

Section V: Water Use Efficiency Information

A. EWMP Implementation and Reporting

1. Critical EWMPs

(1) Water Measurement (Measure the volume of water delivered to customers with sufficient accuracy to comply with subdivision (a) of Section 531.10 and to implement paragraph (2).)

All of the turnout deliveries within the District are fully metered with propeller flowmeters which register both instantaneous and totalized flows. Meters are repaired and/or replaced as necessary. The District staff is capable of repairing these meters when required.

The District maintains daily delivery records for each turnout being used and maintains records of daily water orders from the SWP. A grower's water use to date and remaining allocation is maintained by the District's comprehensive database system (Latis) that the District has used for nearly ten years.. The system helps manage water orders, water use, water supply, water contract information, and water delivery system information.

Staff measures all flow meters located at turnouts along distribution laterals from the canals. The operations superintendent generates a monthly Water Transaction Report from Latis for Water Users to view. This report shows deliveries and any other water related activity (i.e., transfers, exchanges, recharge, etc.) for water users to view. See Appendix 10 for an example of the monthly Water Transaction Report.

The District's obligation to measure water deliveries ends at the meter. The Latis system is proving to be very effective in assisting staff and management to manage and analyze a variety of water related data with the ultimate goal of efficiently managing District water supplies.

BMWD is confident its existing water measurement devices meet the $\pm 12\%$ accuracy standard, and replacement meters meet the $\pm 5\%$ accuracy standard.

This EWMP is being implemented at a satisfactory level.

(2) Volume-Based Pricing (Adopt a pricing structure for water customers based at least in part on quantity delivered.)

BMWD currently implements this EWMP, and will continue to implement it as follows:

Volumetric Rate Structure

BMWD's contracts with their landowners establish a fixed unit pricing (Volumetric Rate Structure - \$/AF) payment structure for SWP water supplies. SWP fixed costs are charged on a contract basis (i.e. assuming that full contract amount is available in any year), while variable costs are based on volumetric (\$/AF) deliveries. This methodology mirrors the

payment structure which KCWA uses to charge its Member Units and which DWR uses to charge its contractors. Full costs (unsubsidized) are recovered for SWP water supplies. . In addition any supplemental water acquired by the District to meet landowner needs is charged on a per acre-foot basis (volumetric).

The District has implemented volume-based pricing and plans to continue that practice.

2. Conditional EWMPs

(1) Alternate Land Use (Facilitation of alternative land use for lands with exceptionally high water duties or whose irrigation contributes to significant problems, including problem drainage.)

BMWD will consider requests for alternative land uses. Marginal land that was uneconomical to farm (high water cost) was permanently retired and the water entitlement from the land was transferred to other agencies. BMWD has agreed to allow the transfer of water entitlements from low producing lands to more productive lands.

The District has also participated in groundwater banking facilities that use land in a different alternative manner. Instead of growing crops, the District is banking water for future use.

Another aspect of the Monterey Agreement, which meets the criteria for this AWMP relates to the marketing of up to 130,000 AF of KCWA's SWP agricultural Table A contract water to other SWP urban contractors. To date, all of the 130,000 AF SWP Table A contract water has been permanently transferred to other SWP urban contractors.

Outside of the Monterey Agreement, other permanent transfers of SWP Table A contract water have occurred within Kern County. Generally, KCWA does not object to transfers of SWP Table A contract water among Member Units. (Kern County Water Agency Water Management Plan, October 2001)

Water Users within the District are free to transfer water amongst each other without the consent of the District. However, current BWSD policy requires that any request to transfer water for use outside of the District be submitted to the District in writing and that other Water Users in the District be offered a first-right-of-refusal to purchase said water at full-cost. Once these conditions are met, the transfer is approved.

In summary, the following types of water transfers are allowed by current BWSD policies once certain conditions are satisfied:

- 1) Between neighboring districts and the same owners in each district.
- 2) Between neighboring districts and the different owners in each district.
- 3) Between non-neighboring districts and the same owners in each district.
- 4) Between neighboring landowners within the District.

