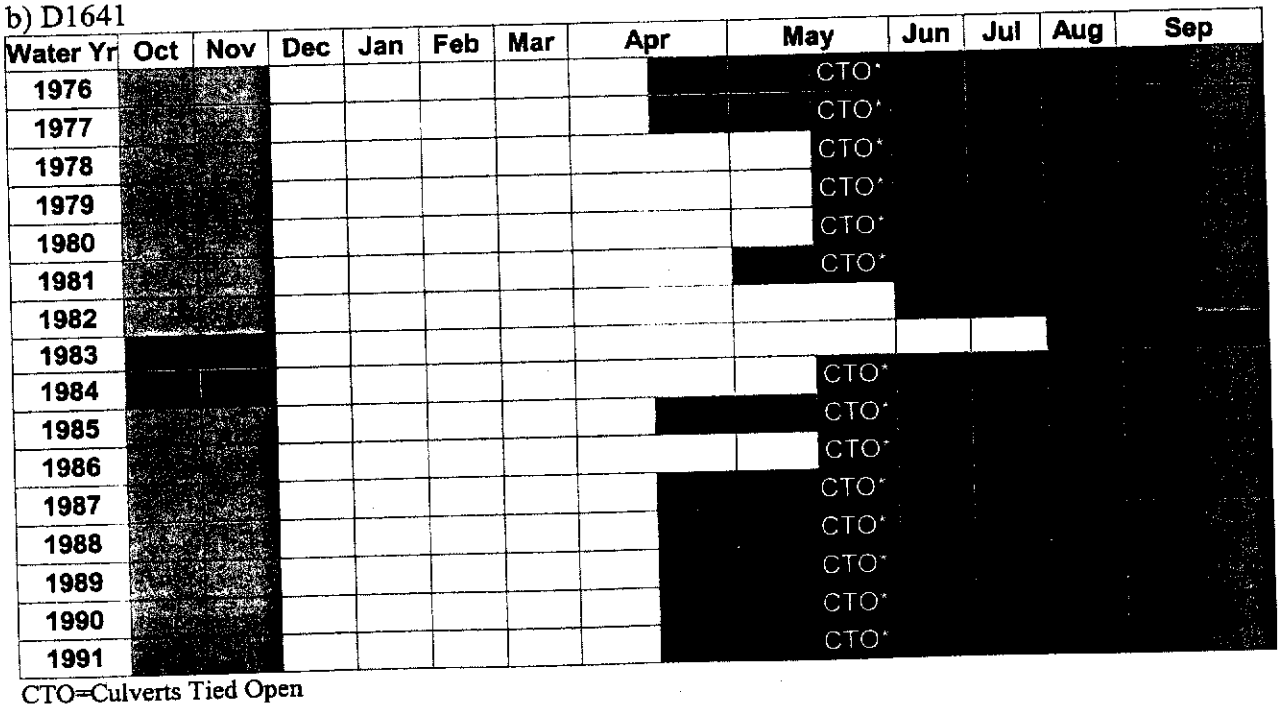
Table 16: 2001 OCAP Old River Temporary Agricultural Barrier Operations

a) D1485



CTO=Culverts Tied Open

b) D1641



CTO=Culverts Tied Open

Legend

No barrier in place

Barrier in place
Notched weir in barrier

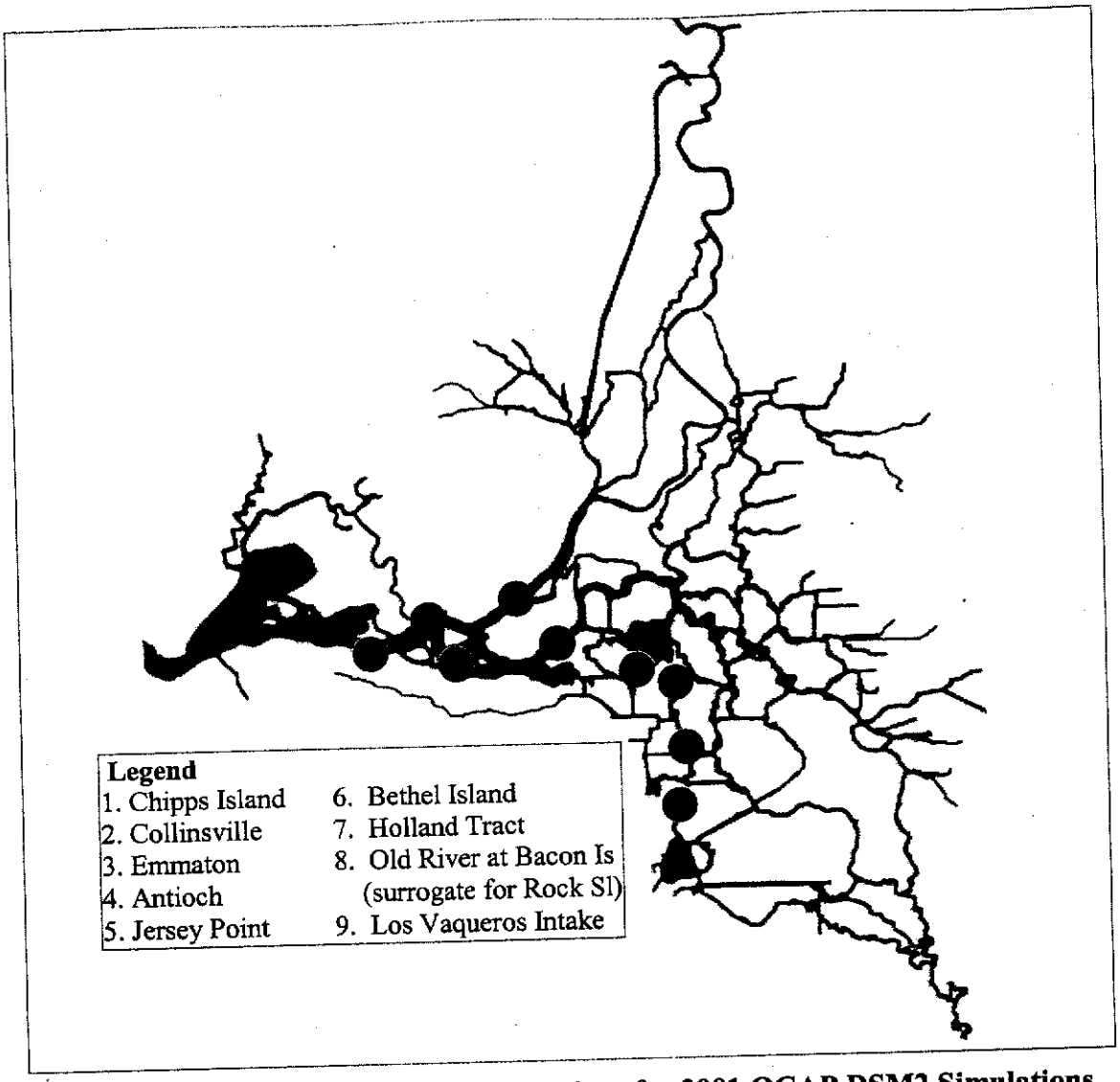


Figure 8: Water Quality Analysis Locations for 2001 OCAP DSM2 Simulations

Table 17: Water Quality Analysis Locations for 2001 OCAP DSM2 Simulations

Location	DSM2 Name	DSM2 Channel	DSM2 Channel Distance
Chipps Island	CHIPS_S_437	437	length
Collinsville	SAC_COLN	436	5733
Emmaton	SAC_EMTN	433	length
Antioch	SJR_ANT	50	length
Jersey Pt	SJR_JPT	83	length
Bethel Is (Piper Sl)	BETHEL_IS	268	4735
Holland Tract (Old R Holland Cut)	OLDR_HOLLAND	117	0
Rock Slough (Old R Bacon Is)	OLDR_BAC	106	length
Los Vaqueros (Old R Hwy 4)	OLDR_HWY4	90	length

