

RECLAMATION

Managing Water in the West

Managing for Excellence

Report on Operation and Maintenance Planning and Budgeting

Tasks 29 and 30



**U.S. Department of the Interior
Bureau of Reclamation**

January 03, 2007

Managing for Excellence

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As part of the Action Plan for Managing for Excellence, Teams 29 and 30 were formed in April 2006. Subsequently, these teams were combined since their purposes were closely connected.

The teams were charged with the following:

- **Action Item #29** - Analyze effectiveness of current Operation and Maintenance (O&M) planning. (Does it square with the Reclamation's Asset Management Plan¹ and is it being done agency-wide?)
- **Action Item #30** - Integrate O&M planning with the budgeting process. (Analyze the extent to which the current Budget Review Committee process accomplishes this.)

To complete this analysis, the team:

- Identified the tools and processes used across Reclamation and by various stakeholders/customers to conduct O&M planning. (Customers are defined as those who fund O&M of facilities)
- Conducted several dozen interviews with Reclamation personnel, as well as external water and power customers and advocacy groups.
- Identified best practices for O&M planning used in Reclamation and by others.
- Analyzed the applicability of those best practices to O&M across Reclamation.
- Evaluated existing customer involvement in O&M planning.

The following is a summation of **Observations** made, **Best Practices** discovered, and resultant **Recommendations** compiled from this analysis by the Team.

The attached **Appendix** contains a more in depth discussion of Asset Management topics and summarizes the information obtained by the Team during the interviews conducted to reach the summation presented here.

¹ At the time of the team formation, Reclamation's Asset Management Plan was still in draft, and had not yet received comprehensive review by Reclamation senior management.

Observations:

Budget Review and Asset Management Processes

- **The current O&M practices are moving toward consistency with the new Asset Management Plan (AMP)**, and it is expected that improvements will be realized as the AMP is implemented throughout Reclamation in such items as condition assessments, implementation of computerized maintenance management systems, and facility reliability ratings.
- **Reclamation has integrated Operations and Maintenance planning and budgeting.** Most O&M planning begins at the lowest level and includes work items, plans and budgets. Each office employs a variety of tools and data to develop work plans, with much of the O&M planning relying on asset performance history to project the requirements for work in upcoming years. Reclamation has expanded efforts to obtain appropriate input for work plans from customers who finance or pay for the work. The Facilities O&M Team, which is a Reclamation-wide team, routinely reviews the O&M budget for Reclamation in its capacity as a BRC Workgroup.
- **Each region plans and prioritizes O&M and Replacements, Additions, and Extraordinary Maintenance (RAX) differently.** Major non-routine items can be problematic to adequately fund. There is no common “quantifiable” approach to prioritizing RAX across Reclamation and inputs to the Facility Reliability Ratings (FRR) which are considered when developing RAX priorities are applied with varying consistency. There is room for improvement.
- The **consolidation** of Regional and Office budgets into final Reclamation-wide budget priorities (walkdown table) **is an unstructured process.**
- Work plans are developed to reflect ongoing O&M plus RAX requirements. **Increasing burden of new reporting requirements, administrative requirements, and unfunded mandates** take staff and budget resources from planned O&M work.
- There is **room for improving procurement, design, and construction management practices** to support O&M planning and execution.

Customer Participation

- **There have been significant improvements** over the past several years with regard to customer participation in O&M planning. Customers generally feel that the quality of the data provided by Reclamation is appropriate, having improved significantly over recent years. In some cases, there is still room for improvement in the frequency and depth of the data.

- **Customers get varying degrees of information**, depending on their involvement in the development of work plans and budget. While some processes are fairly mature, others are in the early stages of development or still need adjustment.
- **The vast majority of customers interviewed are satisfied** with their level of involvement in the O&M work planning and budgeting process. Some felt that the process could be improved by more frequent or more detailed information.
- **Frequent points of communication and clearly defined expectations are the hallmarks of processes that work the best.**

Best Practices:

Budget Review and Asset Management Processes

- **Adoption of a replicable, technically based approach to asset condition assessment** is foundational to improving asset management.
- **There is movement toward a risk-based approach** to prioritization of RAX activities.
- **Five- to ten-year planning for RAX** to minimize spikes in expenditures to customers and/or allow lead time to allocate additional budget and other resources. This also helps accommodate large RAX expenditures when they are unavoidable.
- **Scheduling, planning and tracking of O&M work** in a computerized maintenance management system and/or project management tool can significantly improve efficiency of O&M.

