2005 Guidebook

Which USBR water contractors should use this guidebook?

The preparation of a Water Management Plan is required by applicable Central Valley Project (CVP) water service contracts, settlement contracts, or any contracts that specifically invokes the Standard Criteria for Evaluating Water Management Plans (Criteria).

Exceptions.

The following are exempted from the requirement to prepare a Plan using the Criteria:

- All Contractors that receive **only** irrigation water from any Federal Reclamation project, and deliver water to less than 2,000 acres of land.
- All Contractors that receive **only** municipal and industrial (urban) water from any Federal Reclamation project, and provide water to less than 3,300 people.
- All Contractors that receive a combination of irrigation and urban water amounting to less than an annual average of 2,000 acre-feet from any Federal Reclamation project.

Definitions

1. *Agricultural Water Management Council (AWMC)* - A consortium of agricultural water agencies and public interest groups to implement water conservation practices in California. This effort was formalized in a MOU signed in 1996. Signatory water suppliers agree to develop and implement comprehensive conservation BMPs using sound economic criteria.

2. *BMP* - A policy, program, practice, rule, regulation and/or ordinance, or the use of devices, equipment, or facilities that meet either of the following:
   a. An established and generally accepted practice among districts that results in more efficient use, conservation/management of water, or
   b. A practice for which sufficient data are available from existing water management projects to indicate that significant efficiency improvements or management related benefits can be achieved, that the practice is technically and economically reasonable and not socially or environmentally unacceptable, and that the practice is not otherwise unreasonable for most districts to carry out.

3. *CALFED* - State-Federal program formalized in June 1994 upon the execution of a Framework Agreement by State and Federal agencies having management and regulatory responsibility in the Bay-Delta Estuary. The mission of CALFED is to develop and implement a long-term comprehensive plan that will restore the ecological health of the Bay-Delta.

4. *CUWCC* - A consortium of urban water agencies and public interest groups to implement water conservation practices in California. This effort was formalized in a MOU signed in 1991. Signatory water suppliers agree to develop and implement comprehensive conservation BMPs using sound economic criteria.

5. *Conjunctive Use* - The planned and coordinated use of surface and ground water supplies to increase water supply reliability, as may be included in a Ground Water Management Plan or Banking Program.

6. Contractor - Entities that contract with Reclamation for urban and/or agricultural water.

7. District - The physical boundaries of the district service area.

8. Five-Year Plan Revision - The revision of a Plan using the most recently adopted Criteria. Under RRA, districts are required to re-evaluate and re-submit to Reclamation their respective Plans every 5 years.

9. Ground Water Banking Program - The intentional storage of supplies in subsurface aquifers beyond coincident irrigation needs with the expectation of subsequent retrieval for beneficial use. The district should have a reasonable rationale of how the district or customers will benefit when the water is retrieved for beneficial use. Ground water banking usually involves keeping an account of water input and the subsequent use by predetermined or specified parties. Ground water recharge alone is not a Ground Water Management Plan or a Ground Water Banking Program. An acceptable Ground Water Management Plan or Banking Program must have a

method of retrieval of such water for beneficial use.

10. Ground Water Management Plan - A set of practices and management actions that improve ground water conditions with the intent of protecting and/or increasing the benefits, including the sustainability of the ground water aquifer.

11. Ground water Recharge - The natural or intentional infiltration of surface water into the zone of saturation.

12. Implementation - Achieving and maintaining the staffing and funding necessary to achieve the level of activity called for in the descriptions of the BMPs and to satisfy the commitment by the district for a good-faith effort to optimize benefits from implementing BMPs.

13. Retailer - A district that sells water directly to the water user.

14. Riparian ET - ET from non-crop vegetation usually growing along the banks of water conveyance and storage facilities.

15. Water Conservation/Water Management - Use of less water to accomplish the same purpose(s) or the use of the same amount of water to provide additional benefits. An example of the latter is implementation of a BMP that results in increased total crop production using the same amount of water. Water management that results in the increased benefits of water can be achieved through the implementation of BMPs identified in the criteria. For the purpose of the Criteria, water conservation is considered the same as water management.

16. Wholesaler - A district that sells water to entities that resells the water, usually to multiple customers.

Section 1: Description of the District

A. History

Give a short (one page or less) historical overview of the district. Record significant historical events leading to the current state of the district and identify trends that appear likely to influence the district's future.

Enter the following information in Section 1 of the Plan Format

1. Date district formed and original size

Enter the date that the district was legally organized. Enter the date of the first contract with Reclamation. Enter the original size of the district in acres (there are 640 acres in a square mile). Enter the current year (the last complete calendar year, i.e., 2005) that will be the year of the data entered in the Plan and Tables.

2. Size, population, and irrigated acres

For the current year, enter the current size of the district (acres), urban population served (receives treated drinking water), and irrigated acres served.

3. Water supplies received

Enter the amount of water (in acre-feet) received by the district during the current year. Enter the actual amount of water received from each of the listed sources.

- Federal Urban Water - Water that is provided for municipal and industrial (M&I) use.
- Federal Agricultural Water - Water that is provided for agricultural use.
- State Water - Water from the California State Water Project.
- Other Wholesale – For example, water purchased from Santa Clara Valley Water District.
- Local Surface Water - Santa Barbara's Gibraltar Reservoir is an example.
- Upslope Drain Water – Drain or spill water that leaves the district service area and is used outside of the district service area. (applies only to agricultural districts).
- District Ground Water – Ground water that the district pumps and supplies to customers through its distribution system.
- Transferred Water - The amount of water the district bought, sold, or traded.
- Recycled Water - The amount of treated urban wastewater provided to district customers.
- Other Water – desalination water, etc.

4. Annual entitlement under each right and/or contract

Provide information on the district's entitlement or contractual amount from each source (Reclamation, SWP, ground water from adjudicated basins, drain water contracts, long-term transfer agreements, etc.). Please include each contract's identifying number and any contract restrictions that affect the districts water management. Examples of restrictions include time of

delivery or amount of water available per month. Add rows to the table as necessary.

5. Describe anticipated land-use changes

Land use changes (i.e., agricultural to urban, etc.) that may affect water use type or quantity due to possible, proposed, or current-zoning changes should be addressed. Such changes might include: land annexation, increasing urbanization, or changes to the area's General Plan.

6. Cropping patterns (Agric only)

Identify crops that are grown on 5 percent or more of the district's irrigated acreage and provide the total number of acres for each of those crops. If there are a number of crops grown on small acreage, combine them into one group, and list the combined acreage on the OTHER (<5%) row in the table. Detailing this information for the periods identified in the table provides a perspective on how the district's mix of crops is changing. Use the crop list provided in Attachment D of the Plan Format. Add rows to the table as necessary.

7. Major irrigation methods (Agric only)

List the major irrigation methods used on most acreage within the district for each of the specified years. Combine the acreage of the other irrigation methods into one group and list the combined acreage on the "Other" line in the table. Quantifying this information for the periods provided in the table gives the reader perspective on how the district's mix of irrigation methods is changing. Identify the irrigation methods as listed in Attachment D of the Plan Format. Add rows to the table as necessary.

B. Location and Facilities

Attach a district facilities map that shows points of delivery, turnouts (internal flow), and outflow (spill) points, measurement locations, conveyance system (identify pipelines, lined and unlined canals, etc.), storage facilities, operational loss recovery system, wells, water quality monitoring locations, the location of measuring devices, pumping stations, regulating reservoirs, etc.

1. Incoming measurement methods and locations

Identify each incoming flow to the district (use same names as shown on facilities map), type of measurement device (flume, weir, propeller, acoustic, venturi, magnetic), and accuracy.

2. Current Agricultural Conveyance System

Enter the length (i.e., 1.2 miles) of unlined and lined canals and laterals, pipe, and other types of distribution facilities (such as natural channels). There are 5,280 feet in a mile.

3. Current Urban Distribution System

Enter the length (i.e., 1.2 miles) of asbestos concrete, steel, and cast iron pipe in the distribution

system. Combine the total length of other types of pipes (i.e., plastic) in the "Other" category.

4. List storage facilities

Identify district storage facilities (use same names as shown on facilities map), including volume. Include tanks, reservoirs, etc.

5. Describe agricultural spill recovery system

Describe the district's spill recovery system – where and how distribution system spill water is collected and where it is re-used. Include spill locations on the facilities map.

6. Agricultural delivery system operation

Describe how agricultural customers schedule water deliveries from the district. Identify whether the delivery system provides water:

a. on demand (i.e., customers receive water at any time without notice).
b. on request (i.e., customer requests start time, flow rate and quantity).
c. on a rotation basis (i.e., customers get water every 10 days).
d. some combination of methods.

7. Describe restrictions on the district's water source(s)

If the district's water supplies are constrained in some manner that limits water management and operations, explain. Restrictions might limit the amount of water or time of use. The cause of a restriction might be a contractual or physical limitation. Include information about operational constraints the restrictions impose on water management. Examples of operational constraints include receiving surface drainage from an upslope district with no control over quantity or timing, or the inability to supply the quantity of water needed by the growers due to insufficient canal capacity.

8. Describe proposed changes or additions to district's facilities and operations for the next 5 years

Examples include changes to service area, lining/piping of existing canals, and installation of measurement devices with improved accuracy, etc.

C. Topography and Soils

1. Describe topography of the district and its impact on water operations and management

Describe the topography (e.g., hilly, flat, sloping to a watercourse) of the district. Discuss any impact of topography on district's water management. An example of a topography impact would be if lower sections of a gravity piped water distribution system have excessive pressure while upper portions of the system have inadequate pressure. Topography also affects drainage

capture and reuse.

2. Describe district's soils associations (Agric only)

Provide district's soil associations. An NRCS general soils map of the district service area will generally be the clearest way to present soils information. Provide as Appendix B.

Where can soil classification information be obtained? http://www.nrcs.usda.gov/.

The NRCS (formally the Soil Conservation Service) has soil survey information for most agricultural regions in California. Recent surveys (within the last 25 years) contain a single map called the "General Soil Map." These maps group soils into what are called soil associations and are appropriate for this Plan. Soil groupings are made according to soil characteristic similarities, such as texture, depth, salinity, slope, flooding potential, impervious layers, etc. An awareness of these soil groupings can help target BMP programs - such as in areas where distribution canals might have high seepage rates or in areas of tailwater quality problems. Reclamation's soil classification system is based on projected economic return from different classes of soils and is NOT appropriate for this Plan.

