1. New Melones Reservoir Operations – Provision of Dilution Flow

Quantification Methodology: Items 12 and 13 of the Control Program for Salt and Boron Discharges into the Lower San Joaquin River of the Basin Plan Amendment states:

> 12. Salt loads in water discharged into the Lower San Joaquin River (LSJR) or its tributaries for the express purpose of providing dilution flow are not subject to load limits described in this control program if the discharge:
>
> a. complies with salinity water quality objectives for the LSJR at the Airport Way Bridge near Vernalis;
> b. is not a discharge from irrigated lands; and
> c. is not provided as a water supply to be consumptively used upstream of the San Joaquin River at the Airport Way Bridge near Vernalis.
>
> 13. Entities providing dilution flows, as described in item 12, will obtain an allocation equal to the salt load assimilative capacity provided by this flow. This dilution flow allocation can be used to:
>
> 1) offset salt loads discharged by this entity in excess of any allocation or; 2) trade, as described in item 10. The additional dilution flow allocation provided by dilution flows will be calculated as described in table IV-8.

Item 12 describes water "discharged … for the express purpose of providing dilution flow" but does not define this expression beyond the conditions stated in 12a through 12c. Neither California water law, the Basin Plan nor the Bay-Delta Plan define the expression "dilution flow", therefore Reclamation can only rely on the evidence and words contained within the Basin Plan: the assumptions made in developing base flows for the Basin Plan Amendment (DWRSIM study 771) and on the three conditions 12a through 12c to interpret the phrase "express purpose of providing dilution flow."

Reclamation manages releases on the Stanislaus River to meet a variety of environmental and water quality outcomes. Reclamation accounts for these releases under water rights settlement requirements, flood control requirements, state and federal biological opinion requirements, and the Central Valley Project Improvement Act of 1992 (CVPIA), as well as through in-stream flow and quality conditions, in order to ensure state and federal regulatory compliance and to ensure it does not exceed federal authorities regulating the management of releases from New Melones Reservoir. Reclamation does not have any accounting requirements pertaining to releases made to comply with Water Rights Decision 1641.For the purposes of the Basin Plan Amendment, New Melones releases are a) of a salinity consistently and significantly below the Vernalis water quality objective, b) released from Goodwin Dam and not from irrigated lands, and c) designed to provide environmental flows in the lower Stanislaus River or at Vernalis, and are not intended for consumptive use above Vernalis. They therefore meet the conditions of "dilution flow" established by the Basin Plan Amendment.

In order to determine which of Reclamation's Stanislaus River flows are not included in the design flow at Vernalis (and to maintain the environmental integrity[1] of the salinity control program), Reclamation requested the DWRSIM study from which the Basin Plan Amendment design flows were obtained. Reclamation followed the procedures described in Appendix 1: Technical TMDL Report to the Basin Plan Amendment to recreate Table 4-2 in the Appendix (page 59). From this re-creation, Reclamation then determined the years corresponding to the design flow years, identified in Table 1.

Table 1: Basin Plan Amendment Design Flows (TAF) with Corresponding Calendar Year (Table 4-2 of Appendix 1, Item 41, Model Run 1921-1994)

Year Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet	101	178	255	283	310	148	148	93	106	195	102	91
	1986	*1958*	*1993*	*1993*	*1993*	*1965*	*1937*	*1980*	*1965*	*1977*	*1977*	*1977*
Abv Normal	106	178	164	286	258	89	76	76	105	124	87	85
	1963	*1935*	*1963*	*1932*	*1932*	*1932*	*1932*	*1932*	*1932*	*1931*	*1931*	*1962*
Blw Normal	68	70	106	213	186	73	63	60	94	95	85	81
	1962	*1948*	*1948*	*1950*	*1966*	*1962*	*1962*	*1962*	*1928*	*1924*	*1961*	*1961*
Dry	79	99	95	149	141	39	34	44	71	78	73	77
	1926	*1972*	*1972*	*1933*	*1972*	*1933*	*1964*	*1926*	*1933*	*1925*	*1925*	*1933*
Critical	61	56	71	84	72	30	27	38	60	76	70	69
	1991	*1991*	*1977*	*1931*	*1931*	*1992*	*1992*	*1992*	*1992*	*1991*	*1988*	*1990*