Figure 9: Monthly Average EC at Chipps Island for 2001 OCAP

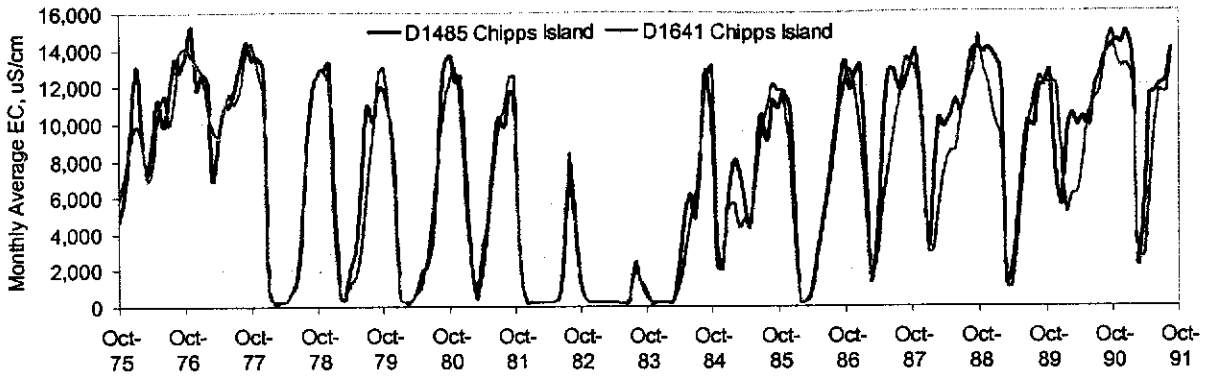


Table 18: Monthly Average EC (uS/cm) at Chipps Island for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	4,682	13,849	13,431	12,715	11,802	13,705	11,426	1,253	808	9,863	10,795	13,330	13,156	14,040	11,990	14,107
Nov	5,998	15,146	13,579	12,928	10,496	12,293	2,681	337	199	2,151	11,733	11,818	13,842	13,791	12,713	14,401
Dec	9,295	11,854	12,998	13,179	7,958	12,498	190	185	180	2,025	10,927	12,815	10,795	13,987	6,900	14,235
Jan	13,031	12,654	852	6,238	353	7,356	198	196	180	5,543	4,746	13,086	3,365	13,540	5,567	14,804
Feb	9,270	12,178	208	425	193	2,070	187	186	213	7,987	212	6,196	6,865	12,730	9,353	12,674
Mar	7,197	7,011	201	298	190	449	198	184	222	7,317	188	1,372	10,213	1,267	10,494	2,530
Apr	8,858	9,236	220	2,167	729	3,211	184	183	1,916	5,798	536	4,027	9,779	1,829	9,853	5,590
May	11,238	10,814	466	3,074	1,721	4,559	193	179	4,525	4,319	2,278	9,921	10,325	4,133	10,293	11,440
Jun	9,849	10,944	1,299	6,612	2,379	7,645	459	170	6,148	7,037	4,376	12,756	11,277	7,875	9,831	11,606
Jul	11,347	11,830	3,361	10,894	3,789	10,273	2,620	307	4,873	10,445	6,194	12,886	10,546	10,000	11,936	12,037
Aug	13,412	13,389	8,527	10,093	8,606	9,886	7,494	2,243	8,302	9,080	8,735	11,708	11,938	9,870	12,581	12,310
Sep	12,810	14,397	11,539	11,906	12,864	11,720	5,116	1,375	12,823	11,160	10,743	12,277	13,918	11,977	13,533	13,929

Table 19: Monthly Average EC (uS/cm) at Chipps Island for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	5,787	14,039	14,241	12,808	12,963	12,363	12,514	1,447	592	12,967	11,729	12,089	13,238	14,661	12,080	14,849
Nov	7,056	13,560	12,991	12,690	10,504	12,950	2,410	350	191	3,349	11,744	12,836	12,763	12,882	12,122	13,498
Dec	8,657	13,223	11,126	12,086	6,804	10,649	186	186	179	1,928	8,330	11,748	10,414	12,078	12,031	12,950
Jan	9,867	12,742	704	4,459	332	5,665	198	197	180	5,225	3,551	9,203	3,028	10,254	7,983	13,048
Feb	9,009	10,684	211	341	193	2,143	187	185	198	5,629	209	4,644	3,004	9,008	5,147	11,620
Mar	6,882	9,772	203	291	190	722	197	184	223	4,328	188	1,595	5,400	1,178	6,078	2,872
Apr	7,195	9,325	229	1,290	599	1,826	182	183	996	4,793	410	2,870	7,313	999	6,206	2,637
May	9,940	10,701	488	1,640	963	3,991	194	179	2,335	4,443	1,862	5,779	8,423	3,187	7,969	6,156
Jun	11,530	11,572	1,503	3,065	2,921	7,002	574	171	4,564	6,775	4,058	7,764	8,528	6,627	10,588	9,672
Jul	9,838	10,937	4,251	6,207	5,345	9,488	3,374	360	5,866	9,248	5,872	9,412	10,478	9,195	11,283	11,618
Aug	11,016	11,998	8,419	9,434	8,259	10,985	8,301	2,440	8,519	10,863	7,816	11,577	11,449	11,433	11,567	11,530
Sep	13,733	13,992	11,125	12,572	10,648	12,535	5,830	1,354	12,000	12,074	10,054	13,425	12,811	12,443	13,392	13,359