3. Describe limitations resulting from soil problems (Agric only)

Describe any limitations resulting from soil problems (e.g., salinity, high water table, high or low infiltration rates, etc.) within the district. If the district provides water to an area that has a high water table or other water or drainage related problem, identify the problem, number of acres with that problem, and what impact the problem has on water use. District staff and customers will have knowledge of soil limitations and the resulting impacts on water management. For instance, crops grown on poor soils may require more water than crops grown on good soils. If the district can identify terrain and soils that use more than average amounts of water, these areas can be targeted for improved management programs.

D. Climate

1. Describe the general climate of the district service area

Describe the general climate of the district (available from the National Weather Service, etc.). Local newspapers or weather service companies may also provide a concise description of local weather patterns. For weather data, specify the period of record (30 years recommended) and reference (weather station) used. Historic weather data from the National Weather Service climatological stations provide all the requested data. Identify which station you selected and how many years of records were available. The web site address is: www.wrcc.dri.edu/summary/.

Average wind velocity.

If this information is not available, please enter "Not available"

Average annual frost-free days

If this information is not available, please enter "Not available"

2. Impact of any microclimates on water management within the district

Where appropriate, relate climate to water use. Are there special microclimates in the district that require more (or less) water? The impact of climate may be similar to the impact of soil and terrain.

E. Natural and Cultural Resources

1. Identify natural resource areas within the district

Identify natural resource areas, size of each (in acres), and describe. Examples of natural resources include wetlands, vernal pools, streams, and wildlife refuges. A map may be the clearest way to provide this information.

2. Describe management of these resources in the past or present by the district

If the district provides water to natural resource areas or manages them, describe the district's role. District staff probably works with the U.S. Fish and Wildlife Service, NRCS, U.S. Army Corps of Engineers, or the California Department of Fish and Game to identify natural resource areas and threatened and endangered species in the district.

3. Identify recreational and/or cultural resource areas

Identify recreational and/or cultural resource areas, size of each in acres, and describe. Examples of recreational resources are sites used for rafting, water skiing, and fishing. Examples of cultural resources are archaeological and historical sites. A map may be the clearest way to provide this information.

F. Operating Rules and Regulations

1. Attach a copy of the district's operating rules and regulations

Attach only the rules and regulations that apply to water supply and use. Note: If the district supplies no agricultural water, write "No Ag" in Section F 2 to F 4 and skip to Section G.

2. Describe the district's agricultural water allocation policy

Describe the district's agricultural water allocation policy. Identify the page number(s) of the relevant sections in the district's rules and regulations (Appendix C).

3. Describe official and actual lead times necessary for water orders and shut-off (Agric only)

Describe the water ordering system. Identify the page number(s) of the relevant sections in the district's rules and regulations (Appendix C). Describe any differences between actual operations and the official rules, such as water delivery orders being filled in 12 hours when the rules say 24 hours is the minimum.

4. Describe the district's policies regarding surface and subsurface drainage from farms

Describe how the district deals with surface and subsurface drainage. Identify the page number(s) of the relevant sections in the district's rules and regulations (Appendix C).

5. Describe the district's policy on water transfers by the district and its customers

Describe the district approach to water transfers. Identify the page number(s) of the relevant sections in the district's rules and regulations (Appendix C).

G. Water Measurement, Pricing, and Billing

Accurate water delivery measurement is an effective water management tool because both the water user and the district are aware of quantity, timing, and location of water use.

Agricultural Customers

A customer is defined here as a farm. A farm may have multiple delivery points, different lessees during the year, and even multiple lessees farming subsections of a farm at one time. A turnout is a water delivery point. Farms may have multiple water delivery points. All turnouts have some method of controlling water flow, but measured turnouts are those which can accurately measure the quantity of water delivered (within plus or minus 6 percent).

1. Provide total number of farms

A farm would generally be an area of land with a county assigned Assessor Parcel Number (APN). Contiguous APNs with the same owner may constitute one farm.

2. Provide total number of delivery points

The point at which water leaves the district delivery system and enters the customer distribution system is the delivery point.

3. Provide total number of delivery points serving more than one farm

This is when the district has delivery points at which water leaving the district delivery system can enter two or more separate farm distribution systems. In this situation the customers are often

responsible for determining how much water each of them receives.

4. Provide total number of measured delivery points.

A measured delivery point is one with a device that is operated and maintained to a reasonable degree of accuracy - under most conditions within +/- 6 percent. Three categories of measurement devices that may meet this criterion are devices with totalizers, standard flow measurement devices, and non-standard but calibrated devices.

5. Provide percentage of delivered water that was measured at a delivery point.

Provide the percentage of delivered water that was measured at a delivery point within +/- 6 percent.

6. Complete measurement device table.

Provide the number of each type of measurement device used by the district, the accuracy of that type of device, how often the device is read and the calibration and maintenance schedule.

The accuracy of the district's measurement devices may have been determined during installation, but periodic calibration is necessary to maintain accuracy. For the various devices, provide the maintenance interval that the district has determined necessary. (See Chapter 11 for information on the Calibration and Maintenance of Measurement Devices.)

Urban Customers

1. Provide total number of connections

A connection is the point at which water leaves the district delivery system and enters a separate distribution system. For instance, a city park may have one or more connections.

2. Provide number of metered connections

Determine the number of connections that have installed meters. Connections with meter boxes but no meters are not metered connections. All connections have valves to control water flow, but measured connections also have meters.

3. Provide number of connections not billed by quantity

Determine the number of connections that are billed by quantity of water flowing through the meter. A City park which has a meter but which is not billed for water use is not billed by quantity.

4. Provide the percentage of water that was measured at delivery point

This will require an estimate of the amount of water provided to unmeasured accounts.

5. Provide the percentage of water that was billed by quantity

Some cities do not bill city departments (parks, sanitation, etc.) for water use. The quantity of water delivered but not billed should be determined and calculated as a percentage of the total.

6. Complete measurement device table

Provide the number of each size of displacement meter used by the district, the accuracy of those meters, how often the device is read and the calibration and maintenance schedule. Identify the number of other types of meters (turbo, compound, etc.), size, accuracy, reading schedule and the calibration and maintenance schedule

The manufacturer has determined the accuracy of their meters, but periodic calibration is necessary to maintain accuracy. For the various devices, provide the maintenance interval that the district has determined necessary. Add rows to the table as needed.

Agricultural and Urban Customers

1. Describe the district's current year agriculture and/or urban water charges.

Describe the district's current year urban and/or agricultural water charges, including dollar amounts for fixed/stand-by fees and quantity charges. Describe the rate structure for urban water deliveries (flat rate, tired rate, seasonal rate, etc.). Describe the rate structure for agricultural water deliveries that are billed by quantity (i.e., first 3 AF per acre at $30 per AF, additional AF per acre at $36 per AF). Describe billing frequency and bill format.

Appendix C, Rules and Regulations should contain the current year water charge ordinance. Identify the page number where the current year rate ordinance can be found in Appendix C.

2. Annual charges collected from customers (current year data)

Complete this table for the current year.

For fixed charges, identify the current year charge for each unit (per acre per year, 1" monthly meter charge, etc.) and how many "units were billed during the current year (acres, 1" meters times 12 months, etc.). Include the total dollar amount collected from each charge.

For volumetric charges, identify the current year charge for each unit (per acre foot, per HCF in tier 1, etc.) and how many "units were billed during the current year (acre feet, total HCF sold in tier 1, etc.). Include the total dollar amount collected from each charge.

3. Describe the district's water-use data accounting procedures.

Describe the district water-use data accounting systems and procedures. Typical systems include standard computer software, district-specific software, and ledgers. The description of the accounting procedures should document how customers access their water-use history and how many years of historic data are available to them. Appendix D should contain examples of actual bills (for each customer category) and discuss how easy the bills are to understand and how they provide customers with current water-use data, comparative yearly-use data, and pricing signals.

H. Water Shortage Allocation Policies

1. Attach the district's current year water shortage policies.

Include the district water shortage allocation plan as Appendix E. It should detail how reduced water supplies and hardship water will be allocated. If the district has different policies for various customer types (i.e., agricultural or urban), attach both plans.

Districts that deliver more than 2,000 AF of water are encouraged to have a water shortage contingency plan. For development of an urban Water Shortage Plan, assistance is available from DWR at www.owue.water.ca.gov/urbanplan and from USBR at www.usbr.gov/mp/watershare/. Contact your local area office for assistance developing an agricultural water shortage plan.

2. Attach the district's current year policies that address wasteful use of water.

Identify rules and regulations that address wasteful use of water. Include information on enforcement methods. Identify the page number(s) of the relevant sections in the district's rules and regulations (Appendix C).

Section 2: Inventory of Water Resources

Note: If the requested information is not available, describe how that information will be obtained for the next Plan revision or state that the information is historical and cannot be reconstructed

Information developed in this section will allow you to calculate a water inventory. A water inventory is a simplified water balance, quantifying how much water comes into the district, how that water is used within the district, and how much water leaves the district. Data entered should be for the current year - identified at the beginning of your Plan.

A. Surface Water Supply

1. Acre-foot amounts of surface water delivered to the district by each of the district's sources.

In Table 1 of the Water Inventory Tables, quantify all district surface water supplies. Specify the type of water (i.e., urban, agricultural, class II, spill, etc.) and the quantity of each delivered to the district by month. If you do not receive State water, local surface water, or other surface water then those columns will be blank. In Table 8, quantify the amount of each type of surface water the district actually received in each of the last 10 years. If the district has sources of surface water that are not listed in the table, add the necessary columns.

B. Ground Water Supply

1. Acre-foot amounts of ground water pumped and delivered by the district.

Quantify district ground water supplies in Table 2. Specify the monthly amount of ground water pumped by the district. The "Pumped by Customers" column asks only for an estimate of private ground water pumping – either by month or year. If the district and/or private parties do not pump ground water, these columns will be blank.

2. Ground water basin(s) that underlie the district.

Information necessary to describe ground water basins can be found in California DWR Bulletin 118, which identifies ground water basins in California. Bulletin 118 describes the general boundaries of each basin and indicates if there is evidence of overdraft. You can use this Bulletin to identify the basin or basins that underlie your boundaries and their size, usable capacity, and safe yield. Large ground water basins underlie several districts. In a few cases, districts overlie more than one ground water basin.

3. Contractor operated wells and managed ground water recharge areas.

The Plan should provide a map of the district that locates district ground water wells and any managed ground water recharge areas (Appendix F).