Reclamation next used the month and years identified in Table 1 (corresponding to the month and year of the Basin Plan Amendment design flow), to identify the modeled releases from Goodwin Dam (node 16) contributing to the design flow at Vernalis. DWRSIM used CVPIA accounting terminology and priorities to model the Stanislaus River, and has a node 581 that modeled calls for additional water needed for Reclamation to meet the Vernalis salinity standard (specifically providing dilution flows). Since these flows count towards dilution flow allocations, the equivalent "design flow" for Goodwin Releases is the flow of node 16 minus the flow of 581. These calculated values are presented in Table 2.

Table 2: Equivalent "Design Flow" for Goodwin Releases, Thousand Acre Feet (TAF)

Year Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet	18	18	9	28	28	20	5	18	15	8	12	13
Abv Normal	9	8	11	29	29	2	2	2	15	8	12	13
Blw Normal	9	13	11	36	46	2	2	2	15	9	12	13
Dry	12	19	17	28	61	2	3	12	15	10	14	13
Critical	9	8	9	28	28	0	0	0	1	8	13	13

[1] Environmental integrity is a term used in respect to environmental pollutant trading programs (such as TMDLs)- it describes the goal of accounting methodology that ensures that the baseline used to define the regulations is maintained and that actions to reduce pollutants are real and not under or over counted. In this case, it was a principle Reclamation employed when determining how to best develop accounting methodologies, ensuring that New Melones dilution flows are *additional* to the base flows assumed by the Regional Board when they developed the Basin Plan Amendment.

Table IV-8 in the Basin Plan Amendment states that dilution flow allocations are calculated as follows:

$A_{dil} = Q_{dil} * (C_{dil} – WQO) * 0.8293$

Where:

A_{dil} = dilution flow allocation in thousand tons[2] of salt per month
Q_{dil} = dilution flow volume in TAF per month
C_{dil} = dilution flow electrical conductivity in µS/cm
WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in µS/cm

Data Collection and Quality Assurance/Quality Control (QA/QC): Reclamation monitors flow operations at Goodwin Dam, where flows are released for multiple environmental purposes. Goodwin Dam is located at latitude 37.8750°N, longitude 121.6030°W. Flow operations are summarized on a monthly basis at www.usbr.gov/mp/cvo/reports.html. Goodwin dam releases are also available on the California Data Exchange Center (CDEC) database at http://cdec.water.ca.gov/ (GDW sensor number 71). Monthly flow releases above the design flows are used for the value Q_{dil}. Stanislaus River "design flows" derived from DWRSIM Study 771 are presented in Table 2 and will be referred to in quarterly and annual reports. (These design flows include spring VAMP pulse flows released from the Stanislaus River).

The closest measure of electrical conductivity (salinity) to Goodwin Dam is at the Orange Blossom Bridge on the Stanislaus River. This station is maintained by the California Department of Water Resources (DWR) and is located at latitude 37.7830°N, longitude 120.7500°W. Electrical conductivity (C_{dil}) is the monthly average of available daily measured electrical conductivity (EC in µS/cm), available on CDEC database at http://cdec.water.ca.gov/ (OBB sensor number 100).

Example: Data for the month of March 2008 is used as an example. Data for flow releases from Goodwin Dam, the Stanislaus River "design flows," and salinity at Orange Blossom Bridge are used to calculate the monthly dilution flow allocations. Table 3 presents this example data and the resulting dilution allocation calculation.

Table 3: WY2008 Goodwin Dam Monthly Dilution Flow Allocation, tons

	Goodwin Dam Flow, TAF	Design Flow, TAF	Q_{dil}, TAF	WQO, µS/cm	C_{dil} (monthly average EC at Orange Blossom Bridge), µS/cm	Dilution Flow Allocation, A_{dil}, thousand tons
Mar	57	9	48	1000	82	-36.5

[2] This is a typographical error in the Basin Plan Amendment. The units are actually tons.