This EWMP has been implemented, and will continue to be implemented through the practices described in this section.

(2) Recycled Water Use (Facilitation of use of available recycled water that otherwise would not be used beneficially, meets health and safety criteria, and does not harm crops or soils.)

BMWD does not have access to any municipal recycled water source, but has been seeking to fund a feasibility study of reusing oil-field produced water. Current technology is too expensive for treatment (such as reverse osmosis) and waste disposal to be borne by BMWD customers. An arrangement between BMWD (Ag) and an urban agency would be required. A general plan would be for the urban agency pay to desalt brines and use oil produced water for agricultural purposes and in return BMWD would turn over SWP water to the urban agency.

As adequate funds nor urban partners are currently available, and are not expected to become available in this planning cycle, implementation of this EWMP is not planned during the term of this AWMP.

(3) On-Farm Irrigation Capital Improvements (Facilitate financing of capital improvements for on-farm irrigation systems)

BMWD is a progressive district and along with its landowners already have implemented the best available technology for conveying water to crops. The District could help farmers secure financing of new irrigation systems from a lending institution; however, most are already efficient in applying water to their fields. However as a result of high water costs and reduced SWP supplies District landowners have already invested millions of dollars installing and managing state of the art micro-irrigation systems at the highest attainable efficiency on all the permanent crop acreage in the District which accounts for 99.8% of the irrigated land in the District.

This EWMP is being implemented at a satisfactory level.

(4) Incentive Pricing Structure (Implement an incentive pricing structure that promotes one or more of the following goals: A. “More efficient water use at the farm level such that it reduces waste”; B. “Conjunctive use of groundwater”; D. “Reduction in problem drainage”.)

Water marketing and transfers already occur routinely within the District and frequently outside the District within the KCWA in accordance with adopted policies. Water marketing, transfers and exchanges offer an opportunity to achieve both the reliability of the water supply and costs at levels economically viable for District water users. Through water transfers and/or exchanges, row crop farmers may release their water entitlement in dry years to permanent crop needs.

The District facilitates transfers and exchanges in accordance with the following priorities: 1) in-District transfers, 2) transfers within KCWA, and 3) transfers outside the KCWA. The District relies on these transfers and exchanges with other water entities to provide the necessary flexibility to optimize beneficial use of the water supplies available to the District.

This EWMP has been implemented and will be continued with current practices.

(5) Infrastructure Improvements (Expand line or pipe distribution systems, construct regulatory reservoirs to increase distribution system flexibility and capacity, decrease maintenance, and reduce seepage)

BMWD's entire main canal is concrete lined. The entire District has lined canal or pipelines, and utilized regulation reservoirs. The Afterbay reservoir has been lined with a clay liner. Five of seven regulation reservoirs owned by the District are lined by virtue of sediment accumulation.

The District performed pond drop tests to determine the amount of seepage from the unlined reservoirs. The results indicated that the reservoir bottoms have sealed up because of the silts and clays deposited over time.

This EWMP has been implemented at a satisfactory level.

(6) Order/Delivery Flexibility (Increase flexibility in water ordering by, and delivered to, water customers within operational limits)

BMWD already has flexibility in water ordering and delivery. Most water orders and deliveries are based on an arranged demand system where the frequency and duration is flexible. The rate of flow is flexible to the extent that capacity of the delivery system allows. The storage capacities inherent in the Afterbay Reservoir, Coastal Aqueduct as well as the California Aqueduct allow BMWD to provide significant flexibility in water ordering and delivery.

The District's main local surface storage is a 400 AF regulation reservoir (Afterbay Reservoir). This reservoir is used for short-term regulation of the District's main pump station (Pump Station A) and generally is not available for long-term storage of surplus waters. As stated in previous sections the Afterbay Reservoir storage gives freedom to some landowners (that obey the District rules and regulations) to operate their own turnouts thus giving flexibility to the farmer.

The Afterbay Reservoir also provides the District enough capacity to curtail pumping during the peak energy period (noon to six), to minimize pumping costs and energy bills. If demands increase, BMWD is interested in additional regulation storage to expand load-shifting capability.