4. If there is conjunctive use of surface and ground water, describe it.

Information necessary to adequately describe ground water conjunctive use programs includes:

a. Determination of the ground water quality (i.e., is the ground water quality adequate for direct use or is blending required?).
b. The amount of ground water storage capacity currently available and how much additional storage could be available by extracting ground water for use.
c. The location of existing and potential recharge sites (spreading basins, in-stream, or injection wells) and identification of the soil types and resulting recharge rates.
d. Determination of hydraulic continuity between the possible recharge and extraction areas.
e. Identification of possible sources of recharge water and the quantities, qualities, and period of availability for each source.
f. For districts without district-owned wells, describe how the district receives compensation from the beneficiaries of the ground water recharge.

5. For managed ground water basins, attach a copy of the management plan.

If the district or its customers use ground water from a managed or adjudicated ground water basin, attach a copy of the Plan (Appendix G).

6. For participation in ground water banking, attach a description of the banking plan.

If the district participates in ground water banking, attach a description of when and how much water was banked, and when and how much is available for retrieval (Provide a copy of the banking plan (Appendix H).

C. Other Water Supplies

Acre-foot amounts of "Other" water used as part of the district's water supply.

All surface and ground water supplies should be identified and quantified in Tables 1 and 2. For instance, a desalinated or level 2 water that was delivered during the current year should be included as part of the year's water supply. Quantify long-term "Other" water supplies in Table 1 and define in the header.

D. Source Water Quality Monitoring Practices

1. Water quality problems.

Describe any surface water or ground water quality problems and how the quality problems limit the use of the water or affect customer water-use decisions. For instance, if ground water is high in salts or expensive to pump, how does this impact the district surface water supply? If a potable supply is high in salts, do customers use home water softeners?

2. Potable Water Quality (Urban only).

Attach the current year Customer Water Quality Report (Appendix I) that is mailed to all customers. This report provides information on the quality of each of the district's water sources. If there are water quality concerns and/or problems, describe how they affect the district's water treatment process and its customers

3. Agricultural districts.

Indicate if the district has any surface or ground water quality issues that affect customer-use decisions.

Concerns Yes _____ No _____

If there are water quality concerns and/or problems, describe the quality problems and how they affect the water's use.

4. Description of the water quality testing program and the role of each participant in the program.

Describe the water quality testing program – which agencies are involved, how the program is funded, the frequency of each analysis, results of analyses, and identified problems or concerns.

5. Current year water quality monitoring programs.

If there are water quality concerns and/or problems, identify which agencies participate in the Water Quality Testing Program and which agency conducts the program.

For surface water, identify the analyses performed, the frequency of the tests and the results (concentration range and average).

For ground water, identify the analyses performed, the frequency of the tests and the results (concentration range and average).

If there are no water quality issues, enter N/A.

6. Agricultural districts current year total dissolved solids (TDS) range for surface water and ground water.

Surface water: _____ ppm Ground water: _____ ppm

Enter the TDS range by source. This is requested due to its impact on the leaching requirement. Describe how the district's customers are notified of changes in the quality of water they are receiving from the district, i.e., when delivered water TDS is above normal for your system.

E. Water Uses within the District

1. Agricultural

In the Water Inventory Tables, Table 5, list the crops grown (use the crop list provided in Attachment D of the Plan Format) in the district. For each crop, list the irrigated acres of the crop, crop ET, leaching requirement, water used for cultural practices (frost protection, pre-irrigation, etc.), and effective precipitation. The spreadsheet formulas will combine these values to determine the total water demand (AF) of each crop. You may wish to combine crops grown on less than 5 percent of the total irrigated acreage. To combine crops, determine an average crop ET, leaching and cultural requirement, and effective precipitation for this group of small acreage crops. The crop ET for crops in your area can be found in DWR California CIMIS Database, Cal Poly Irrigation and Training Research Center (ITRC) and Center for Irrigation Technology (CIT) Bulletin 113-3 (April 1975) or obtained from the DWR district office or the local farm advisor. The local UC Cooperative Exchange office can also provide information on crop ET and water used for leaching and cultural practices. Effective precipitation by crop must be determined locally or you may contact Reclamation for assistance.

2. Types of irrigation systems used for each crop

List the crops grown in the district and how many acres of each type of irrigation used on each crop. The types of irrigation systems used on each crop can help the district to target customer assistance programs, workshops, and educational materials. When the district collects information for the yearly Reclamation Crop Report, request information on the number of acres of different irrigation systems used on each crop. Expanding an existing report will minimize district and customer cost and paperwork. Use the five general irrigation system types – basin, furrow, sprinkler, low-volume and Combination (sprinkler and furrow, etc.).

3. Urban

Quantify the number of connections and yearly water use for each of the following customer account types.

a. Single-Family - A connection that serves a single detached residence.
b. Multi-Family - A connection that serves a building containing multiple dwelling units or an individual unit in a building containing multiple units.
c. Commercial - A connection that serves businesses that provide or distribute a product or service, such as hotels, restaurants, office buildings, commercial businesses, or other places of commerce.
d. Industrial - A connection that serves primarily manufacturers or processors of materials.
e. Institutional - A connection that serves institutions dedicated to public service. This includes schools, courts, churches, hospitals, and government facilities. All public service facilities are to be considered institutional connections regardless of ownership.
f. Landscape Irrigation - A connection that serves an urban landscaped area.
g. Wholesale - A connection that provides water to a water agency.
h. Recycled - A connection that provides recycled urban wastewater.

i. Other (specify).
j. Unaccounted - the quantity of water that is treated but not sold - lost through leaks, breaks, slow meters, fire fighting, line flushing, etc.

4. Urban Wastewater Collection and Treatment Systems serving the district service area

Describe the wastewater collection and treatment systems serving the district service area. Include the level of treatment, quantity of water treated, and place of disposal of the treated water. Water providers that do not provide wastewater treatment services should request this information from the wastewater agency.

a. Waste treatment plant - Provide the names of the wastewater plants serving the district service area.
b. Treatment level (1, 2, 3) - If there are different treatment streams, quantify the AF treated to each level during the current year.
c. Disposal to - Identify where the treated wastewater is discharged (i.e., ocean, river, percolation ponds, etc.) and how the recycled water is used (i.e., landscape, toilet flushing, etc)
e. Total discharged to ocean/saline sink - Quantify the AF discharged to these areas during the current year.

5. Ground water recharge/management/banking

Identify contractor operated ground water recharge areas (as identified in Section 2 B).
List the quantity of water used for planned ground water recharge, including method of recharge.

A ground water recharge program uses surface water to recharge a ground water basin for later withdrawal or provides surface water to farmers that normally pump ground water (in lieu of recharge) so that the ground water is left in the ground. Describe each recharge location with respect to soil type, method of recharge, percolation or injection rate, and hydraulic continuity with the extraction areas. Include the AF recharged in the current year. Do not include incidental recharge, such as canal seepage or deep percolation resulting from excess irrigation, unless data relating to the above points has been developed.

If you participate in a defined ground water banking system, describe it here or attach a description. In order to participate in a ground water banking program, water must be able to be withdrawn at a later date. Describe how water that was percolated into the ground will be withdrawn for district or customer use.

6. Transfers and Exchanges

Transfers into or out of the district.
Describe the source and quantity of water in any transfer, trade, exchange, reschedule to another year, purchase or sale, into or out of the district, and for what uses. Information on transfers and exchanges within the district is not requested. Transfers refer to water exchanges, sales, or other agreements that transfer or exchange water between water districts or users, such as:

a. Agriculture to urban
b. Urban to agriculture
c. Agriculture to agriculture
d. Urban to urban

7. Wheeling or other transactions

List wheeling or other transactions not covered above that involve moving water into or out of the district. Provide the following information for the current year: from whom to whom, acre-feet of each transaction and use.

8. Any other uses of water

If there were other uses of water not covered above, describe them (e.g. water for hydroelectric power, water used to meet water quality objectives, emergencies, environmental deliveries, etc.) and the quantities involved.

F. Irrigation Drainage from the District

If a district has drain water, but does not monitor quality of the surface and/or subsurface drain water, the Plan should state how this information would be collected in the future. If the district has no surface or subsurface drain water, state "None" and leave this section blank.

1. Surface and subsurface drain/return flow.

Identify the drains that carry drainage flows within and out of the district (show on the facilities map, Appendix A) and specify where drain flow is used within the district. If surface drain water leaves the district's service area and is reused, identify the general location and type of that reuse. For example, if the district surface return flow is discharged into the Sacramento River, the Plan should state that irrigation runoff and operational spills are returned to the Sacramento River. In this case, specific downstream uses would be unknown.

If subsurface drain water is collected and leaves the district's service area and is then reused, identify the general location, type of that reuse. If surface and/or subsurface drain water is used within the district for agriculture, wildlife refuges, M&I, or other purposes, do not describe.

2. Identify which agency manages the drainage water quality testing program and describe the district role in the current year program.

If the district conducts, participates, or funds any part of a drainage-testing program, please describe those activities.

3. Drainage Water Quality Testing Program

Include the information listed below:

a. Analyses performed
b. Concentration range
c. Frequency range
d. Average

4. Usage limitation resulting from the drainage water quality.

Describe the constituents in the drain water (i.e., selenium, boron, etc.) and the resulting limitations on use. For instance, excessive nitrates would limit the use of drain water for domestic consumption but not for agricultural use. High salt concentrations may limit the use of drain water for agricultural use.

Contractors included in the drainage problem area, as identified in, A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (September 1990), should also complete Attachment A

G. Water Accounting (Inventory)

Develop a water inventory for the district for the current year. The intent of the water inventory is for districts to quantify water supplies, uses, losses within the district and outflow.

Knowledge of the amount of water used for various purposes can lead to improved water management. A water inventory also identifies where a district lacks information. When analyzing BMPs, the water savings resulting from an individual practice can be estimated based on the water inventory. Completing Tables 1 through 8 provides all the water inventory data. If you have completed Tables 1 through 8, skip to the next section.

1. Quantify districts water supplies.

To complete this section, enter the necessary data in the listed tables

a. Surface water supplies, imported and originating within the district, by month (Table 1, completed in Section 2 A).

Quantifying surface supplies by month will allow districts to show what supplies are used to meet water demands (including ground water recharge).

b. Ground water extracted by the district, by month (Table 2, completed in Section 2 B).

c. Effective precipitation by crop (Table 5).

The district will have to calculate this information based on when the crop was planted, the soil moisture profile and precipitation patterns and intensity. Information is available from ITRC and CIT. DWR district staff or local farm advisors may also have information on the effective precipitation amounts for the crops grown in your district.

d. Estimated annual ground water extracted by non-district parties (if records are not available, provide an estimate and basis for estimation) (Table 2, completed in Section 2 B).