Customer Participation and Prioritization

- **Working in a collaborative manner with customers to develop work plans and budgets.** Regular reporting at agreed-upon times on budget versus actual costs, accomplishments, and changes in the work plan. (For example: Hoover, Central Valley Project, and Bonneville Power Administration funding arrangements)
- **Well-established, documented processes** to develop O&M work plans and budgets with power customers and the Power Marketing Administrations.
- **Sharing realistic work plans** with customers at the outset of the planning process.
- **Working early enough in the process** to assure that customers have meaningful input into the development of work plans and budgets prior to the Budget Review Committee (BRC) process and communicating work plan changes throughout the process.
- **Provide visible performance data** to facility personnel and customers.

Recommendations:

Performance Measures

- **Asset managers should measure the performance of their water delivery facility assets.** After three years, these measures should be assessed across Reclamation to identify best practices.
- **Develop performance measures** that apply to O&M planning which will result in increased O&M effectiveness and efficiency **such as increasing wrench time** (i.e. actual time spent performing maintenance activities).
- **Provide meaningful performance data** to management, facility personnel and customers regarding performance of facilities in order to increase visibility and ownership.

Asset Management, Planning & Program Execution

- **Adopt scheduling, planning and tracking of O&M work** for both water and power to capture the performance metrics data.
- **Develop quantifiable condition assessment tools** and metrics for major components of water facilities to gain consistency within the Facility Reliability Rating or alternative metrics that are adopted.
- **Increase focus on preventive maintenance in order to decrease unexpected RAX expenditures.**
- **Adoption of a quantifiable prioritization framework** for O&M that is used Reclamation-wide in the BRC process that is flexible enough to accommodate special situations
- **Analyze the past ten years of expenditures** for large RAX items, normal RAX items, and Congressional write-ins. Based on this analysis, **develop a strategy for the next ten to twenty years for a capital rehabilitation investment plan** to ensure the funding strategy needed to successfully address RAX needs.
- **Evaluate opportunities to improve procurement, design and construction management practices in support of O&M** planning and execution through increased use of existing procurement flexibilities and streamlining of internal processes.

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Interviews conducted with:

Belle Fouche Irrigation District
Boise Project Board of Control
Bonneville Power Administration
Central Arizona Water Conservation District
Central Utah Water Conservancy District
Central Valley Project Water Association
Central Valley Project Preference Power Customers
Colorado River Energy Distributors Association
Garrison Diversion Conservancy District
Hydro Quebec
Imperial Irrigation District
Metropolitan Water District
Mid-West-Electric Consumers Association
Northern California Power Association
Northern Colorado Water Conservancy District
O&M Managers Reclamation-wide
Western Area Power Administration Rates Managers
Western States Power Corporation

APPENDIX

1. Introduction

As part of the Action Plan for Managing for Excellence, Teams 29 and 30 were formed in April 2006. Subsequently, these teams were combined since their purpose was closely connected, they had many of the same team members, and they had the same Team Leader.

The teams were charged with the following tasks:

- **Action Item #29** - Analyze effectiveness of current O&M planning (does it square with the Reclamation's Asset Management Plan² and is it being done agency-wide?).
- **Action Item #30** - Integrate O&M planning with the budgeting process (analyze the extent to which the current Budget Review Committee process accomplishes this).

From those general tasks, the team developed the following objectives:

- Identify and document what constitutes O&M Planning within Reclamation;
- Identify the tools and processes used across Reclamation and by various stakeholders to conduct O&M Planning.
- Identify best practices for O&M Planning used in Reclamation;
- Analyze the applicability of those best practices to O&M across Reclamation;
- Document and evaluate existing stakeholder involvement (best practices) in O&M Planning;
- Make recommendations to the Executive Sponsor as to which best practices should be adopted, how they should be adopted (Asset Management Plan, Policy Statement, Directives and Standards, guidelines), and who should be accountable for their implementation; and
- Evaluate the existing relationship between O&M Planning and budgeting, including an evaluation of the effectiveness of the integration of O&M planning into the current BRC process, and make recommendations for improvement.

To accomplish the objectives, the team prepared a standardized list of interview questions and conducted a series of interviews with Reclamation O&M and budget personnel, external stakeholders and other organizations from whom the team believed could share information on how they conduct O&M planning, budgeting and stakeholder outreach.

² At the time of the team formation, Reclamation's Asset Management Plan was still in draft, and had not yet received comprehensive review by Reclamation senior management.