In 2003, the Dudley Ridge Water District (DRWD), with State grant funding and BMWWD's cooperation, performed a reservoir feasibility study and found a prime location for a surface reservoir just upstream of Pump Station A, and near the terminus of the Coastal Aqueduct. BMWWD had previously considered this property for potential storage given the area's topography and surveyed the site in 2001. DRWD and BMWWD have discussed the project with Central Coastal Water Authority (CCWA) (given their proximity to the reservoir) and KCWA. If built, BMWWD believes this reservoir (Forebay Reservoir) could bring tremendous benefits to the District, CCWA and KCWA. The Forebay Reservoir could be utilized to store available excess water such as Article 21 and carryover water, additional regulation storage (for operational variations and off-peak pumping curtailment), water quality enhancement, emergency storage, watershed runoff, and other more complex scenarios.

Currently, adequate funds (including funds from other beneficiaries of the AWMP) are not available, and cannot reasonably be expected to be made available, for implementation of the EWMP during the term of the AWMP. Proposition 50, a current State-funding source, specifically excludes funding for surface storage projects. The District is pursuing partners (urban and agricultural) to help fund the project. And, the project has been submitted to the Kern Integrated Regional Water Management Planning Group for possible future Prop 84 funding.

This EWMP has been implemented at a satisfactory level, and will continue to be implemented by continuing the practices discussed in this section.

(7) Supplier Spill and Tailwater Systems (Construct and operate supplier spill and tail-water systems)

Except in case of emergencies, BMWWD does not experience operational spills from their main canal. Daily deliveries are matched with the ordered demand, utilizing the manual gate at the main canal headworks. In the worst case, such a spill may be gravity fed back into the distribution system for beneficial use.

A Net Benefit Analysis performed in the prior AWMP (Exhibit E) showed the implementation of the EWMP would not provide any significant financial benefits.

This EWMP has been implemented and will continue to be implemented with current practices.

(8) Conjunctive Use (Increase planned conjunctive use of surface water and groundwater with the supplier service area)

BMWWD currently has an active conjunctive use program through groundwater banking outside the District. In dry years, the District can recover up to 43,500 AF of banked groundwater (excluding capacity in the Kern Water Bank) to supplement SWP shortages. Given the location of the District, an exchange with local agencies is required in order to divert SWP water for use into BMWWD.

The District has practiced conjunctive use of water for many years. Due to the significant amount of acreage planted in permanent crops, demand within BMWD remains relatively constant from year to year. In dry years, when supplies from the SWP are low, supply deficits are augmented with banked supplies and/or through purchases and transfers.

This EWMP has been implemented at a satisfactory level, and will continue to be implemented by the practices described in this section.

(9) Automated Canal Controls (Automate canal control devices)

As the water is lifted from Pump Station A, it is discharged into the Afterbay canal, which leads into the Afterbay reservoir. Between the Afterbay reservoir and the main canal there is a canal gate that isolates the reservoir and canal. Just downstream of this gate is a canal gate that sets the flow delivered into the canal. This canal gate is manually operated to match the desired deliveries for the each day. Each revolution on the handle constitutes an appropriate flow rate. This main canal gate has been operational since its construction in 1963, and the District automated it using SCADA telemetry under the prior AWMP. This was the most important gate to automate, as it regulates flows for the entire distribution system.

All gates downstream from the canal headworks are manually operated. Each revolution on the handle constitutes an appropriate flow rate. Each gate's calibration is different from one another. The District has been getting quotes from automated gates companies to replace the manual gates, and evaluating benefits versus costs.

The benefits of automating the gates are very difficult to quantify. In theory, yields could increase due to a flexible supply. However, this increase is likely very small. From a manpower perspective, automated gates would eliminate the need to manually change gate openings. The current canal fluctuations during operations could result in water losses on farm due to changing flow rates, but this loss is likely small and difficult to quantify.

The benefit to cost ratio for replacing manually operated gates with automated gates has thus far been difficult to quantify. The District will continue to explore whether there are cost effective canal gate automation alternatives, and seek funding if alternatives are cost effective.