Urban water wells are usually metered, and the information is generally available by contacting the pumpers. If the district does not have ground water production records for private agricultural ground water pumpers, use the following method to estimate the quantity pumped:

- (water needed for crop ET) + (water needed for leaching) - (effective precipitation) = (crop water need)
- (crop water need)/(irrigation efficiency) = (estimate of applied water)
- (estimate of applied water) - (amount of water delivered by the district) = (estimate of private ground water pumped)

A similar method can be used to estimate the private urban pumping.

e. Recycled water, by month (water originating from a municipal wastewater treatment plant) (Table 3, completed in Section 2 E 2).

Recycled water is urban wastewater that is treated and available for reuse.

f. Other supplies, by month (Table 1).
To be defined by the district.

2. Quantify water used.
To complete this section, enter the necessary data in the listed tables.

a. Conveyance losses, including seepage, evaporation, and operational spills from canals; and (urban) leaks, breaks, fire, and flushing from pipes (Table 4)

Types of canal losses include seepage, evaporation, and operational spills. Losses from piped urban distribution systems results from leaks, breaks, flushing, and fire fighting.

Canal seepage is the most difficult to calculate. Seepage from unlined canals varies as soil characteristics change so the rate of loss per section requires ponding tests, good metering or some other technique. Evaporation can be calculated by determining the surface area of the canals and regulating reservoirs and applying the local evaporation rate. Operational spills can usually be calculated since the end of a canal is generally a weir or other structure that could be calibrated. Describe how the values were determined or estimated. See the Canal Lining and Reservoir Lining documents in Chapter 11.

Conveyance seepage is considered a loss of irrigation water, and sometimes, ground water recharge. For example, when the Friant Unit's class II water is available, conveyance seepage in some cases may be considered a ground water recharge method. However, when contract water is conveyed, seepage often results in loss of water intended for irrigation, increasing pumping costs and degrading water quality. Practices that reduce seepage can help districts use water more efficiently, but may require new methods and locations for ground water recharge.

Losses from urban distribution systems can be calculated by conducting a system water audit. The AWWA Water Audit Manual has complete instructions, worksheets, and examples.

b. Consumptive use by riparian vegetation (Table 6)

Estimate the annual consumptive water use by riparian vegetation inadvertently or intentionally provided with district water. Do not include riparian vegetation located at an environmental or recreational resource. Estimate the total acres of incidental riparian vegetation and an overall use (based on ET during the months when water is available) to obtain an estimate of consumptive use. Information may also be available from local farm advisors and neighboring districts.

c. Applied irrigation water, crop ET, water used for leaching and for cultural practices (e.g., frost protection, soil reclamation, etc.) (Table 5)

This section quantifies crop water need. Crop water need includes crop ET and water used for leaching and cultural practices. Determine the total crop water need for each crop.

ET requirements for different crops in different climates can be found in DWR Bulletin 113-3 (April 1975), Oregon State University Miscellaneous Publication 8530 (1992) and Nevada Department of Conservation and Natural Resources, Division of Water Planning, Miscellaneous Publications. Information is available from ITRC and CIT. DWR district staff or local farm advisors may also have information.

d. Urban water use.

Determine total water sales and other authorized uses. Do not include losses, fire fighting, and system flushing, as these were included in Table 4, Distribution System Losses.

e. Ground water recharge (Table 6)

Quantify water used by the district for the purposeful recharge of ground water, including recharge ponds and water injected for recharge. Purposeful ground water recharge is a program that determines when and where the water will be recharged and extracted – not just general deep percolation of surface water.

f. Water exchanges and transfers (Table 6)

Quantify inter-district water transfers.

g. Estimated deep percolation within the district (Table 6)

Deep percolation is usually estimated as the difference between applied water (minus any runoff leaving the district) and crop water use. Some deep percolation may be necessary for leaching. Excess deep percolation is considered an economic loss since unneeded ground water is purchased, ground water quality is degraded and energy is used for unnecessary pumping. Water

applied for intentional recharge is not deep percolation. Table 6 calculates an estimate of the current year's deep percolation.

h. Agricultural flows to perched water table or saline sink (Table 7)

Calculate, or if necessary, estimate the amount of deep percolation or drainage that flows to a saline sink (the ocean, Kesterson, etc.) or to a perched water table (within 5 feet of the soil surface).

i. Agricultural irrigation spills or drain water leaving the district (Table 6)

Calculate, or if necessary, estimate the total return flows (surface outflow) leaving the district.

j. Other (Table 6)

Quantify any other uses of water within the district. Include in the non-agri or non-urban row. This may be incidental urban use in an agricultural district or incidental agricultural uses in an urban district.

3. Overall water inventory.

Compare total water estimated to be available for sale within the district with the total water actually sold by the district (Table 6).

Table 6 compares total water available for sale with total water sold. This water budget usually identifies areas where water management could be improved and thus helps the district to select and implement appropriate BMPs. Evaluation of the BMPs in Sections 3 and 4 requires an estimate of how much water may be conserved by each practice. Parts of this process are imprecise. For example, estimating water savings from education programs is very difficult. However, this process will help the district to estimate the amount of potential water savings and the costs of achieving those savings.

Section 3: BMPs for Agricultural Contractors

Any Contractor that provides water to 2,000 farmed acres or more must complete this section.

However, if a primarily Urban Contractor provides some Agricultural Water, they are required to include Agricultural BMP 1 (Water Measurement) and BMP 4 (Pricing Structure) in their plan.

Once a Contractor provides water to 2,000 farmed acres or more they are required to address **all** the BMPs in Section 3, BMPs for Agricultural Contractors.

In this section, describe the water management program the district determines will best accomplish each BMP. The success of some of the practices will depend on cooperative work with other entities. Monitoring implementation activities and results will allow the district to modify planned programs that do not accomplish the practice as designed.

Some BMPs are considered universally applicable (critical) and others are considered "generally applicable" (exemptible). Under certain circumstances, one or more of the exemptible BMPs may not be appropriate for district implementation. The district will implement each exemptible BMP unless the district provides adequate documentation that supports an exemption or states the reason the BMP is not applicable in accordance with Attachment B.

Wholesalers must insure that their subdistricts have an adequate Plan found to meet the Criteria. Wholesalers may include subdistricts in a single Plan or require each retailer to prepare separate Plans. If subdistricts prepare their own Plans, the wholesaler should be involved to the extent necessary to insure it is found to meet the Criteria.

Note: If the requested information is not available, describe how that information will be obtained for the next Plan revision or state that the information is historical and cannot be reconstructed.

For each BMP, describe how the plan will be carried out, including actions and timelines, budgets, staff, and projected results (e.g., changes in water and energy use, chemical inputs, improved yields, increased habitat) for at least 3 years. Identify how each BMP will be monitored to see if it is achieving the projected results.

A. Critical BMPs for Agricultural Contractors

Critical BMPs are those that every Reclamation agricultural district is expected to implement. These BMPs are considered to be the basic elements of good water management. Select a program design for each critical BMP that will provide maximum benefit to the district and its customers.

1. Water measurement

Measure the volume of water delivered by the district to each customer with devices that are operated and maintained to a reasonable degree of accuracy, under most conditions, to +/- 6

percent. Three categories of measurement devices that may meet this criterion are devices with totalizers, standard flow measurement devices, and non-standard but calibrated devices.

The **first category** includes devices with totalizers that measure volume: Propeller meters, Venturi meters, magnetic meters, and acoustic meters. These have a high level of accuracy with proper installation and periodic maintenance and calibration.

The **second category** includes standard flow measurement devices that measure flow rate and also require accurate measurements of water level and delivery time to determine volumes: Replogle and Parshall flumes; rectangular, trapezoidal (Cipolletti), and V-Notch weirs; and canal meter gates. These devices require proper installation; continuous or sufficiently frequent recording of water levels and flow rates; delivery beginning and ending times; adjustments for approach velocity in some cases; and regular maintenance and calibration for good accuracy.

The **third category** includes non-standard, calibrated flow measurement devices. This category includes special measurement devices developed by a district. Typically, there are no published standard dimensions or flow tables for such devices. Consistent dimensions and installations; accurate determination of delivery time; local calibration and a verification of accuracy, based on a representative sample number of devices measured over time; and a proposed schedule for maintenance and calibration would be necessary for acceptability. This category also includes calibrated pumps when the suction side water level fluctuation is small when compared to the lift (+/- 6 percent) and the discharge pressure is not changed.

Refer to the Calibration and Measurement document, Chapter 11, for examples of installation, calibration, and maintenance of measurement devices that are described here

Rough estimates of flow rate or volume, such as flow rate estimates at check structures, the sum of siphon tubes, or the use of occasional flow readings and multiplying by the time between readings (or other methods of measurement not specified here), are **NOT** acceptable as they do not provide a documented reasonable degree of accuracy.

Estimates of flow rate or volume based on one moment of time and assumed continuous over a period of more than an hour are **NOT** acceptable. Flow rate estimates at check structures or the sum of siphon tubes (or other methods of measurement not specified here), are **NOT** acceptable, as they do not provide a documented reasonable degree of accuracy.

a. Provide total number of customer turnouts that are unmeasured or do not meet the standards listed above.
b. Provide number of appropriate measurement devices installed last year.
c. Provide number of appropriate measurement devices installed this year.
d. Provide number of appropriate measurement devices to be installed next year.

Water measurement of each turnout has many benefits. When customers know how much water they use for incremental time periods (monthly, per irrigation, etc.), they are able to make informed economic decisions. The distribution system can be correctly sized and operated to provide the water quantities and timing that customers need. Contractor costs for pumping, canal

maintenance, and drainage can be controlled. Measurement devices (meters, flumes, weirs, sonic, etc.) should be selected based on the characteristics of the district's distribution system, water quality, and delivery requirements. It is important to implement a maintenance and/or replacement program in conjunction with the installation program, because measurement devices become less accurate over time.

Contractors that measure deliveries can provide customers with their historic water delivery records. Customers can then determine what quantities of water were applied to crops in previous years and evaluate their irrigation systems and operations.

An example of a measurement program is the one implemented by the Laguna Irrigation District. The Laguna Irrigation District delivers water to 32,000 acres of agricultural land. In 1988, the district began a project to install propeller meters on all district delivery turnouts. The goal of the project was to ensure that all growers in the district received an equitable share of the available water. There was no method of measuring water deliveries prior to this program.

When the Laguna Irrigation District implemented the metering program it had over 500 turnouts. To reduce cost, the district purchased 180 portable propeller meters of various sizes. Contractor personnel installed these meters at delivery turnouts when a grower received water and read the meters daily during a water delivery.

This program allowed the district to change from a rigid delivery schedule to an arranged demand system, which features flexible flow rates and shut off times. The new system ensures the equal distribution of available water.