2. Organization of this Appendix

This report is organized to address the above questions through the following major topics.

- Section 3 – Discusses what constitutes O&M Planning in Reclamation
- Section 4 – Discusses current macro-level planning tools and processes
- Section 5 – Discusses some of the micro-level (field) work prioritization tools and methodologies
- Section 6 – Discusses the results of internal interviews held with Reclamation personnel on work plan development, budgeting and stakeholder involvement, including RAX prioritization
- Section 7 – Discusses the results of external interviews with stakeholders who either finance O&M /capital work or pay for it
- Section 8 – Discusses the results of external interviews with organizations which the team identified has potentially having best practices in O&M workplan development and budgeting
- Section 9 – Discusses the current Budget Review Committee (BRC) process
- Section 10 – Discusses the current metrics created for the O&M program and other metrics currently under review

3. What is O&M Planning?

O&M planning has two components – operations and maintenance. For the purposes of this report, “operations” is defined as those activities which directly relate to the delivery of water and power to Reclamation customers. Maintenance is the act of keeping fixed assets in acceptable condition. It includes preventive maintenance, normal repairs, replacement of parts and structural components, and other activities needed to preserve the asset so it continues to provide acceptable services and achieves its expected life. Maintenance excludes activities aimed at expanding the capacity of an asset or otherwise upgrading it to serve needs different from, or significantly greater than, those originally intended.

O&M planning is a set of activities that (1) begins with an understanding of the asset inventory; (2) understands the role the assets play in delivering benefits to end users; (3) considers the maintenance needs of those assets to keep them in an operating condition at an acceptable risk of service interruption or failure; (4) prioritizes asset maintenance to focus on risk management for the most mission-critical assets first; (5) and balances work and budget so as to maximize the amount of productive work without consistently exceeding the ability of the organization to accomplish such work.

4. Current O&M Planning Tools and Processes Used in Reclamation

Most O&M planning begins at the facility or area office level. In other words, at the lowest level that has a perspective or responsibility for O&M of physical works. Each office employs a variety of tools and data to develop work plans. In large part, much of the O&M planning relies on history to project forward the requirements for work in upcoming years. Of course, with an aging infrastructure, not everything is routine. The operating offices use their experience and information tools to anticipate non-routine work.

As work plans are developed, they are costed out and an annual and multi-year budget is developed. These budgets are forwarded to regional offices for consolidation. In many cases, work plans are presented to, and reviewed by, stakeholders who will have to finance or pay for the work.

Consistency with Asset Management Plan

Reclamation's Asset Management Plan (AMP) is anticipated to be adopted in 2006. The AMP focuses on mission-critical assets (e.g., major structures such as dams, canals, power plants, pumping plants) and, to a lesser extent, mission-dependent/not critical (e.g., buildings) and non-mission-dependent assets (heritage assets). Reclamation's AMP is required by the Department's AMP, tiers off of the Department's AMP, and complies with the intent of E.O. 13327, *Federal Real Property Asset Management*. The AMP sets forth Reclamation's overall asset management framework which will be supplemented by other guidance documents. It reflects Reclamation's mission and sets out four core business objectives for asset management – delivery reliability, cost effectiveness, safety and security of assets, and support of the Western Interconnection.

For the most part, the AMP reflects the practices and processes presently employed by Reclamation in the management of its mission-critical assets. As such, it is consistent with the processes that are necessary to plan and budget asset management work.

Condition Assessment Tools and Processes

Reclamation uses several condition assessment tools in which to evaluate the condition of its mission-critical assets.

Reclamation uses the Facility Reliability Rating (FRR) as an indicator and for trending. The FRR was designed to capture information on dams and associated facilities to indicate a relative reliability condition and to develop trending data over time. It was designed as an alternative to the Facility Condition Index (FCI – a metric that was developed for condition assessments for school buildings), since it not only evaluates maintenance factors, but encompasses operations and maintenance factors as well that contribute to the overall reliability condition of these more complex assets that Reclamation has responsibility for.