The District does not plan to implement this EWMP in this planning cycle because 1) it has previously implemented cost-effective and feasible automation, and 2) additional automation has not yet been found to be locally cost effective.

This EWMP has been previously been implemented at a satisfactory level.

(10) Customer Pump Test/Evaluation (Facilitate or promote customer pump testing and evaluation)

The District encourages the proper maintenance and operation of wells, pumps and other landowner owned equipment.

Customers do have many booster pumps on pressurized irrigation systems supplied with power by Pacific Gas and Electric (PG&E). PG&E provides subsidized pump tests to any customer requesting it through a program administered by Fresno State University (Center for Irrigation Technology).

The District will implement this EWMP by further publicizing PG&E's program by providing a link on the District's website to PG&E's website regarding the program.

(11) Water Conservation Coordinator (Designate a water conservation coordinator)

BMWWD has designated the General Manager as water conservation coordinator for the purposes of the Memorandum of Understanding for Agricultural Water Suppliers, and this AWMP.

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BWSD considers that it has adequately implemented this EWMP, and will continue to implement it with Mark Gilkey serving as water conservation coordinators.

(12) Water Management Services to Customers (Provide for the availability of water management services to water users)

On-farm irrigation and drainage system evaluations

KCWA has been the single largest local contributor to the North West Kern Resource Conservation District's (NWKRCDD), formerly the Pond-Shafter-Wasco Resource Conservation District's (PSWRCD) Mobile Lab program for many years, contributing at least \$5,000 annually to the program. This contribution supports the cost to perform 15-20 irrigation evaluations per year. This program is designed to evaluate irrigation systems on-farm, offering recommendations to improve distribution uniformity and overall system improvements. BMWWD will cooperate with NWKRCDD to perform system evaluations in their District.

Many of the District's landowners already perform system evaluations in-house, along with irrigation scheduling and other management techniques for water conservation. Other landowners, if interested would be pointed to the NWKRCO or equivalent agency.

This EWMP has been implemented at a satisfactory level, and will continue to be implemented through support of NWKRCO activities.

Agricultural water management educational programs and materials for farmers, staff and the public

KCWA has conducted an in-school water education program for 15 years. The program has been approved by Kern County's Superintendent of Schools as meeting classroom science and history criteria. This program targets children in grades 1-6.

BMWD individually contributes and/or pays annual dues to the following organizations that target water awareness both locally and State-wide:

- Water Education Foundation
- California Water Awareness Campaign
- Kern Teacher Ag Seminar
- Water Association of Kern County

This EWMP has been implemented at a satisfactory level, and will continue to implement it through activities described in this section.

(13) Identify Institutional Changes (Evaluate the policies of agencies that provide the supplier with water to identify the potential for institutional change to allow more flexible water deliveries and storage)

BMWD's administrative and O&M office is located in the District. Water Users frequently visit the office to place water orders, discuss maintenance activities and administrative matters.

As previously noted, the District is nearly entirely dependent on the State Water Project (SWP) for its water supply. The SWP has historically been, and is expected to continue to be, subject to delivery deficiencies. Contractual obligations are 4.1 million acre-feet (MAF) per year while the average annual water supply is approximately 2.5 MAF. As environmental and urban water demands continue to increase, the reliability of the SWP decreases for all SWP contractors. Delivery deficiencies are related to both the reduced quantity of water available and the increased frequency that shortages are imposed. The District continues to look at ways to further stabilize, or firm up, the reliability of the water supply so that production agriculture can continue to flourish in the District.

One method of stabilizing the water supply that the District has initiated is groundwater banking. The District participates in the following groundwater banking/recovery programs:

- KCWA Pioneer Property
- Berrenda Mesa Spreading Grounds

Through 2020, the District and its water users had approximately 113,500 acre-feet (af) in storage in these projects. One District landowner also participates in groundwater banking activities through the Kern Water Bank.

BMWD has initiated and will continue efforts to develop programs with other agencies that would alleviate the aforementioned problems regarding water supply stability.