The Laguna Irrigation District reports that flexible deliveries allow growers to irrigate crops according to crop need, increasing irrigation efficiency, and reducing deep percolation. It also helps growers to more closely monitor water application and identify high-use fields. A comparison of deliveries in 1987 (before metering) and 1991 (after metering) indicates that 8 percent less water was used in 1991.

The Laguna Irrigation District also purchased a computer and database software to compile the meter readings, a rack to store the meters, repair parts for the meters, and staff training courses. They hired a consulting agency to administer the program. Project cost was approximately $260,000. The district customers are pleased with the metering/billing system.

2. Designate a water conservation coordinator

Provide the name, title, business mailing address, phone number and e-mail address of the district staff person responsible for Plan development and implementation. For small districts, this could be a part-time responsibility. For larger districts, this may be a full-time responsibility with additional staff.

If a consultant is hired to write this Plan, the district should designate a district staff member as conservation coordinator to manage the work and communicate with Reclamation.

Reclamation offers workshops to assist with Plan development and will provide technical assistance to the district during Plan preparation and implementation. When necessary, Reclamation area office staff will meet with a district's conservation coordinator to assist with the preparation, implementation, and evaluation of the Plan.

3. Provide or support the availability of water management services to water users

Develop and conduct individual programs or cooperative programs with other districts in regional programs. Some districts may want to arrange program delivery through consulting firms, cooperative extension, or other entities. The services should include, but not be limited to:

a. On-farm evaluations

1) On-farm irrigation and drainage system evaluations using a mobile lab type assessment

The Criteria states that districts shall provide or support on-farm irrigation system evaluations for their customers.

The BMP is intended to provide the water users with access to irrigation system performance information that will help them to improve their irrigation systems and management. Water users may or may not take advantage of this service. The districts are not required to offer these services free of charge.

The following are examples of adequate programs:

a) Offer to district water users a rebate/discount of 25 percent off the fair market price of an evaluation.
b) Annually provide evaluations to at least 5 percent of the district water users requesting this service.
c) Actively advertise a district organized evaluation program to district water users.

This can be accomplished by providing financial support to mobile lab programs, consultants, university students, or others who can perform the evaluations. The district shall also make all district water users aware of the service through newsletters, bill stuffers, or other district publications. If the district can demonstrate that at least 5 percent of district customers currently have systems evaluations annually, the district does not have to provide the service. The district is still expected to maintain support for this service by providing information to district customers.

On-farm irrigation system evaluations provide information that growers need to make efficiency improvements to existing irrigation systems. Irrigation evaluations, such as those being provided by mobile labs and other consulting services, identify correctable problems such as worn nozzles, insufficient filtration, incorrect or irregular nozzle sizes, excessive run time, etc. Also, evaluations often identify when and where over- or under-irrigation are occurring.

In the Plan provide information on the number of farms and acres that are projected to receive irrigation system evaluations each of the next 3 years. Include:

a) Total number of irrigated acres.
b) Number of irrigated acres to be surveyed per year by on-farm irrigation evaluations.
c) Total number of farms.
d) Number of farms to be surveyed per year by on-farm irrigation / drainage evaluations.

For those districts with irrigation specialists on staff, on-farm evaluations could be part of the district's overall program, thus supplementing the efforts of other services or mobile labs. Mobile Lab Programs are available – contact your USBR Area Office Specialist for more information. Agricultural consultants may also be able to perform this service for district customers. Information on existing mobile labs can be obtained from DWR. If a mobile lab is not located in the local area, DWR can provide information on starting one.

2. Timely field and crop-specific water use information to the water user

There are several substantial benefits of accounting for water deliveries by crop and field. A water user having knowledge of the deliveries has real-time information on their individual irrigation events and the total of all irrigation on each field throughout the season. Comparison of per acre water usage of each crop by field within the district provides very meaningful water use information both to the water user and the district. Crop-specific and field-specific data allows development of a tiered water pricing system that is sensitive to crop type. It also provides accurate data for measuring the results of BMPs.

So that water users can compare their crops' specific water use with others within the district, the district can prepare an annual report that summarizes water use by crop and by field, computes the unit water use per acre, and sorts these data in several ways-by water user, field number, crop type, and unit water use. At the end of each year, these reports can either be mailed to district customers or posted at the district office.

These reports will also be the best source of information to identify anomalies in water use that are indicators of possible sources of excessive tailwater and deep percolation or inaccurate metering. Reclamation has examples of these reports.

b. Normal year and real-time irrigation scheduling and crop ET information (i.e., CIMIS).

Describe the district's irrigation scheduling assistance program, including methods of data dissemination, and list any cooperating agencies.

ET calculations and irrigation scheduling information is available from the DWR CIMIS network (at no charge) and other irrigation service providers

To assist growers to develop crop irrigation schedules, districts can establish programs to:
1) Disseminate the data to interested district customers
2) Provide technical assistance and instruction on scheduling techniques

The CIMIS project uses computer and telecommunication technologies to collect and disseminate climatological data to districts, growers, irrigators, and others on a daily basis.

Climatological data is measured and collected constantly by a network of computerized climate stations. The data is transmitted to and stored in a centralized computer and is accessible to all interested parties within 24 hours. Hardware and software requirements to receive this data include a personal computer with Internet access.

If a district wants to establish an evaporation pan station, detailed discussions on the minimum standards for installation and application of the data in determining crop ET can be found in the California DWR Bulletins 113-3 and 113-4. Information is also available from ITRC and CIT. DWR district staff or local farm advisors may also have information. Contractors will have to establish a program to disseminate the data collected at these stations (newspapers, television, radio, telephone, e-mail, newsletter, etc.).

Historical climatological data can be used to develop normal year crop ET rates that can assist:

1) Contractors to determine approximate quantities of water that may be requested during any particular growing season.
2) Growers to estimate the growing season ET requirements of crops.

DWR Bulletin 113-3 also provides normal year ET rates, adjusted for effective precipitation, for selected crops.

For assistance in developing training workshops and seminars in irrigation scheduling, districts can contact local offices of the UC Cooperative Extension Farm Advisors. Consultants are also available to assist in the development of training courses or to provide direct technical assistance.

c. Surface, ground, and drainage water quantity and quality data

Describe the district's surface, ground, and drainage water quality monitoring program; include methods of data dissemination and list any cooperating agencies.

If the district has water sources with a range of qualities that affects how much water is needed for leaching, providing water quality information to customers when sources change can assist them to use an appropriate amount of water. When the quality of delivered water changes, districts should inform customers so that they can make appropriate irrigation adjustments (for leaching, etc.). Workshops can be designed to assist growers to make the best use of this information.

d. Agricultural water management educational programs and materials for farmers, staff, and public (soil moisture and salinity monitoring; in-school awareness programs; Agwater software; efficient irrigation techniques, crop water budget, and other approaches; program delivery via workshops, seminars, newsletters, field days, and demonstrations, etc.).

Describe the district proposed or supported educational programs and their goals. Attach the materials used in these programs (Appendix J).

The district should either sponsor or conduct educational seminars/workshops for district farmers and staff. Examples of workshop topics include: Information on weather, crop ET, soil moisture

holding capacity, crop characteristics, irrigation scheduling, and water-use planning. Input from customers, consultants, irrigators, and other technical experts will be important when determining the content of these seminars/workshops.

Educational seminars/workshops can serve districts in several ways. They can be used to:

1) Communicate the importance of implementing efficiency programs.
2) Describe conservation procedures that can be utilized by customers.
3) Provide a forum for growers, industrial users, and others to exchange ideas and experiences. These meetings also provide districts an opportunity to exchange ideas.

Information included in the Plan should include:

1) Name and description of each program
2) Co-funders (if any) of each program
3) Yearly participation targets

Various local, State, and Federal agencies (USDA's Agricultural Research Service, the UCCE, resource conservation districts, etc.) offer technical assistance and will work with the district to provide educational seminars and workshops to water users.

4. Pricing structure

Adopt a water pricing structure for district water users based at least in part on quantity delivered.

Describe the proposed quantity-based water pricing structure and when it will become (or became) effective. Financial variables influence the way customers use water. For example, when agricultural customers pay for each AF of water received, they are more likely to order an amount closer to the actual crop water need. Ordering only what is needed can reduce demand on distribution system capacity, reduce tailwater, and increase supply reliability. Experience shows that urban customers reduce water use by 20 percent or more when charges are quantity based. This can result in substantial cost savings for potable and wastewater treatment costs.

5. Evaluate the need, if any, for changes in policies of the institutions to which the district is subject

Identify changes to the rules and regulations of the district's water suppliers that would allow for more efficient water use and operations. Water projects (CVP, SWP, etc.) and wholesale water agencies provide water based on policies that sometimes make retail water management more difficult. For instance, policies that require payment for unused entitlement, or that limit carry-over of unused water, can encourage unnecessary water use. Identify any policies that reduce the district's ability to improve water management and provide suggestions for improvements.

As an example, Westlands Water District, through negotiations with Reclamation, was able to change their water year so that the end of the water year could coincide with the end of the rainy season. Now Westlands Water District's customers are better able to manage their water supplies to take advantage of effective precipitation.

6. Evaluate and improve efficiencies of district's pumps

Describe the pump efficiency evaluation program and the role of the district and participating local utilities in the program.

Many districts operate booster pumps or ground water pumps as part of their delivery and spill recovery facilities. A program to evaluate and improve the efficiencies of such pumps may result in energy savings and peak load reductions, or reveal capacity limitations due to inefficient facilities. Over the long term, the district may be able to reduce operational costs and improve operational efficiency.

Provide information in the Plan on the district's pump testing program. Contact your local energy utility to determine if they offer pump-testing programs that can assist districts to minimize power costs.

B. Exemptible BMPs for Agricultural Contractors

Agricultural districts should implement the following BMPs unless the district demonstrates that the practice is not appropriate. Some districts may spend time studying the most effective way to implement a BMP or conduct a pilot study to determine if a BMP is appropriate for that district. For appropriate BMPs, provide a description of the implementation plan and include time schedules, budgets, and monitoring plans. If a BMP is to be studied, or a pilot study conducted, provide details and schedules of the study. These studies must be completed expeditiously and before the next Plan revision. The district should follow the exemption criteria (see Section 6) to justify exemptions and document the exemption in this section. Some Exemptible BMPs may not apply to the district. See Attachment B for examples of circumstances under which Exemptible BMPs are not applicable.

The purpose of preparing a Plan is for the district to implement the BMP programs developed during the planning process. Each year the districts report on the previous year's actual BMP activities, budget, and staffing. They also project expenditures and staffing levels for the coming year and provide information on planned activities.