Figure 10: Monthly Average EC at Collinsville for 2001 OCAP

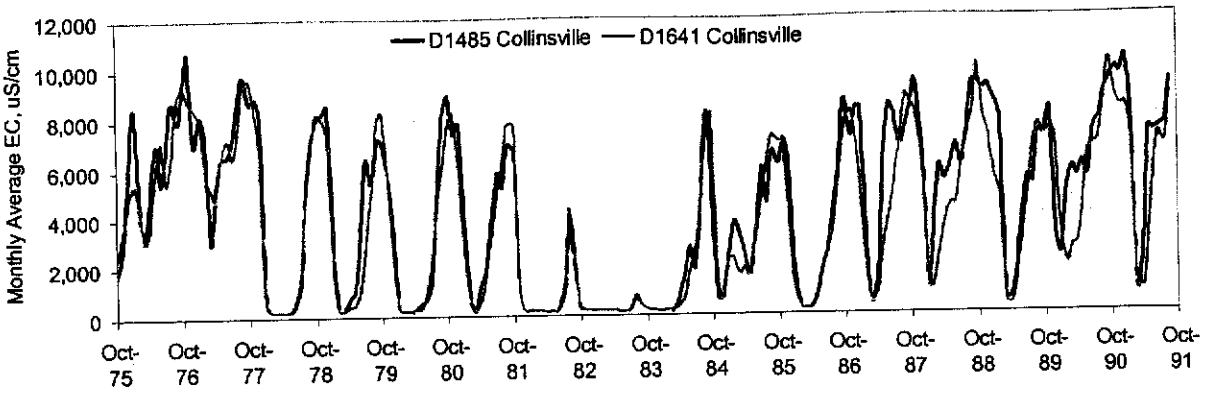


Table 20: Monthly Average EC (uS/cm) at Collinsville for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	1,725	9,230	8,656	7,946	7,003	8,966	6,686	359	265	5,167	6,119	8,674	8,392	9,303	7,190	9,382
Nov	2,643	10,642	8,865	8,208	5,770	7,365	923	195	181	661	7,106	7,183	9,300	9,054	8,178	9,815
Dec	5,137	6,997	8,060	8,479	3,810	7,787	184	182	179	651	6,156	8,361	6,108	9,221	3,180	9,618
Jan	8,504	8,114	455	2,885	238	3,432	197	195	180	2,547	1,848	8,283	1,121	8,550	2,387	10,254
Feb	4,949	7,327	201	252	188	577	185	184	186	3,809	188	2,626	3,620	7,909	4,989	7,849
Mar	3,203	3,019	199	209	187	207	195	180	187	3,240	182	430	5,932	591	5,862	996
Apr	4,655	5,172	201	754	263	1,278	180	182	641	2,487	236	1,740	5,428	609	5,521	2,827
May	7,003	6,411	220	1,021	502	1,786	181	179	1,767	1,588	756	6,131	6,040	1,609	6,054	7,348
Jun	5,406	6,547	394	3,321	713	4,027	215	171	2,756	3,532	1,731	8,419	6,833	4,239	5,549	7,262
Jul	6,955	7,196	1,172	6,329	1,335	5,758	915	186	1,887	5,985	2,743	8,149	5,967	5,518	7,532	7,428
Aug	8,728	8,722	4,564	5,385	4,629	5,234	3,778	757	4,464	4,531	4,563	6,843	7,293	5,294	7,806	7,626
Sep	7,923	9,731	6,855	7,153	8,225	6,929	2,143	406	8,265	6,591	6,134	7,499	9,311	7,325	8,917	9,337

Table 21: Monthly Average EC (uS/cm) at Collinsville for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	2,368	9,298	9,552	8,118	8,242	7,749	7,741	417	234	8,161	6,991	7,485	8,448	10,059	7,185	10,217
Nov	3,266	8,761	8,176	7,911	5,744	8,213	914	196	182	1,259	6,940	8,206	8,064	7,984	7,409	8,728
Dec	4,419	8,452	6,200	7,322	2,947	5,901	183	182	179	609	3,950	7,096	5,688	7,252	7,216	8,288
Jan	5,376	7,989	397	1,878	233	2,255	197	195	179	2,258	1,206	4,709	1,047	5,479	3,703	8,366
Feb	4,590	5,853	205	232	188	608	185	183	184	2,269	187	1,751	1,036	4,705	1,945	6,940
Mar	3,018	5,184	200	206	187	247	195	180	184	1,579	183	469	2,353	473	2,684	1,136
Apr	3,406	4,855	206	417	239	567	179	182	320	1,898	218	1,004	3,599	321	2,769	929
May	5,837	6,334	222	477	300	1,518	180	178	709	1,665	600	2,683	4,425	1,146	4,234	2,923
Jun	7,083	7,144	454	1,041	1,017	3,420	231	172	1,841	3,305	1,564	3,982	4,423	3,238	6,448	5,685
Jul	5,343	6,311	1,621	2,706	2,174	5,013	1,280	192	2,540	4,805	2,511	5,096	6,061	4,862	6,774	7,182
Aug	6,461	7,293	4,364	5,022	4,165	6,219	4,352	835	4,472	6,141	3,782	6,987	6,885	6,832	6,954	6,773
Sep	8,992	9,363	6,500	7,956	6,069	7,701	2,555	408	7,511	7,235	5,577	8,734	8,185	7,639	8,786	8,760

Figure 11: Monthly Average EC at Emmaton for 2001 OCAP

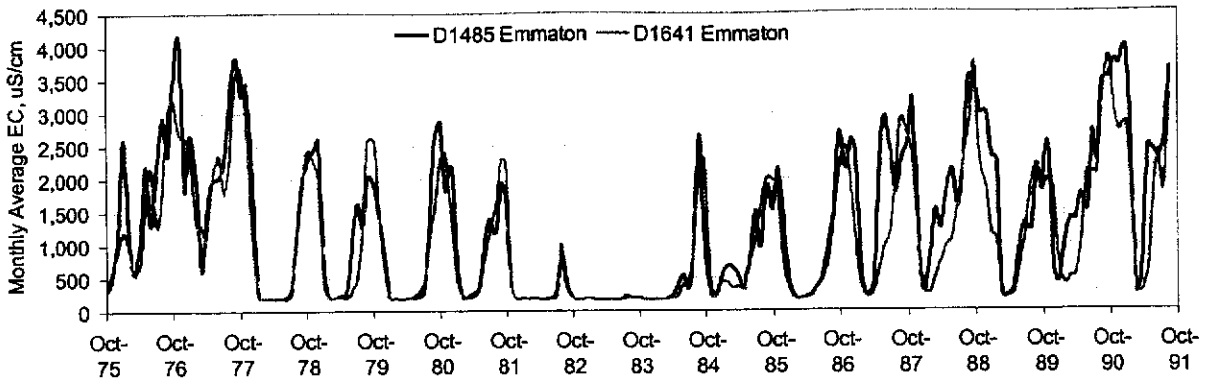


Table 22: Monthly Average EC (uS/cm) at Emmaton for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	308	3,470	3,258	2,242	1,889	2,842	1,750	191	188	1,065	1,516	2,665	2,548	3,446	1,864	3,513
Nov	452	4,117	3,423	2,418	1,363	1,834	266	182	177	235	2,156	2,137	3,171	2,976	2,496	3,776
Dec	1,134	1,849	2,286	2,581	766	2,152	180	179	178	208	1,487	2,584	1,415	2,982	598	3,703
Jan	2,596	2,647	218	586	186	619	192	188	179	509	381	2,349	283	2,331	423	3,970
Feb	1,150	1,936	192	204	186	205	180	182	182	680	183	496	841	2,247	1,057	2,330
Mar	572	605	190	191	182	183	190	180	181	628	179	204	1,511	217	1,390	290
Apr	1,031	1,431	187	226	187	277	178	180	211	535	189	380	1,237	204	1,358	644
May	2,186	1,945	189	235	201	344	179	177	367	302	234	1,867	1,719	320	1,757	2,457
Jun	1,289	2,016	201	845	214	1,005	185	174	547	802	373	2,905	2,106	1,047	1,528	2,397
Jul	2,222	2,218	254	1,619	271	1,394	237	179	343	1,502	500	2,426	1,545	1,299	2,690	2,301
Aug	2,925	3,063	1,113	1,224	1,149	1,197	833	214	1,104	964	1,011	1,768	2,173	1,222	2,257	2,512
Sep	2,346	3,835	1,869	2,027	2,633	1,920	424	188	2,653	1,865	1,555	2,204	3,525	2,197	3,459	3,634