In addition as shown below, this EWMP has previously been implemented at a satisfactory level with the following practices, which will be continued:

Regular District Meetings

BMWD holds monthly meetings and distributes a meeting notice to each landowner. On average, about 90% of the majority landowners attend each monthly meeting.

Other Meetings

In addition to the monthly meetings, other meetings include:

- The District manager also attends monthly KCWA Member Unit Managers meetings, to discuss topics and issues.
- The District manager, superintendent, or board members attend the annual ACWA conferences.
- The District also holds meetings to discuss policies on an as needed basis.
- Any meeting (monthly, policy, others) can be translated for farmers that wish to hear information in Spanish.

BMWD web site

BMWD has a web site and will be updating it as needed. The web address is <http://www.bmwd.org/>

Links to KCWA and DWR

Contractually, the only institution to which BMWD is subject to is the KCWA. Similarly, contractually, the only institution to which KCWA is subject to is DWR. Nevertheless, policy differences arise nearly every year with respect to water supply and operations of the SWP. Generally, as policy issues arise, they are discussed among the State Water Contractors, Inc. (SWC), a non-profit organization of SWP contractors. Once agreement is reached by the SWC as a whole then DWR is engaged to seek changes in the subject policies.

SWC holds an annual retreat at which DWR and Contractor policies and issues are reviewed in depth. DWR management staff is invited to these retreats and participate in the discussions. This has been a valuable forum for resolution of issues.

BMWD, along with KCWA, considers the existing arrangement for resolution of policy issues to be successful. DWR and SWC policies are discussed and resolved as they arise, leading to a dynamic resolution process.

This EWMP will continue to be implemented by continuing current practices.

(14) Supplier Pump Improved Efficiency (Evaluate and improve the efficiencies of the supplier's pumps)

In 2001 and 2010, BMWD utilized State grant and PG&E rebates to assist in funding pump efficiency tests on all District-owned pumps and repair of selected pumps. The District intends to keep testing pumps periodically to ensure that these units are operating at peak efficiency. Pumps with low efficiencies will be re-evaluated to determine if newer more efficient units would replace existing less efficient units.

The District recently installed sensors in Pump Station "A" for remote control utilizing the SCADA system. A unique feature implemented by the District's electrical technician, displays on a screen each pump's electrical usage in kWh per AF. Over time, if this value (kWh/AF) begins to decrease, it is an indication that the pump or motor is beginning to deteriorate and thus the unit is running inefficiently and needs to be evaluated. The kWh/AF number can be correlated to an overall plant efficiency (OPE).

This EWMP has been implemented at a satisfactory level, and will be continued as described in this section.

Table 47 summarizes the EWMPs implemented and planned, Table 48 summarizes the EWMPs efficiency improvements, and Table 48 summarizes the schedule to implement EWMPs.

Table 49 includes estimates of Water Use Efficiency (WUE) Improvements that occurred since adoption of the prior Water Management Plan (2005). In most cases data was not available to allow quantification.

The prior Plan's water balance calculations indicated very high overall District WUE had been attained by 2005, with little room for improvement.

WUE improvements from EWMPs to continue and/or be implemented are also in Table 48. These also generally have no available data to allow for an estimate. Given the District's current WUE estimate of nearly 100%, little improvement is expected over the next 5-10 years. Rather, maintenance of high WUE is the expectation.

Table 47. Report of EWMPs Implemented/Planned (Water Code §10608.48(d), §10608.48 (e), and §10826 (e))		
EWMP No.*	Description of EWMP Implemented	Description of EWMPs Planned
Critical EWMPs		
1	Water Measurement	Continue current practices
2	Volume-Based Pricing	Continue current practices
Conditionally Required EWMPs (locally cost-effective and technically feasible EWMPs)		
1	Alternate Land Use	Continue current practices
2	Recycled Water Use	Currently not feasible
3	On-Farm Irrigation Capital Improvements	Implemented by District landowners
4	Incentive Pricing Structure	Continue current practices
5	Infrastructure Improvements	No plans for further improvements
6	Order/Delivery Flexibility	Continue current practices
7	Supplier Spill and Tailwater Systems	Continue current practices
8	Conjunctive Use	Continue current practices
9	Automated Canal Controls	No plans for further improvements
10	Customer Pump Test/Eval.	Publicize PG&E's program on the District's website
11	Water Conservation Coordinator	Continue current practices
12	Water Management Services to Customers	Continue current practices
13	Identify Institutional Changes	Continue current practices
14	Supplier Pump Improved Efficiency	Continue current practices
Other Optional EWMPs (as applicable)		
Notes: *EWMP numbers correspond to (Water Code §10608.48(c))		