Contractors should maintain regular records of BMP implementation activities to facilitate the completion of the annual update. The BMP records can be tracked in a variety of ways. Some methods are: conservation staff recording data by BMP on their time sheets, weekly schedules, and special BMP budget computer codes.

1. Facilitate alternative land use

Facilitate alternative uses (voluntary, compensated) for lands with exceptionally high water duties or whose irrigation contributes to significant problems (such as drainage).

This BMP applies only to districts that have irrigated lands with the following characteristics:

a. High water table (<5 feet)
b. Poor drainage
c. Ground water selenium concentration > 50 ppb
d. Poor productivity

If a district does provide water to lands that have the above characteristics, describe the district program that will promote a voluntary, compensated change of use for those lands.

The decision to retire land usually includes other factors, such as alternative land-use demand. Also, it may not preclude the option of re-establishing irrigated agriculture, if circumstances should change.

In Arizona, recreation-oriented uses have been proposed for agricultural lands retired due to salinity problems. In other areas, golf courses and shooting ranges have been proposed. Reclamation and DWR are interested in working with districts to design such a program.

2. Facilitate use of available recycled water that otherwise would not be used beneficially, meets all health and safety criteria, and does not cause harm to crops or soils

The use of recycled urban wastewater for agricultural irrigation provides an opportunity for use of an available water supply. Reuse of urban wastewater can be an important element in overall water management.

Identify the source of recycled water and the yearly quantity that is available. Provide the cost of the recycled water and describe its quality in relation to the crops the water will irrigate. Describe the program that will promote the use of the recycled water by agricultural customers and identify the district role in the program.

3. Facilitate the financing of capital improvements for on-farm irrigation systems

Identify district programs to facilitate and/or provide financial incentives for improved on-farm water management. Include information on the estimated amount of yearly financial assistance. Attach the funding information the district provided to water users.

Facilitating financial aid to farmers may include cataloging available funding sources and procedures or obtaining funding and administering the program or providing low-interest loans.

Often a grower can greatly improve water management if financing is available. For some growers, the ability to implement efficient management practices and install modern irrigation systems is hampered by the lack of capital. These individuals are willing to improve efficiency if long-term affordable financing is available.

4. Incentive pricing

Implement a pricing structure that promotes one or more of the following goals:

a. Encourages more efficient water use at the farm level
b. Supports planned conjunctive use of ground water
c. Increases ground water recharge
d. Reduces problem drainage
e. Improves management of environmental resources

Describe the incentive pricing structures that were considered, which were selected for implementation, and when it will become effective.

Incentive pricing structures, such as increasing block rates, are those that encourage appropriate water use. Incentive rates encourage customers to accurately determine and apply only the water a crop needs, thus reducing over-irrigation and the resulting drainage.

Examples and explanations of agricultural rate schedules can be found in Reclamation's Incentive Pricing Handbook for Agricultural Water Districts, available from your Reclamation area office.

Several districts have implemented incentive pricing structures for irrigation water and drainage water disposal. Because of area specific management needs (such as leaching requirements, potential supply shortages, crop types, and soil and climatological conditions) districts incentive rate designs will vary.

The Broadview Water District implemented an increasing block-rate pricing structure for agricultural in 1989. The purpose of the program was to motivate growers to improve their on-farm irrigation operations and reduce the quantity of drain water collected in the subsurface drainage system.

The Broadview Water District's block-rate pricing structure was comprised of two components: crop-specific tier levels (percolation depths which determine the price of water) and field-level accounting of water deliveries. The crop-specific levels are required because the volume of drain water generated from the applied water varies by crop according to crop ET. Crops with higher ET requirements are permitted to receive additional irrigation water applications before higher prices become effective. Without these concessions, growers could be limited in crops selection. Field-level accounting of water deliveries encourages the growers to carefully monitor and apply their irrigation supplies.

The pricing structures for the 1989 growing season were established at 90 percent of the district-wide average irrigation depths for 1986 through 1988 for all crops. This approach incorporates locally relevant crop water requirements, soil characteristics, and irrigation practices. The 10 percent reduction in applied water was previously determined to result in a 15 percent reduction in drain water volume. Other incentive pricing structures can be as effective as this example.

5a. Line or pipe ditches and canals

Line or pipe the distribution system to increase distribution system flexibility and capacity and

decrease maintenance and seepage.

Describe the program to line or pipe the distribution system reaches with the greatest loss per foot or those that have the greatest negative impact on delivery flexibility and capacity. As water cost or demands increase, it will become cost effective to line/pipe more sections of the distribution system.

Seepage and evaporation losses in earthen canals and laterals can be minimized by replacement with pipelines or lining with bentonite clay, pour-in-place concrete or plastics/textile membranes. To reduce on-farm seepage losses, districts may wish to consider helping growers to line their ditches or install pipelines.

An example of a district that utilizes a pipeline distribution system is the Westlands Water District, whose permanent distribution system consists of a buried pipeline network which conveys irrigation water from the main supply canals to 160- or 320-acre land units totaling more than 550,000 acres. The distribution system was built between 1965 and 1979 and serves approximately 90 percent of the irrigable land in the district. Most of the remaining district lands are served by farmer-constructed temporary diversions, which are maintained by the farmers.

The district water supply is distributed through 1,034 miles of buried pipe, varying in diameter from 10 to 96 inches. Gravity and pumps feed 71 lateral pipelines.

In 1969, the Shasta View Irrigation District, located in the Klamath Falls area, converted from an unlined canal system to a piped water delivery system. A 65-year Rehabilitation and Betterment Act loan from Reclamation funded the $3.2 million project.

Seventeen miles of buried pressure pipe replaced 21 miles of unlined canal, which eliminated eight small regulating reservoirs and 110 farm-pumping stations. The unlined canal system had lost approximately 30 percent of the district water supply through seepage. District losses are now less than 5 percent.

An additional benefit of the pipe system is the ability to deliver water to growers for frost protection. The elevation of the Klamath Basin is such that frost is a threat to the potatoes grown in the region. To protect against the affects of frost, growers sprinkle the potato fields to control air temperature. The unlined canal system could not deliver enough water to meet the demands for frost protection. The new pipe system was designed to operate at full pressure during frost periods, assuring growers of sufficient water to protect the potato fields.

5b. Regulatory reservoirs

Construct regulatory reservoirs to improve distribution system delivery flexibility. The construction and/or lining of regulatory reservoirs can provide improved system operation and distribution flexibility, additional supply storage, reduced operational losses, and increased flexibility in the reception of surface and/or aqueduct supplies.

The Imperial Irrigation District constructed six regulatory reservoirs as part of its program to

improve the operation efficiency of its distribution system. Although the combined storage capacity of these reservoirs is only about 2,300 AF, some of the more significant benefits of the reservoirs include:

a. Storing water normally held with less efficiency in the district's canals and laterals or released to the Salton Sea (when growers are unable to use ordered water due to unexpected rainfall).
b. The ability to meet customer water delivery requests
c. Increased distribution system operational efficiency

6. Increase flexibility (within operational limits) in water ordering by, and delivery to, water users

Modify distribution facilities and controls to increase the reliability, consistency, and flexibility of water deliveries.

Describe measures you plan to implement to: change from a rotation to an on-demand delivery system, and improve delivery flexibility and system capacity. Describe measures you plan to implement to increase delivery flexibility available to farmers, and describe obstacles for further flexibility improvements.

Many factors affect the effectiveness of irrigation. Among these are soil texture and uniformity, surface gradient, length of irrigation run, weed growth, debris from previous plant growth, irrigation water quality, root zone soil chemistry, depth of the unsaturated zone, wind velocity, humidity, air temperature, grower's expertise, and the design, condition, and operation of the irrigation system.

If all of the above factors are optimum, but the irrigation water is not available at the necessary time or in the appropriate quantities, irrigation effectiveness will be adversely affected. Weather unpredictability often does not allow a grower sufficient lead time to order water. Unlike urban water systems, agricultural districts often do not have systems that can provide water on demand.

The Broadview Water District at one time required a 48-hour notice for water orders and a 24-hour notice to end a water delivery. This was modified in 1990 to 2-hour notice in most cases to provide growers with more flexibility. Many growers now apply frequent, shallow irrigations instead of the deep, infrequent irrigations used prior to 1990. Growers have the ability to begin and end irrigations on short notice, often in the same day.

Increased flexibility allows growers to irrigate only when necessary, but growers must be sure that the water will be there when needed.

Provide a copy of a water order form (Appendix K)

7. Construct and operate district spill and tailwater recovery systems

Construct facilities to capture and reuse district operational spills.

The design and operation of a district's conveyance system has a significant role in the quantity of annual operational spills.

A district should measure the annual spill from each canal and determine the percentage that could be captured for beneficial use. This data is essential to correctly site and size spill and tailwater recovery systems.

Interceptor systems can be designed to capture and transport operational spills throughout a conveyance system. One design adds lateral-connector canals. In this design, a secondary canal is constructed at the terminus point of a series of laterals to capture operational spill. The system is designed to either pump spills back into the laterals or transport them to a reservoir for storage.

The Imperial Irrigation District has a lateral interceptor, 5 miles in length, that captures operation spills from the terminus points of eight lateral canals and delivers the water to more than 22,000 acres of cultivated land. The interceptor has more than 90 automated drop leaf gates in addition to a 240 AF reservoir for storage of spill water. The interceptor annually conserves approximately 8,300 AF of water.

8. Optimize conjunctive use of surface and ground water

Increase planned conjunctive use of surface and ground water within the district.

Describe the potential for increased conjunctive use and identify programs to achieve this potential.

If feasible, districts should prepare and implement long-range plans to conjunctively use surface water and ground water to meet current and future demands. Conjunctive use programs store surplus imported and local surface water in ground water basins. When surface water is inadequate to meet demand, ground water is pumped and distributed.

The Arvin-Edison Water Storage District has an active conjunctive use program. The district utilizes two major spreading basins and a total of 55 recovery wells. During wet years, agricultural demand is adequately met with imported surface water. Surplus surface water is transported to the spreading basins and percolated into the ground water basin. During years when the district's imported surface water supply will not meet demand, the district pumps the stored ground water. This conjunctive use program began in 1966. As of 1991, the district had stored approximately 1 million AF of water in the ground water basin.

The costs to develop, implement, and maintain a conjunctive use program include funds to construct and maintain the spreading basins and to install and maintain the ground water extraction wells. If feasible, districts may wish to develop programs with neighboring districts.

9. Automate canal structures

Automation of canal structures may increase flexibility in water deliveries and increase district control over its water supplies; thereby, providing the opportunity to improve the efficiency of

water use.