Table 23: Monthly Average EC (uS/cm) at Emmaton for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	410	3,194	3,677	2,412	2,586	2,309	2,276	196	189	2,275	1,956	2,117	2,635	3,751	1,790	3,832
Nov	558	2,631	2,876	2,241	1,338	2,387	273	182	178	331	1,902	2,462	2,318	2,267	1,986	3,040
Dec	877	2,612	1,464	1,990	570	1,288	179	179	178	211	803	1,908	1,228	1,865	1,826	2,665
Jan	1,193	2,470	219	410	188	425	192	188	179	417	300	950	311	1,160	743	2,810
Feb	959	1,282	193	202	186	222	180	181	181	422	183	347	252	1,064	387	1,932
Mar	538	1,279	191	190	182	186	190	180	180	318	180	202	479	201	504	311
Apr	690	1,094	190	203	188	203	178	180	189	365	191	243	721	186	515	252
May	1,643	1,859	188	198	194	311	179	177	220	317	214	542	971	249	1,020	619
Jun	2,154	2,353	205	247	266	726	183	174	394	717	337	928	1,072	696	2,090	1,723
Jul	1,258	1,758	314	504	396	1,123	282	179	480	1,035	445	1,169	1,614	1,084	2,082	2,391
Aug	1,824	2,175	1,002	1,179	907	1,601	1,003	221	1,026	1,568	761	1,990	2,152	1,930	2,063	1,800
Sep	3,003	3,532	1,737	2,572	1,567	2,281	502	189	2,327	1,991	1,378	2,885	2,803	2,207	3,196	3,217

Figure 12: Monthly Average EC at Antioch for 2001 OCAP

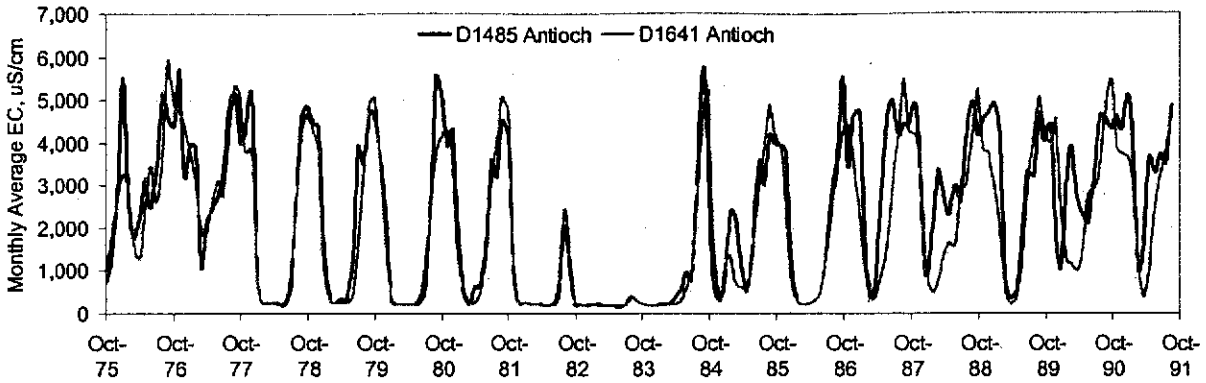


Table 24: Monthly Average EC (uS/cm) at Antioch for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	725	4,415	4,009	4,866	4,656	5,130	4,185	216	201	3,647	4,002	5,548	4,432	4,175	4,021	4,332
Nov	1,110	5,687	4,233	4,448	3,592	3,906	1,016	195	187	741	3,934	3,413	4,892	4,548	4,371	4,621
Dec	2,738	3,202	5,118	4,391	2,333	4,294	212	190	182	306	3,796	4,646	3,309	4,687	1,859	4,296
Jan	5,499	3,954	743	1,567	279	2,011	229	217	181	891	1,105	4,734	887	4,882	1,056	5,093
Feb	2,844	3,866	238	262	214	388	204	194	195	2,370	233	1,774	2,000	4,142	3,221	3,714
Mar	1,797	1,099	239	229	203	210	222	192	201	2,237	210	335	3,350	778	3,910	1,011
Apr	2,261	2,021	230	318	206	623	195	189	316	1,026	207	677	2,734	362	2,659	1,566
May	3,151	2,384	208	311	221	615	185	183	524	497	261	2,856	2,292	520	2,300	3,639
Jun	2,480	2,752	217	1,280	248	1,701	198	163	940	1,417	473	4,631	2,980	1,815	2,117	3,271
Jul	3,468	3,293	483	3,911	487	3,582	364	180	789	3,547	1,156	4,989	2,615	3,273	3,351	3,736
Aug	5,128	4,675	2,646	3,484	2,603	3,172	1,999	354	2,437	3,001	2,453	4,213	4,013	3,215	4,613	3,504
Sep	4,613	5,166	4,632	4,705	5,517	4,542	1,255	289	5,731	4,169	3,833	4,436	4,958	4,675	4,584	4,844

Table 25: Monthly Average EC (uS/cm) at Antioch for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	982	4,888	5,078	4,685	5,021	4,116	4,695	231	207	5,152	4,218	4,232	4,288	5,244	4,350	5,446
Nov	1,646	4,719	3,738	4,224	3,463	4,273	1,175	195	191	1,619	3,780	4,398	4,158	3,811	3,957	3,868
Dec	2,590	4,444	3,833	3,744	1,857	3,455	210	192	181	359	2,395	3,622	3,521	3,770	4,501	3,724
Jan	3,252	3,723	728	1,160	309	1,457	231	217	181	1,140	781	2,357	1,005	2,915	2,541	3,630
Feb	2,992	2,995	248	266	216	477	206	191	193	1,350	239	1,110	480	1,953	1,178	2,990
Mar	1,708	1,968	243	226	203	231	219	192	196	727	209	326	753	497	1,166	1,120
Apr	1,270	1,778	236	233	206	247	191	189	209	585	212	370	1,322	220	983	356
May	2,409	2,444	214	236	220	451	183	182	275	505	254	892	1,633	388	1,502	967
Jun	3,459	3,107	225	391	331	1,428	195	165	554	1,314	447	1,505	1,566	1,221	2,743	2,404
Jul	2,605	2,744	783	1,502	974	3,238	535	180	922	2,988	1,173	2,802	2,952	2,823	2,931	3,208
Aug	3,487	3,864	2,488	3,156	2,364	4,006	2,408	391	2,339	3,901	2,130	4,171	2,991	4,162	3,304	3,714
Sep	5,892	5,289	4,187	4,975	3,764	5,067	1,528	294	4,680	4,900	3,384	5,480	4,130	5,060	4,627	4,665