Table 48. Report of EWMPs Efficiency Improvements (Water Code §10608.48(d), §10608.48 (e), and §10826 (e))			
Corresponding EWMP No.(s)*	EWMP	Estimate of Water Use Efficiency Improvements That Occurred Since Last Report <i>(Quantitative or Descriptive)</i>	Estimated Water Use Efficiency Improvements 5 and 10 years in future <i>(Quantitative or Descriptive)</i>
Critical 1	Water Measurement	No data available to estimate	0%
Critical 2	Volume-Based Pricing	No data available to estimate	0%
Conditional 1	Alternate Land Use	No data available to estimate	0%
Conditional 2	Recycled Water Use	No data available to estimate	0%
Conditional 3	On-Farm Irrigation Capital Improvements	No data available to estimate	0%
Conditional 4	Incentive Pricing Structure	No data available to estimate	No data available to estimate
Conditional 5	Infrastructure Improvements	No data available to estimate	0%
Conditional 6	Order/Delivery Flexibility	No data available to estimate	0%
Conditional 7	Supplier Spill and Tailwater Systems	No data available to estimate	0%
Conditional 8	Conjunctive Use	No data available to estimate	0%
Conditional 9	Automated Canal Controls	No data available to estimate	0%
Conditional 10	Customer Pump Test/Eval.	Not applicable (new EWMP)	No data available to estimate
Conditional 11	Water Conservation Coordinator	No data available to estimate	0%
Conditional 12	Water Management Services to Customers	No data available to estimate	No data available to estimate
Conditional 13	Identify Institutional Changes	No data available to estimate	No data available to estimate
Conditional 14	Supplier Pump Improved Efficiency	No data available to estimate	No data available to estimate
Notes: *EWMP numbers correspond to (Water Code §10608.48(c)).			

Table 49. Schedule to Implement EWMPs ((Water Code §10608.56 (d))				
EWMP	Implementation Schedule	Finance Plan	Budget Allotment	1999 AWMC MOU Demand Measures
Critical				
1. Water Measurement	NA	NA	(1)	C-1
2. Volume-Based Pricing	NA	NA	(1)	No equivalent
Conditional				
1. Alternate Land Use	NA	NA		B-1
2. Recycled Water Use	NA	NA		B-2
3. On-Farm Irrigation Capital Improvements	NA	NA		B-3
4. Incentive Pricing Structure	NA	NA	(1)	C-2
5. Infrastructure Improvements	NA	NA		B-5
6. Order/Delivery Flexibility	NA	NA	(1)	B-6
7. Supplier Spill and Tailwater Systems	NA	NA		B-7
8. Conjunctive Use	NA	NA	(1)	B-8
9. Automated Canal Controls	NA	NA		B-9
10. Customer Pump Test/Eval.	NA	NA		No equivalent
11. Water Conservation Coordinator	NA	NA	(1)	A-2
12. Water Management Services to Customers	NA	NA	(1)	A-3
13. Identify Institutional Changes	NA	NA	(1)	A-5
14. Supplier Pump Improved Efficiency	NA	NA	(1)	A-6
Other EWMPs:				
1999 AWMC MOU A-4: Improve communication and cooperation among water suppliers, users, and other agencies.				
1999 AWMC MOU B-4: Facilitate voluntary water transfers.				
Grand Total all EWMPs				
Note: There is no equivalent AWMC Critical EWMP #2 or Conditional EWMP #10 NA = Not Applicable (1) Budget allocation within District's operation budget				