Estimate annual operation spills by reach. Identify locations for automated canal structures and other distribution system improvements. Estimate annual water savings (AF/Y) resulting from the evaluated projects. Describe program to automate distribution system.

10. Facilitate or promote water user pump testing and evaluation

Describe the program to facilitate or promote customer pump testing and evaluation.

A district and the local utility can develop a cooperative pump testing service program for their customers. The program will benefit all involved parties by cutting down on energy demand while providing ground water or pressurized low-volume systems at the lowest possible price.

Utility companies may offer a free pump testing service to their customers. A pump test report discusses the condition of the pumps and provides improvement recommendations.

C. Provide a 3-year Budget for BMPs
(Current year and 2 projected future year budgets for all BMPs.)

3-Year Budget Summary

1. Amount actually spent during current year

BMP #	BMP Name	Budgeted Expenditure (not including staff time)	Staff Hours
A1	Measurement	$0	0
2	Conservation staff	$0	0
3	On-farm evaluations / water delivery info	$0	0
	Irrigation Scheduling	$0	0
	Water quality	$0	0
	Agricultural Education Program	$0	0
4	Quantity pricing	$0	0
5	Policy changes	$0	0
6	Contractor's pumps	$0	0
B1	Alternative land use	$0	0
2	Urban recycled water use	$0	0
3	Financing of on-farm improvements	$0	0
4	Incentive pricing	$0	0
5	Line or pipe canals/install reservoirs	$0	0
6	Increase delivery flexibility	$0	0
7	District spill/tailwater recovery systems	$0	0
8	Optimize conjunctive use	$0	0
9	Automate canal structures	$0	0
10	Customer pump testing	$0	0
	Total	$0	0

2. Projected budget summary for the next year

BMP #	BMP Name	Budgeted Expenditure (not including staff time)	Staff Hours
A1	Measurement	$0	0
2	Conservation staff	$0	0
3	On-farm evaluations / water delivery info	$0	0
	Irrigation Scheduling	$0	0
	Water quality	$0	0
	Agricultural Education Program	$0	0
4	Quantity pricing	$0	0
5	Policy changes	$0	0
6	Contractor's pumps	$0	0

B1	Alternative land use	$0	0
2	Urban recycled water use	$0	0
3	Financing of on-farm improvements	$0	0
4	Incentive pricing	$0	0
5	Line or pipe canals/install reservoirs	$0	0
6	Increase delivery flexibility	$0	0
7	District spill/tailwater recovery systems	$0	0
8	Optimize conjunctive use	$0	0
9	Automate canal structures	$0	0
10	Customer pump testing	$0	0
	Total	$0	0

3. Projected budget summary for 3rd year.

BMP #	BMP Name	Budgeted Expenditure (not including staff time)	Staff Hours
A1	Measurement	$0	0
2	Conservation staff	$0	0
3	On-farm evaluations / water delivery info	$0	0
	Irrigation Scheduling	$0	0
	Water quality	$0	0
	Agricultural Education Program	$0	0
4	Quantity pricing	$0	0
5	Policy changes	$0	0
6	Contractor's pumps	$0	0
B1	Alternative land use	$0	0
2	Urban recycled water use	$0	0
3	Financing of on-farm improvements	$0	0
4	Incentive pricing	$0	0
5	Line or pipe canals/install reservoirs	$0	0
6	Increase delivery flexibility	$0	0
7	District spill/tailwater recovery systems	$0	0
8	Optimize conjunctive use	$0	0
9	Automate canal structures	$0	0
10	Customer pump testing	$0	0
	Total	$0	0

If your district is identified as being in the drainage problem area (see Attachment A) provide the information requested below.

D. Drainage Problem Area Programs

(for districts located in the drainage problem area, as defined in Attachment A)

The following programs have been incorporated in the district water conservation programs to improve conditions in the drainage problem areas.

Activity	*Program Description*	*Budget*	*Results*
Source Control			
Land Retirement			
Drainage Water Treatment			
Drainage Water Reuse			
Shallow Groundwater Pumping			
Evaporation Ponds			

The following programs were not been implemented because:

Most districts in the geographic area that drain to the San Joaquin Delta have a set of quantifiable objectives that were identified as applicable to their district. Please find your agency in Chapter 12 and provide the information requested below for each of the QOs listed for your agency.

E. District Quantifiable Objectives (QOs)

(QOs for each district are identified in the QO Agency document in Chapter 10 of the Water Management Planner, and as defined in Attachment C)

Discussion of District participation in the QOs that apply to the District (see

Name of QO	*Related BMP*	*Interest in Outside Funding*	*Agency Role*

Section 4: BMPs for Urban Contractors

Any Contractor that annually provides urban water to 3,300 people or more is required to complete this section.

However, if a primarily Agricultural Contractor provides some Urban Water, they are required to include Urban BMP 4 (*Metering With Commodity Rates for All New Connections and Retrofit of Existing Connections*) in their plan.

Once a Contractor annually provides water to 3,300 people or more, they are required to address **all** the BMPs in Section 4, BMPs for Urban Contractors.

These BMPs will be evaluated based on the CUWCC's current MOU Exhibit 1 (BMP Definitions, Schedules, and Requirements). Under certain circumstances, the generally applicable practices may not be appropriate for Contractor Implementation. Contractors will implement each BMP unless the Contractor provides adequate documentation for an exemption. BMP Number 4, Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections, is the only BMP that is not exemptible.

For each of the BMPs, please refer to the CUWCC MOU Exhibit 1 (Chapter 11), which is included in this document. Please check the CUWCC website (www.cuwcc.org) to verify that this is the current version. This document lays out the requirements for implementation, coverage, and documentation. Districts are required to complete the "CUWCC Coverage Calculators" for each BMP and may wish to complete the USBR BMP Target Form. These spreadsheets can be found at the USBR website and on the CD included in the *Planner*.

Wholesalers must insure that their retailers have Plans that meet the Criteria. Wholesalers may include their retail water districts in a single Plan or require each retailer to prepare a separate Plan. If retailers prepare their own Plans, the wholesaler should be involved to the extent necessary to insure all Plans meet the Criteria.

The purpose of preparing a Plan is for the district to implement the BMP water efficiency programs. Each year districts report on actual BMP activities during the previous year.

Districts should maintain records of BMP implementation activities to facilitate the completion of the Annual Update. The BMP records can be tracked in a variety of ways. Some methods are: conservation staff recording BMP data on their time sheets, weekly schedules, and special budget BMP computer codes.

The BMPs are intended to reduce long-term urban demands and improve water management in an effort to maximize the limited water resources available. These BMPs are in addition to programs that may be instituted during water supply shortages.

1. Water Survey Programs for Single-Family and Multi-Family Residential Customers

2. Residential Plumbing Retrofit

3. System Water Audits, Leak Detection, and Repair

4. Metering With Commodity Rates for All New Connections and Retrofit of Existing Connections

5. Large Landscape Conservation Programs and Incentives

6. High-Efficiency Washing Machine Rebate Programs

7. Public Information Programs

8. School Education Programs

9. Conservation Programs for CII Accounts

10. Wholesale Agency Assistance Programs

11. Conservation Pricing

12. Conservation Coordinator

13. Water Waste Prohibition

14. Residential ULFT Replacement Programs

Note: Annual reporting is completed on the Internet at http://www.cuwcc.org/.

C. Provide a 3-year Budget for BMPs (Current year and 2 projected future year budgets)

3-Year Budget Summary

Actual Current Year Expenditures

Year _____		Actual Expenditures	
BMP #	BMP Name	(not including staff hours)	Staff Hours
1	Residential Water Audits	$0	0
2	Residential Retrofit	$0	0
3	System Water Audit and Leak Detection	Not WC budget	
4	Metering w/Commodity Rates	$0	0
5	Landscape Water Audits	$0	0
6	Washing Machine Rebates	$0	0
7	Public Information	$0	0
8	School Education Program	$0	0
9	CII Conservation Programs	$0	0
10	Wholesale Agency Programs	$0	0
11	Conservation Pricing	$0	0
12	Conservation Coordinator	$0	0
13	Water Waste Prohibition	$0	0
14	ULFT Program	$0	0
	Total	$0	0

Projected Budget for Next Year

Year _____		Actual Expenditures	
BMP #	BMP Name	(not including staff hours)	Staff Hours
1	Residential Water Audits	$0	0
2	Residential Retrofit	$0	0
3	System Water Audit and Leak Detection	Not WC budget	
4	Metering w/Commodity Rates	$0	0
5	Landscape Water Audits	$0	0
6	Washing Machine Rebates	$0	0
7	Public Information	$0	0
8	School Education Program	$0	0
9	CII Conservation Programs	$0	0
10	Wholesale Agency Programs	$0	0
11	Conservation Pricing	$0	0
12	Conservation Coordinator	$0	0
13	Water Waste Prohibition	$0	0
14	ULFT Program	$0	0
	Total	$0	0

Projected Budget for 3rd Year

Year _____		Actual Expenditures	
BMP #	BMP Name	(not including staff hours)	Staff Hours
1	Residential Water Audits	$0	0
2	Residential Retrofit	$0	0
3	System Water Audit and Leak Detection	Not WC budget	
4	Metering w/Commodity Rates	$0	0
5	Landscape Water Audits	$0	0
6	Washing Machine Rebates	$0	0
7	Public Information	$0	0
8	School Education Program	$0	0
9	CII Conservation Programs	$0	0
10	Wholesale Agency Programs	$0	0
11	Conservation Pricing	$0	0
12	Conservation Coordinator	$0	0
13	Water Waste Prohibition	$0	0
14	ULFT Program	$0	0
	Total	$0	0

Section 5: Plan Implementation

Pursuant to water service and settlement contract terms, districts must report annually on Plan implementation.

Agricultural districts can complete an annual update by filling in the information for BMPs on the Agricultural Water Management Council web site at www.agwatercouncil.org.

Urban districts can complete an annual update by filling in the information for urban BMPs on the CUWCC web site. Contractors who are signatories of the CUWCC MOU are currently submitting annual reports via the CUWCC *BMP Reporting Database* located on their web site at www.cuwcc.org. Through an agreement with the CUWCC, Reclamation's urban non-signatories may now submit their annual reports through the CUWCC web site using "guest accounts." Urban BMPs are reviewed based on the CUWCC MOU (amended March 14, 2001).

Section 6: Exemption Process

Intent:

To demonstrate in a clear and concise manner that a BMP is not cost effective, not financially feasible, not legal, or not environmentally possible for a district to implement. For agricultural districts, only the BMPs in Section 3: BMPs for Agricultural Contractors, B. Exemptible BMPs are exemptible. For urban districts, all BMPs, except BMP 4 (metering), are exemptible.