For High- and Significant-Hazard Dams, the FRR evaluates:

- Currency of Site Inspections
- Currency of SOPs and their exercise
- Presence of trained dam operators
- Status of security recommendations
- Status of reservoir and operating restrictions
- Status of dam safety recommendations
- Structural performance (instrumentation)
- Status of reservoir operations monitoring
- Status of Category 1 and Category 2 O&M recommendations³

For reserved works associated facilities, the FRR evaluates:

- Currency of Site Inspections
- Currency of operating documents
- Training of operators
- Status of operating restrictions
- Status of operation and security recommendations
- Status of maintenance recommendations

Each High- and Significant-Hazard Dam has an annual FRR completed or updated. Similarly, each reserved works' mission-critical associated facility has an FRR completed or updated annually. Thus, the FRR is a tool that can aid in the evaluation of the reliability condition of these mission-critical facilities and the need for additional resources (i.e., increased maintenance funding), but it is not the only indicator. Reclamation has also developed and utilizes guidelines based on industry standards to conduct inspections of its dams, power plants, and associated facilities.

Based on the scoring of these assets under this FRR system, the assets are categorized as being in good, fair or poor condition.⁴ This categorization is somewhat analogous to GSA's Real Property condition metrics, however, these condition descriptors are more focused on the maintenance condition of simple structures such as buildings.

- **Good condition** Facility/equipment condition meets established maintenance standards, operates efficiently, and has a normal life expectancy. Scheduled maintenance should be sufficient to maintain the current condition.
- **Fair condition** Facility/equipment condition meets minimum standards but requires additional maintenance or repair to prevent further deterioration, increase operating efficiency, and to achieve normal life expectancy.

³ Category 1 O&M recommendations involve corrections of severe deficiencies where immediate and responsive action is required to ensure safety and structural and operational integrity of a facility. Category 2 O&M recommendations cover a wide range of important matters where action is needed to prevent or reduce further damage or preclude possible operational failure of the facility.

⁴ Note that FRRs are high-level assessments of a mission-critical asset's condition, but they are not the sole determinant for maintenance, repair or replacement decisions.

- **Poor condition** Facility/equipment does not meet most maintenance standards and requires frequent repairs to prevent accelerated deterioration and provide a minimal level of operating function. In some cases this includes condemned or failed facilities.

Asset Management Reviews

Reclamation is a capital-intensive organization which stores, delivers and generates water and power products and services to a wide sector of the public. In any capital-intensive industry, effective asset maintenance is both a critical activity and a major source of cost for the organization. In addition, Reclamation is faced with a continual aging of its infrastructure, some of which is over 100 years old. The ultimate goal of asset maintenance is to ensure reliable delivery of products and services at the least life-cycle cost. Reclamation's policy is to allocate human, physical and financial resources for the maintenance of its mission-critical assets to ensure sustained and reliable delivery of water and power to the public, and to serve other authorized project purposes, with emphasis on safety, cost effectiveness and minimal environmental impact. Reclamation employs the following business practices in maintaining its mission-critical assets.

Facility Review Program The standards and procedures for conducting facility reviews of existing high- and significant-hazard dams are found in the Reclamation Manual at FAC 01-07 (<http://www.usbr.gov/recman/fac/fac01-07.pdf>) and FAC 06-01 (<http://www.usbr.gov/recman/fac/fac01-06.pdf>). Reclamation evaluates its portfolio of high- and significant-hazard dams with regard to the identified risks to the structures and the public, and then prioritizes its dam safety mitigation activities to reduce the most significant risks to the public.

Associated Facilities Review of Operation and Maintenance Program Associated facilities are those water-related facilities and structures which are not high- or significant-hazard dams; e.g., canals, dikes, fish screens, etc. For reserved works associated facilities, the periodic examinations conducted under this program yield a breadth of information by which Reclamation can address the facility needs. Within this program, the number and nature of Category 1 and Category 2 O&M recommendations⁵ drive much of the decision making with regard to resource allocation, as addressing those recommendations has a direct impact on risk reduction in achieving core objectives. See <http://www.usbr.gov/recman/fac/fac01-04.html>.

Power Facilities The Power O&M Review Program is the key activity Reclamation engages in to assess the overall condition and management of its power facilities. Category 1 and 2 recommendations result from the periodic O&M reviews that are undertaken on annual, 3-year, and 6-year cycles.⁶

⁵ Category 1 O&M recommendations involve corrections of severe deficiencies where immediate and responsive action is required to ensure safety and structural and operational integrity of a facility. Category 2 O&M recommendations cover a wide range of important matters where action is needed to prevent or reduce further damage or preclude possible operational failure of the facility.