Figure 13: Monthly Average EC at Jersey Point for 2001 OCAP

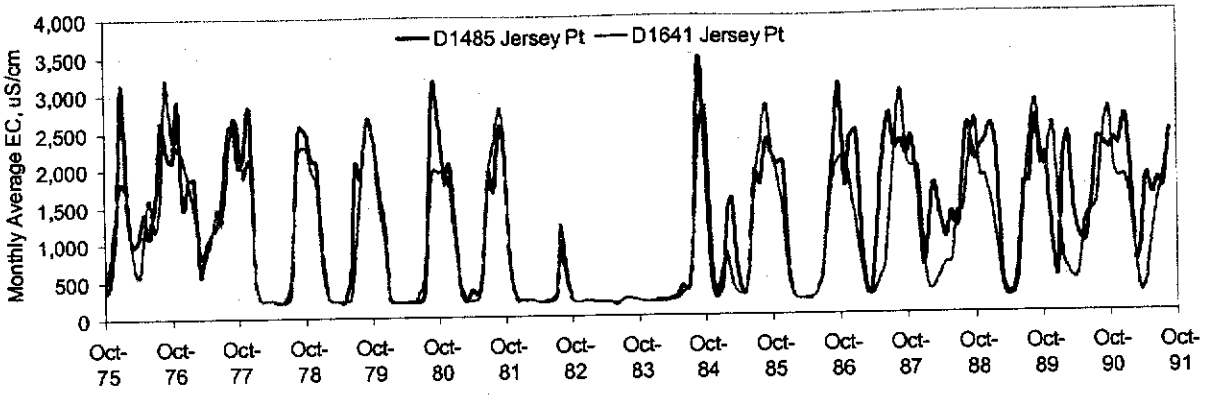


Table 26: Monthly Average EC (uS/cm) at Jersey Point for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	353	2,119	2,030	2,473	2,500	2,545	2,154	201	199	2,072	2,171	3,088	2,101	2,049	1,958	2,172
Nov	476	2,899	2,130	2,100	1,883	1,776	754	194	186	581	2,017	1,723	2,351	2,228	2,107	2,311
Dec	1,334	1,498	2,776	2,090	1,241	2,038	207	187	180	230	2,046	2,359	1,665	2,298	937	2,242
Jan	3,139	1,840	483	769	243	990	227	211	180	384	609	2,446	648	2,508	512	2,611
Feb	1,527	1,870	235	255	208	284	200	187	195	1,408	229	1,003	1,157	2,126	2,055	1,888
Mar	987	591	238	228	200	204	221	189	201	1,536	205	276	1,730	536	2,380	678
Apr	1,066	880	229	227	200	356	191	187	225	611	205	339	1,276	278	1,292	894
May	1,411	1,111	206	210	200	311	184	180	262	275	212	1,272	1,003	280	1,007	1,820
Jun	1,090	1,220	208	546	203	721	197	160	382	586	259	2,335	1,347	774	925	1,559
Jul	1,605	1,510	270	2,068	257	1,932	230	180	359	1,912	505	2,673	1,158	1,737	1,582	1,770
Aug	2,602	2,282	1,399	1,848	1,340	1,673	985	229	1,267	1,747	1,217	2,224	2,005	1,727	2,313	1,662
Sep	2,248	2,626	2,565	2,627	3,095	2,560	621	223	3,418	2,343	2,080	2,301	2,529	2,608	2,294	2,400

Table 27: Monthly Average EC (uS/cm) at Jersey Point for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	442	2,401	2,599	2,290	2,559	1,928	2,381	205	206	2,760	2,183	2,088	2,060	2,601	2,227	2,730
Nov	791	2,254	1,860	1,963	1,732	1,991	851	194	190	1,197	1,895	2,123	1,941	1,814	1,925	1,949
Dec	1,436	2,167	2,112	1,799	1,064	1,704	206	189	179	278	1,354	1,767	1,975	1,825	2,532	1,778
Jan	1,836	1,793	508	635	273	865	228	211	180	605	514	1,177	824	1,469	1,625	1,793
Feb	1,668	1,381	245	260	210	383	202	185	193	822	236	654	317	943	754	1,408
Mar	878	890	242	226	200	219	218	189	195	418	206	261	341	358	560	729
Apr	549	759	236	220	205	207	187	187	200	295	211	236	523	202	424	254
May	1,031	1,071	213	217	218	256	182	179	225	282	214	380	662	230	612	410
Jun	1,608	1,469	211	239	231	609	193	162	286	557	250	625	672	506	1,242	1,058
Jul	1,157	1,239	416	803	463	1,923	287	180	382	1,773	556	1,394	1,349	1,518	1,358	1,492
Aug	1,662	1,813	1,280	1,745	1,201	2,286	1,215	243	1,142	2,269	1,144	2,178	1,362	2,247	1,472	1,807
Sep	3,193	2,671	2,240	2,654	1,960	2,795	752	225	2,494	2,816	1,833	2,981	1,983	2,825	2,235	2,302

Figure 14: Monthly Average EC at Bethel Island for 2001 OCAP

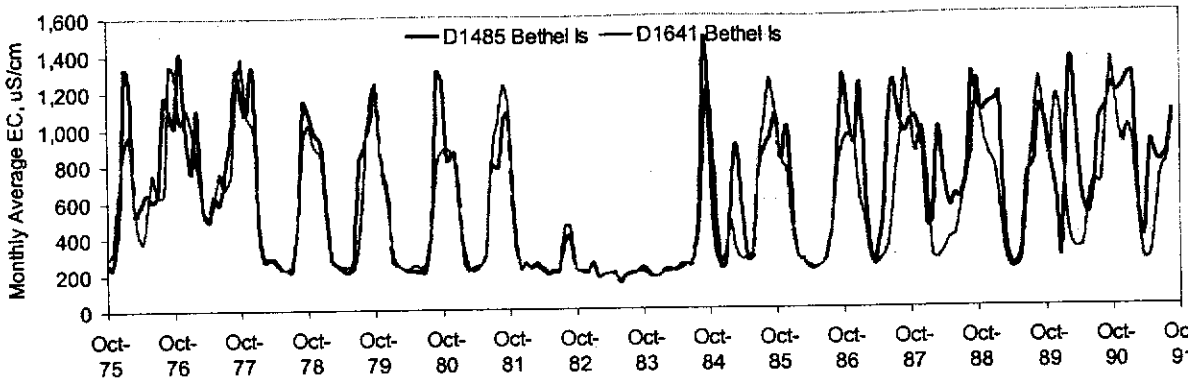


Table 28: Monthly Average EC (uS/cm) at Bethel Island for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	257	1,018	1,161	1,071	1,231	1,257	1,071	214	213	1,119	1,065	1,270	1,024	1,108	1,041	1,204
Nov	241	1,411	1,084	977	828	822	507	208	198	425	822	1,056	1,036	1,066	848	1,163
Dec	512	954	1,315	916	629	860	222	201	178	224	987	909	902	1,109	616	1,192
Jan	1,319	755	515	576	268	577	260	252	181	242	445	1,226	451	1,125	280	1,257
Feb	1,238	1,103	275	282	245	255	223	176	207	603	284	676	478	1,155	917	1,265
Mar	533	596	277	255	228	215	252	187	219	899	265	302	977	458	1,355	531
Apr	591	492	270	226	214	229	227	199	212	542	220	244	705	226	845	389
May	644	635	229	212	211	251	195	195	223	265	219	507	551	236	564	891
Jun	604	585	223	278	212	312	213	150	244	280	232	1,002	616	323	502	818
Jul	632	715	218	814	211	789	210	179	242	749	268	1,241	595	712	672	789
Aug	1,165	981	517	889	494	780	373	199	478	885	470	1,035	758	791	1,041	852
Sep	1,086	1,321	1,139	1,037	1,297	1,043	401	200	1,462	951	840	962	1,265	1,087	1,083	1,060