Evaluation:

Some BMPs are not appropriate or possible for a district to implement. To document an exemption, provide the basis, rationale, and details for excluding a BMP. Such documentation must address, as appropriate, cost effectiveness, financial feasibility, and environmental or legal constraints to BMP implementation. Reclamation will also consider exemption requests prepared using the final AWMC exemption process or the CUWCC exemption process (BMP Cost Effectiveness Calculators are available at CUWCC.org).

Detail Expected in an Adequate BMP Exemption:

Legal Restraints

In order to justify a BMP exemption because it would not be legal for the district to implement, detail the following:

1. A list of any known laws, regulations, court decisions, or other legal constraints that make it illegal for the district to implement the BMP.
2. A list of the steps that would be required to remove these constraints.
3. A description of what steps the district has taken to remove these constraints.
4. Documentation of efforts by the district to work with other entities that would have the legal authority to carry out the BMP within the district's service area.

Environmental Constraints

In order to justify an exemption due to known adverse environmental impacts, the Plan must document the critical environmental issues and known (qualitative and/or quantitative) negative impacts of the BMP, and an explanation of why effective mitigation of these impacts is not possible. If mitigation of the environmental impacts is possible, the practice must be implemented unless it can be exempted by another exemption category. For example, if the mitigation costs make the project economically infeasible, a discussion of the mitigation plan and necessary mitigation costs should be included as a part of the economic analysis.

Economic Constraints

1. In order to justify an exemption due to economic constraints, the Plan must document the following:

   A benefit-cost analysis that demonstrates the costs to the district outweighs the benefits to the district over the life of the measure. The district must perform the analysis by comparing the present value of all benefits to the present value of all

costs. Document the projected/estimated benefits and costs and the methodology for analysis (benefits and costs should be quantified to the extent possible). The analysis performed for each excluded BMP (from the district's perspective) must include, but is not limited to, the following benefits and costs:

Benefits

All avoided capital costs which include, but are not limited to, the costs associated with the development of new supplies (studies, construction, labor, etc.), transportation, the increase in storage, distribution capacity, waste water facilities, and treatment capacity, etc.

a. Operation and maintenance costs associated with the decrease in the production and distribution of water or the treatment and disposal of waste water that include, but are not limited to, energy, labor, treatment, storage, drainage treatment and disposal, etc.
b. Water purchases avoided by the district.
c. Environmental costs avoided by the district.
d. Environmental enhancements.
e. Revenues from other entities that include but are not limited to, revenue from the sale of water made available by the BMP, financial incentives received from other entities, etc.
f. Other benefits to the district customers that include, but are not limited to, hydropower, improved crop yields, improved crop quality, labor savings, fertilizer savings, increased farm income, etc

Costs

a. Capital expenditures incurred by the district for Implementation of the BMP that include, but are not limited to, equipment, supplies, materials, construction, etc.
b. Operation and maintenance costs to plan, design, implement, enforce, and evaluate the practice.
c. Financial incentives to customers.
d. Costs to the environment.
e. Other costs to the district.

Several accepted benefit-cost analysis methodologies exist (California Energy Commission's Integrated Resource Planning Methodology, Generally Accepted Accounting Principles, Agricultural Water Management Council's Net Benefit Analysis, etc.). A district is considered to be the best suited to evaluate their own economic situation with an appropriate methodology.

2. A discussion and quantification, to the extent possible, of other benefits associated with the implementation of the BMP that may be of interest to potential partners, but are not the direct sole responsibility of the district.

Financial Constraints

In order to adequately justify an exemption due to financial constraints, the Plan must clearly document the following:

1. The benefits and costs of the BMP to the district.

2. The district's funding needed to implement the BMP.
3. A discussion regarding why the district cannot finance the BMP through rate adjustments, assessments, etc.
4. A discussion of the district's reasonable efforts to secure funding from other entities that include, but are not limited to, lending institutions and bonding authorities, and an explanation of why these entities would not provide funding.
5. The required amount of a grant or subsidy that would be needed to feasibly implement the BMP if financing or partnerships could not be obtained.

Section 7: Regional Criteria

Regional Criteria have been developed for the Sacramento Valley River Contractors as a pilot project. No other Regional Criteria have been explored.

Section 8: Five-Year Plan Revision Procedure

Revision Process

Pursuant to water service and settlement contract terms, districts are required to submit revised Plans every 5 years. Contractors must use the most recently adopted Criteria for a new Plan or a 5-year Plan revision. The district must continue to file an Annual update every year to report implementation actions taken.

Review Process

Contractors are requested to submit draft plans to the area office for review and forwarding to Reclamation's Regional Office. Once forwarded to the Regional Office, districts will receive, within 90 days, notification of Reclamation's acceptance or request for modification. Following notification by Reclamation that the Plan has conditionally met the requirements of the Criteria, districts must submit three copies of the completed Plan and a resolution by the district's Board formally adopting the Plan. The status of the district's Plan will then be noticed in the *Federal Register*, and the public is given 30 days in which to comment. Copies of the document will be available for review at the Regional Office and the appropriate area office. If no comments are received within 30 days, the review process will be officially complete. If public comments are received, additional changes may be required.

Signatories to the AWMC

Contractors who are signatories of the AWMC should also submit the Plan to the AWMC after notification by Reclamation that the Plan has conditionally met the requirements of the Criteria. The AWMC will review the agricultural Plans using Reclamation's Criteria. The AWMC may provide comments to Reclamation within 30 days of receiving the agricultural Plan. Reclamation will review the AWMC comments as part of its concurrent review of the Plan. The goal is to have the district's Plan meet the requirements of both AWMC and Reclamation.

Consequences of Non-Compliance

Under most conditions, an adequate Plan must be in place before Reclamation will consider extending any discretionary benefits. Discretionary benefits include, but are not limited to, funding through the Water Conservation Field Services Program or the Efficiency Incentive Program (except for Plan development), and assistance from Reclamation sponsored technical assistance programs.

Attachment A

Information Required of Contractors Located in a Drainage Problem Area

Contractor's included in the drainage problem area, as identified in A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (September 1990), are listed, by sub-area, below. If future editions of the drainage report revise the boundaries of a drainage problem area or other factors used to determine which districts are in a drainage problem area, Reclamation will revise Attachment A to conform with the current drainage report.

1. Reclamation districts in the **Grasslands subarea**: Broadview Water District, Central California Irrigation District, Del Puerto Water District, Firebaugh Canal Water District, Mercy Springs Water District, Pacheco Water District, Panoche Water District, San Luis Canal Company, and San Luis Water District.

2. Reclamation districts in the **Westlands subarea**: James Irrigation District, Tranquillity Irrigation District, and Westlands Water District.

3. Reclamation districts in the **Tulare subarea**: Alpaugh Irrigation District, Atwell Island Water District, Lower Tule River Irrigation District, and Pixley Irrigation District.

4. Reclamation districts in the **Kern subarea**: Alpaugh Irrigation District.

Contractors listed above shall describe which recommendations prescribed in A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (September 1990) have been incorporated in their water conservation programs to improve conditions in drainage problem areas. These recommendations include:

1. Source Control
2. Land Retirement
3. Drainage Water Treatment
4. Drainage Water Reuse
5. Shallow Ground water Pumping
6. Evaporation Ponds

Provide a description and level of expenditure for each activity designed to address the recommendations of the San Joaquin Valley Drainage Program. Identify how implementation of the recommendations has or will substantially reduce deep percolation on drainage problem lands. Describe which recommendations have not been implemented and why.

Attachment B

Agricultural Exemptible BMPs

To establish that a BMP is not applicable to the district, the Plan should explain the reasons why the BMP does not apply to the district. This justification must be consistent with Section 1 of the Criteria entitled, "Describe the District." Examples of N/A for each exemptible BMP are listed below. This list is not all-inclusive.

Section 3. B. Exemptible BMPs for Agricultural Contractors

1. Facilitate Alternative Land Use - N/A could include: Districts without irrigable lands that have exceptionally high water duties or whose irrigation does not contribute to significant problems.

2. Facilitate use of available recycled water that otherwise would not be used beneficially, meets all health and safety criteria, and does not cause harm to crops or soils - N/A could include: Completely piped systems that do not have delivery constraints.

3. Facilitate the financing of capital improvements for on-farm irrigation systems - None identified.

4. Incentive pricing - District that receives only class 2 water.

5. a) Line or pipe ditches and canals - N/A could include: Completely piped systems, unlined systems or sections or systems that are used as part of a planned conjunctive use program.

b) Regulatory reservoirs - N/A could include: Completely piped systems that do not have delivery constraints.

6. *Increase flexibility in water ordering by, and delivery to, the water users within operational limits* - None identified.

7. Construct and operate district spill and tailwater recovery systems - N/A could include: Completely piped systems that do not have delivery constraints.

8. Optimize conjunctive use of surface and ground water - N/A could include: Districts that do not overlie a useable ground water basin and neither the district or its customers pump or use ground water.

9. Automate canal structures - N/A could include: Completely piped systems that do not have delivery constraints.

Attachment C

Quantifiable Objectives

Assess Quantifiable Objectives. CALFED is developing QOs that provide incentives for participation in implementing Water Management activities by water users including Contractors. These activities may or may not directly benefit the water user/Contractor. If there are CALFED QOs that apply to the geographic location of your district lands, identify the QOs that apply to the district and comment on potential for Contractor participation. Reclamation's Area Office and Regional Office will have the latest copy of QOs listed by Contractor. Evaluate and comment on any BMP or practice that is complementary, or could be complementary to the QOs in the District.

Attachment D

Crop List

barley
corn - field
oats
rice
sorghum
wheat
other cereals

alfalfa
clover
irrigated pasture
other hay
silage
other forage

cotton
hops
safflower
sugar beats
soybeans
other field crops

asparagus
beans
broccoli
cabbage
carrots
cauliflower
celery
corn
cucumbers
garlic
greens
lettuce
melons
onions
peas
peppers
potatoes
squash
tomatoes
other vegetables

Sudan grass
Bermuda grass
other grasses

apples
apricots
avocados
berries (all kinds)
cherries
grapefruit
lemon / limes
oranges / tangerines
dates
grapes
olives
peaches
pears
prunes / plums
strawberries
other fruits

almonds
pecans
pistachios
walnuts
other nut trees

ornamental nursery
joboba
other

Irrigation Methods List

Level basin
Furrow
Sprinkler
Low Volume
Multiple (combination of two methods)