⁶ See <http://intra.usbr.gov/~power/drafts/fac04-01.pdf>

5. Field-Level Prioritization Tools and Methodologies

Equipment and Work Order Prioritization Using Maximo Maximo is Reclamation’s computerized asset and maintenance management system. Presently, it is deployed at 46 power facilities and three water facilities. In general, it is used as a tool for managing maintenance at Reclamation’s larger and more complex facilities. In terms of prioritization of work, Preventive Maintenance (PM), Corrective Maintenance (CM) Predictive Maintenance (PdM) and Emergency tasks/jobs are evaluated for their relative importance to water delivery and power generation. All workorders are assigned a priority and entered into the MAXIMO PM module using the following priority assignment:

Priority Level	Work Activity
EMERGENCY (e.g., forced outage) Priority (4)	None
HIGH (regulatory) Priority (3)	Mandatory Asset /Inspections
MEDIUM Priority (2)	Critical Asset /Inspections
LOW Priority (1)	Routine Asset /Inspections

Many facilities use the prioritization scheme in Maximo to set their work plans for upcoming years.

Equipment and Work Order Prioritization at non-Maximo Facilities – For facilities not presently using Maximo, work order priorities are set using a similar approach, however, the assets are more limited and do not require a sophisticated computerized maintenance management system to set priorities and budgets. Annual work plans, Standard Operating Procedures, the Dam Safety Information System, the Power Resources Information System and card file work order systems are used to schedule, prioritize, and track maintenance.

Risk-Based HydroAMP Reclamation is introducing HydroAMP (Hydro Asset Management Partnership) into its power program which involves a comprehensive monitoring of key components of the power generation train, and comparison against an industry-developed scorecard to aid in maintenance, repair and replacement decision making.

The four organizations (Bonneville Power Administration, Army Corps of Engineers, Hydro-Quebec, and Reclamation) involved in HydroAMP joined together to create a framework to streamline and improve the evaluation of the condition of hydroelectric equipment and facilities in order to support asset management and risk-based resource allocation.

A two-tiered approach for assessing hydropower equipment condition was developed. Tier 1 of the assessment process relies on test and inspection results that are normally obtained during routine O&M activities. Equipment age, O&M history, and other relevant condition indicators are evaluated and combined with the test results to compute a Condition Index. An additional, stand-alone indicator is used to reflect the quality of the information available for scoring the condition indicators. The condition and data

quality indicators and the condition index for each piece of equipment are easily tracked using a Computerized Maintenance Management System or other database tools. The Tier 2 phase of the condition assessment utilizes non-routine tests and inspections to refine the condition index obtained during the Tier 1 assessment. Tier 2 tests often require specialized expertise or instrumentation, depending on the problem or issue being investigated. Typically, a low condition index or data quality indicator score from the Tier 1 assessment triggers the need for a Tier 2 evaluation.

Individual equipment condition assessment results can be combined to develop an aggregated assessment of a complete power train unit as well as an entire generating station. These summary indices are designated Unit Index and Station Index, respectively.⁷

Prioritization Processes for Customer-Funded Work Reclamation has funding arrangements (discussed in the next section) with multiple power, water and power marketing administrations. Work prioritization is determined under funding agreements and in technical/governance meetings between Reclamation and the funding group.

6. Existing Work Plan Processes in Reclamation

There are two general approaches to work plan development in Reclamation. The first is work plans which are primarily associated with supporting requests for appropriated funds through the BRC process. The second is work plans primarily associated with customer or Power Marketing Administration (PMA) funding of O&M or capital improvements.

Work Plans Associated with Appropriation Requests Work plans and associated budgets are generally initiated at the lowest facility level of the organization; e.g., a facility or area office. From there, regions conduct a review of their priorities, budget availability, and “walk down” the budget to propose funding for the top priority items on a regional basis. Those work items which do not fall within the available budget are identified as “over target.”

Work Plans Associated with Customer Funding Work plans and associated budgets are generally initiated at the lowest facility level of the organization; e.g., a facility or area office. From there, regions conduct a review of their priorities, budget availability, and “walk down” the budget to propose funding for the top priority items on a regional basis. Those work plans are then presented to customer groups⁸ who directly fund the accomplishment of work.

In general, the highest priority of O&M work gets accomplished first in Reclamation. The prioritization starts at the local planning level (field or area office), and is changed or refined as the budget is consolidated and scrutinized through the budget review process.

⁷ Hydropower Asset Management Using Condition Assessments and Risk-Based Economic Analyses (draft)

⁸ Power marketing agencies, Western Area Power Administration and Bonneville Power Administration, are consulted also in this process.