Table 29: Monthly Average EC (uS/cm) at Bethel Island for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	289	1,309	1,379	1,017	1,222	869	1,126	219	232	1,229	1,036	905	1,135	1,246	1,039	1,345
Nov	321	1,029	1,071	902	817	885	578	207	214	789	823	951	846	1,007	827	1,124
Dec	656	1,105	995	850	589	842	222	213	173	261	747	895	982	834	1,151	885
Jan	908	1,004	553	527	309	521	262	242	184	302	409	620	660	789	1,029	980
Feb	957	817	295	290	249	329	228	170	205	484	278	479	279	591	561	888
Mar	547	590	286	252	227	222	238	188	206	328	257	266	264	308	353	520
Apr	371	512	287	241	223	220	211	198	217	266	235	229	316	208	317	262
May	497	572	238	241	249	256	190	192	247	286	225	274	378	215	338	273
Jun	753	755	225	222	232	303	204	153	247	299	228	336	392	266	571	465
Jul	625	659	246	352	251	816	214	181	249	762	278	570	533	607	696	724
Aug	640	737	509	729	479	1,054	453	200	435	1,061	473	915	694	976	677	799
Sep	1,334	1,217	938	1,167	802	1,226	457	203	1,005	1,256	755	1,283	880	1,253	986	1,008

Figure 15: Monthly Average EC at Holland Tract for 2001 OCAP

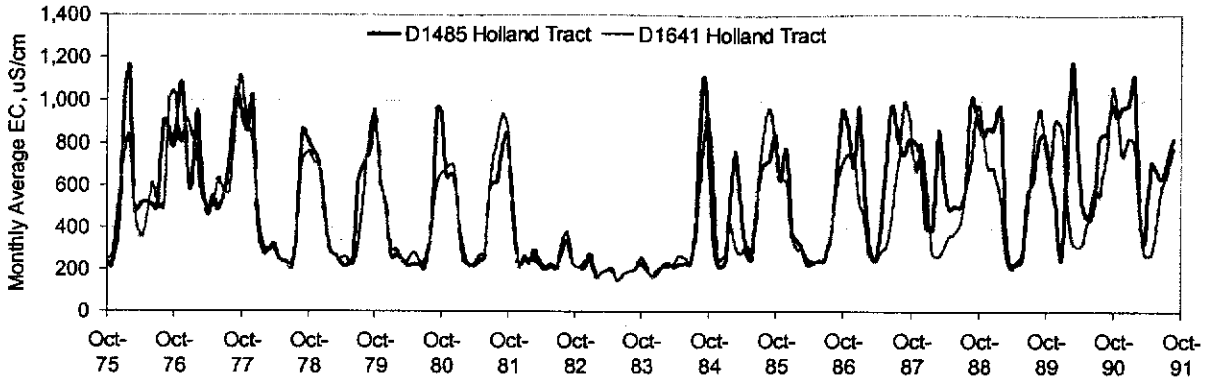


Table 30: Monthly Average EC (uS/cm) at Holland Tract for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	236	790	964	803	953	947	844	224	228	884	840	951	815	909	842	985
Nov	218	1,086	861	758	636	641	439	210	207	373	625	890	799	838	647	923
Dec	394	814	1,015	704	502	657	214	210	168	217	768	684	736	871	517	967
Jan	975	579	443	482	260	475	262	270	181	227	382	970	400	867	251	980
Feb	1,153	954	279	285	267	244	233	162	216	488	338	602	392	962	725	1,106
Mar	477	668	295	265	247	225	290	186	232	761	300	311	854	411	1,182	485
Apr	516	462	301	230	221	221	223	202	214	535	226	243	638	215	786	325
May	519	554	249	219	222	241	209	197	226	270	228	398	490	228	503	705
Jun	511	482	235	246	225	265	226	144	232	248	242	765	500	272	437	675
Jul	489	576	211	616	208	603	208	182	228	567	245	974	503	553	519	632
Aug	906	757	396	696	379	616	301	194	368	696	371	820	576	627	829	702
Sep	865	1,049	863	770	964	783	338	199	1,099	719	636	743	1,007	824	848	816

Table 31: Monthly Average EC (uS/cm) at Holland Tract for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	257	1,042	1,113	764	950	658	880	226	258	948	814	696	928	978	814	1,063
Nov	268	801	895	709	650	685	494	210	224	667	645	745	669	833	651	955
Dec	521	915	800	689	489	695	214	243	161	249	614	744	798	677	906	739
Jan	739	862	502	465	296	448	267	244	193	270	372	529	588	683	871	824
Feb	835	739	312	290	296	308	234	158	213	423	295	445	276	542	523	802
Mar	498	558	304	260	246	221	247	187	210	315	299	267	262	289	332	470
Apr	354	491	324	254	234	233	206	199	230	276	254	236	299	207	311	271
May	427	503	255	259	283	275	200	194	268	314	234	284	358	223	319	272
Jun	611	634	233	222	243	275	214	146	257	279	236	312	367	245	464	381
Jul	534	562	227	292	228	619	207	182	239	580	249	452	426	472	588	590
Aug	494	572	398	558	375	816	354	194	344	822	375	708	573	759	551	642
Sep	1,010	949	709	890	604	939	378	202	764	963	577	986	696	967	763	776

Figure 16: Monthly Average EC at Old River at Rock Slough for 2001 OCAP

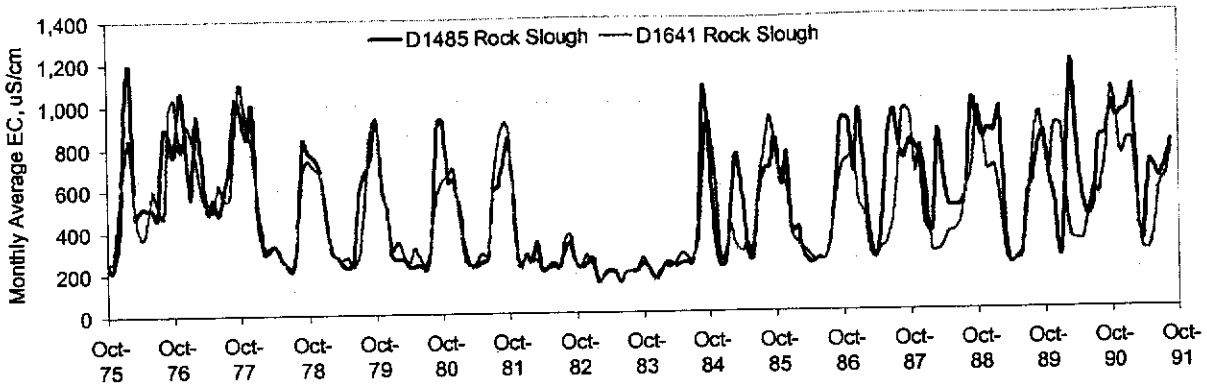


Table 32: Monthly Average EC (uS/cm) at Old River at Rock Slough for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	237	769	963	774	927	914	829	228	233	863	819	910	801	900	833	971
Nov	217	1,056	843	742	616	626	434	215	221	370	602	900	776	819	624	902
Dec	380	827	986	686	492	638	218	229	159	221	748	657	727	853	517	927
Jan	930	561	460	485	273	472	282	254	176	229	386	949	400	844	252	952
Feb	1,179	945	290	294	261	248	246	142	226	472	402	607	380	943	692	1,034
Mar	480	762	306	272	264	230	344	171	239	746	290	326	846	418	1,174	491
Apr	516	491	333	235	228	224	209	199	219	556	232	250	642	217	801	318
May	510	556	272	224	227	246	219	192	232	281	234	386	496	233	509	688
Jun	512	479	245	247	232	263	235	139	236	249	250	737	492	268	440	666
Jul	471	565	215	591	212	580	212	189	231	544	247	946	502	534	493	617
Aug	880	730	380	679	364	601	292	196	355	677	360	799	552	610	807	692
Sep	849	1,024	831	733	922	749	336	201	1,050	687	610	718	984	789	821	784

Table 33: Monthly Average EC (uS/cm) at Old River at Rock Slough for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	258	1,030	1,098	738	926	636	860	231	264	915	794	674	923	952	792	1,037
Nov	262	780	894	694	636	666	489	214	219	658	627	726	652	831	632	949
Dec	505	903	779	678	481	687	218	279	153	252	603	734	778	661	872	728
Jan	720	856	523	470	308	445	287	223	194	268	377	526	588	681	863	795
Feb	831	745	328	298	345	311	244	141	221	419	319	451	281	548	529	789
Mar	505	579	317	266	274	225	255	172	215	320	312	276	278	294	338	473
Apr	364	511	332	262	246	240	195	194	236	285	274	245	305	213	326	282
May	419	500	269	273	318	284	212	189	281	331	241	301	366	233	326	281
Jun	599	627	241	228	253	278	220	142	267	284	243	318	377	248	452	372
Jul	535	561	229	288	230	594	211	186	243	558	249	439	415	457	580	572
Aug	478	554	385	538	363	789	342	196	333	794	364	684	568	733	542	628
Sep	969	917	681	858	582	906	374	205	733	927	555	950	672	932	737	749

Figure 17: Monthly Average EC at Los Vaqueros Intake for 2001 OCAP

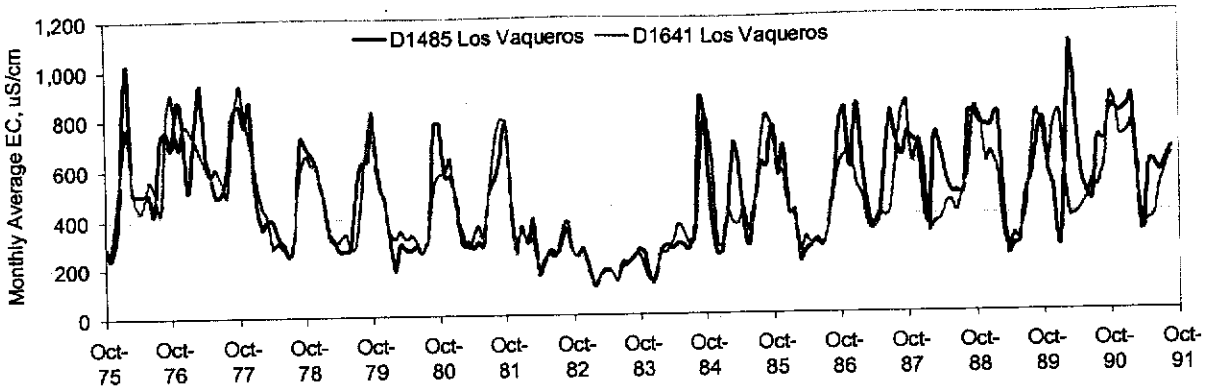


Table 34: Monthly Average EC (uS/cm) at Los Vaqueros Intake for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	277	687	852	682	830	783	767	259	271	807	757	777	726	808	776	819
Nov	243	873	769	653	569	565	449	240	251	392	560	819	694	753	572	805
Dec	348	770	860	611	462	565	247	275	135	250	670	585	672	748	503	794
Jan	767	515	525	487	317	468	355	176	156	255	400	837	401	748	263	818
Feb	1,020	774	368	340	188	289	300	121	263	428	411	608	363	795	574	859
Mar	508	939	393	311	292	298	394	162	285	690	217	431	712	455	1,075	530
Apr	501	667	394	270	267	274	171	185	269	598	256	340	644	237	804	320
May	503	580	335	271	269	299	208	178	289	365	269	387	540	273	572	593
Jun	501	493	294	279	283	287	266	134	282	281	300	617	485	280	472	588
Jul	429	512	242	512	252	508	247	214	265	475	273	808	486	471	449	552
Aug	733	605	344	616	331	547	287	210	328	610	342	714	479	544	691	597
Sep	753	824	720	630	771	644	350	238	866	593	541	633	802	669	681	648

Table 35: Monthly Average EC (uS/cm) at Los Vaqueros Intake for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	292	908	936	650	820	568	783	261	246	808	735	608	843	818	728	865
Nov	271	684	813	609	596	580	496	239	188	634	590	636	607	769	579	833
Dec	452	769	699	614	457	630	249	275	136	286	564	667	695	604	745	696
Jan	642	763	587	483	344	447	364	166	169	280	397	519	584	643	797	713
Feb	773	720	450	332	315	342	289	126	253	412	421	476	332	564	548	748
Mar	532	660	415	299	345	274	311	162	252	369	253	353	363	337	381	506
Apr	430	612	283	306	309	315	170	181	294	369	313	332	379	256	390	356
May	464	567	306	339	330	366	222	176	365	434	283	405	440	315	407	363
Jun	559	603	275	273	302	320	249	136	342	336	287	388	448	295	453	385
Jul	515	541	246	286	255	514	240	198	295	489	268	410	403	410	529	497
Aug	430	490	354	476	336	690	322	208	321	692	343	590	499	628	498	561
Sep	803	733	600	732	518	785	381	242	626	802	499	807	576	801	611	618

Figure 18: Monthly Average Chloride at Old River at Rock Slough for 2001 OCAP

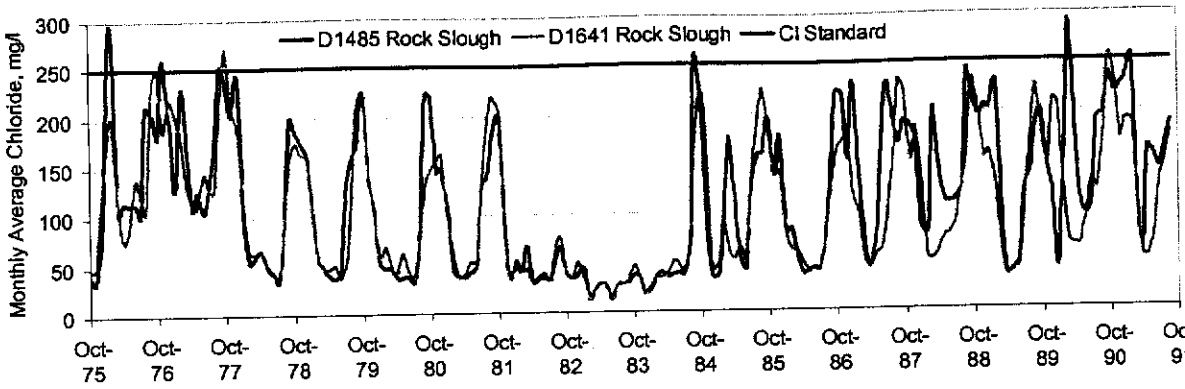


Table 36: Monthly Average Chloride (mg/l) at Old River at Rock Slough for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	40	182	234	183	225	221	198	37	38	207	196	220	191	217	199	236
Nov	34	259	202	175	141	144	92	34	35	75	137	217	184	195	143	218
Dec	78	198	240	160	108	147	34	37	19	35	176	152	171	205	115	225
Jan	225	126	99	106	49	102	51	44	23	37	79	230	83	202	44	231
Feb	292	229	54	55	46	43	42	14	37	103	84	139	78	229	162	253
Mar	105	180	58	49	47	38	68	22	40	176	54	63	203	88	291	108
Apr	114	108	65	39	37	36	32	29	35	125	38	43	148	34	191	61
May	113	125	49	36	37	42	35	28	38	51	39	79	109	38	113	161
Jun	113	104	42	42	38	46	39	13	39	43	43	173	108	48	94	155
Jul	102	128	34	134	33	132	33	27	38	122	42	230	111	119	108	141
Aug	212	172	78	158	74	137	54	29	71	157	72	190	124	140	192	161
Sep	204	251	199	173	223	177	66	30	258	160	139	169	240	188	196	186

Gray shading indicates values that exceed the standard of 250 mg/l chloride.

Table 37: Monthly Average Chloride (mg/l) at Old River at Rock Slough for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	45	252	270	174	224	147	207	38	47	221	189	157	223	231	188	254
Nov	46	185	216	162	147	155	107	33	35	152	144	170	151	199	145	230
Dec	111	218	185	158	105	160	34	51	17	44	138	173	185	153	210	171
Jan	169	205	116	102	58	95	53	36	28	48	77	117	134	159	207	189
Feb	199	176	64	56	68	59	41	14	35	88	62	97	51	123	118	187
Mar	111	131	61	47	49	36	44	22	34	62	60	50	50	55	67	103
Apr	74	113	65	46	42	40	28	28	39	52	49	42	58	33	63	52
May	88	110	48	49	61	52	33	27	51	65	41	57	74	38	63	51
Jun	137	144	40	37	44	50	35	14	48	52	41	61	77	42	97	76
Jul	119	126	37	53	38	135	33	26	41	126	43	94	87	98	131	129
Aug	104	125	79	120	73	188	68	29	65	189	73	159	128	172	121	144
Sep	236	222	159	206	132	219	76	31	172	224	125	231	156	226	173	177

Gray shading indicates values that exceed the standard of 250 mg/l chloride.

Figure 19: Monthly Average Chloride at Los Vaqueros Intake for 2001 OCAP

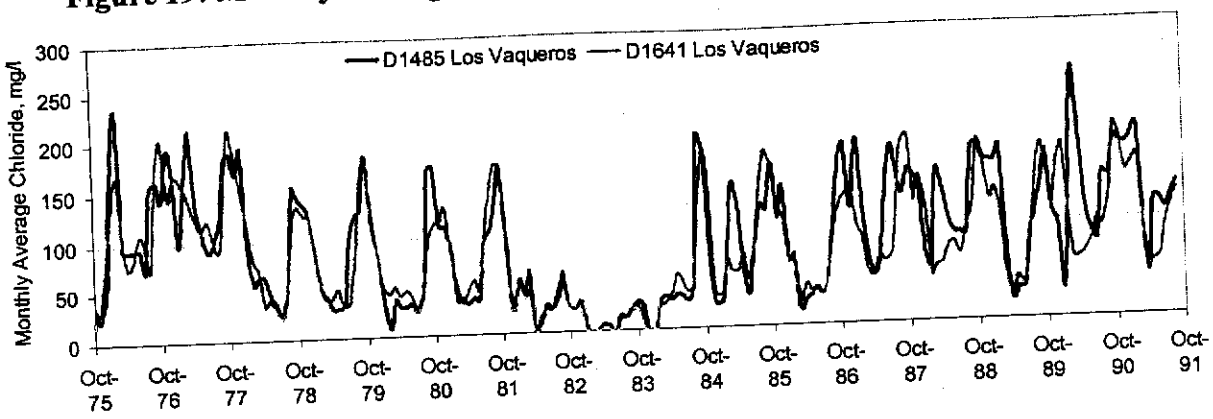


Table 38: Monthly Average Chloride (mg/l) at Los Vaqueros Intake for 2001 OCAP D1485

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	32	144	189	142	183	170	166	27	30	177	163	168	154	177	168	180
Nov	23	195	166	135	112	110	79	22	25	63	109	180	146	162	112	176
Dec	51	166	191	123	82	110	24	31	-7	25	139	116	140	161	94	173
Jan	166	97	100	89	43	84	53	4	-1	26	65	185	66	160	28	180
Feb	235	167	57	49	8	35	38	-11	28	73	68	122	55	173	113	191
Mar	95	213	64	41	36	37	64	0	34	145	15	74	151	80	250	101
Apr	93	138	64	30	29	31	3	7	30	119	26	49	132	21	176	44
May	93	115	48	30	30	38	13	5	35	56	30	62	104	31	112	118
Jun	93	91	36	32	33	35	29	-7	33	33	38	125	89	33	85	117
Jul	73	96	22	96	25	95	24	15	29	86	31	177	89	85	79	107
Aug	156	121	50	124	47	105	34	13	46	123	49	151	87	105	145	119
Sep	162	181	153	128	167	132	52	21	193	118	104	129	175	139	142	133

Table 39: Monthly Average Chloride (mg/l) at Los Vaqueros Intake for 2001 OCAP D1641

WY/ Mon	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Oct	36	204	212	134	180	111	170	27	23	177	157	122	187	180	155	192
Nov	30	143	178	122	119	115	92	21	7	129	117	130	122	166	114	184
Dec	80	166	147	124	81	128	24	31	-7	34	110	138	146	121	160	146
Jan	132	165	117	88	50	78	56	2	2	33	65	98	116	132	174	151
Feb	167	153	79	47	42	50	35	-9	25	69	71	86	47	110	106	160
Mar	101	136	70	38	50	31	41	0	25	57	25	53	55	48	60	94
Apr	74	123	34	40	41	42	3	6	37	57	42	47	60	26	63	53
May	83	111	40	49	46	56	17	4	56	75	34	67	76	42	67	55
Jun	109	121	31	31	39	43	24	-7	50	48	34	62	78	37	80	61
Jul	97	104	23	34	26	97	22	10	37	90	29	68	66	68	101	92
Aug	74	90	53	86	48	145	44	13	44	145	50	117	93	128	92	109
Sep	175	156	120	156	98	171	60	22	127	175	92	177	113	175	123	125