The determinants of what constitutes high-priority work vary from region to region. The following is the team's findings on workplan development from internal interviews.

Pacific Northwest (PN) Region In developing work plans and prioritizing their budget request, the Pacific Northwest Region focuses on those activities central to its core mission of delivering water and power and other authorized project benefits for Reclamation projects and districts receiving Reclamation water. Those core activities include: (1) ongoing operation and maintenance as well as replacements, additions, and extraordinary maintenance for project facilities; (2) activities necessary to meet the requirements of current and imminent biological opinions on Reclamation projects that must be met in order to continue project operations; (3) various regulatory requirements such as life safety code improvements and universal accessibility requirements; and (4) basic resource management of project lands that are owned and necessary to operate and manage a Reclamation project.

The PN region plans and develops its O&M budget 2½ years prior to enactment. The region provides formulation guidance and internal program funding targets to the area and program managers. The region's internal targets encompass the entire Water and Related Resources budget for the region and are comprised of ten defined program activities – one of which is the “base” program. The region's base O&M program is defined as “the resources needed to carry out the ordinary and routine day-to-day operation and maintenance of the region's infrastructure.” For routine “base” O&M, the targets are established by analyzing historical trends and assessing future needs, however, they do not fluctuate significantly from year to year.

To ensure funding requests were appropriate, beginning with the formulation of the FY 2008 O&M budget, the region's leadership team sanctioned a “base” program analysis. The base program analysis and formulation effort centered around developing the base program by activity, by identifying and describing in detail the activities budgeted, identifying staff positions associated with base activities, and describing activities as either required or discretionary. The analysis found that the activities budgeted and the associated positions were appropriate and that reducing funding for the base program would not sustain the program. The region has found the in-depth analysis effort worthwhile and intends to continue the analysis and trending of the base program in future fiscal years by refining and gaining consistency in the activities budgeted and potentially identifying areas of savings or where additional program direction may be needed.

The PN region uses a combination of Excel spreadsheets and Access database work plans to develop O&M budgets. Once work plans are developed, the region's leadership team meets to prioritize the region's entire budget and develop a regional walk down table. Though the region's O&M budget is a high priority, it is not exempt from short term walk down reductions. Occasionally, the region's base O&M program is subject to minor reductions on the region's walk down table.

In developing work plans associated with water users, the PN Region follows the guidelines and policies established by Reclamation Manual Policy WTR P05 which requires Reclamation to work with and be accountable to its water and power contractors

during operations and maintenance program formulation and cost reporting. The PN Region's O&M managers formulate O&M budget plans for out years and formally present them to the districts through "early bird" meetings with the water users. Again, the "base" O&M program does not change much from year-to-year; generally just inflationary increases, and the stakeholders rarely have issues with the routine O&M budgets.

For development of work plans and priorities associated with Replacements, Additions, and Extraordinary Maintenance (RAX) items, the PN region has a team composed of the O&M manager from each area office, the Regional Manager for Facility O&M, and the Regional Budget Officer that meets during the formulation year to prioritize the region's entire RAX budget. The group uses internal ranking criteria entitled the "Basis for Prioritization of Replacements, Additions, and Extraordinary Maintenance." It provides the guidelines and the framework for prioritizing the request. The region first considers area office priorities, then applies the criteria to each requested activity while also considering whether the activity could be delayed another year or if it was critical to budget for it in the current budget formulation process. Some examples of the criteria are design status, contract status, facility review recommendations, public safety, and consideration of GPRA goals such as accessibility. Although the criteria may be modified by future regulatory requirements or priorities, it serves as a foundation for prioritizing maintenance activities and assures the most important maintenance activities are addressed.

For major maintenance items that stakeholders are responsible for paying a share, the O&M managers also provide estimates to the districts in accordance with WTR P05. The managers develop budgets for the major maintenance items utilizing internal asset inventories, equipment lists, results of RO&M reviews, working with the districts/stakeholders, etc. Regional O&M managers notify the stakeholders as early as possible of upcoming major maintenance activities.

Partnership with Bonneville Power Administration Direct Funding: Under a 1996 interagency agreement, the Bonneville Power Administration (BPA) provides for direct funding of power operations at all hydroelectric power facilities in the Pacific Northwest Region. This agreement allows for day-to-day power operations and maintenance and includes various performance measures and targets for Reclamation to meet. The region has negotiated with BPA for the third 5-year funding agreement under the interagency agreement for the 2007-2011 period and expects to continue its successful partnership with BPA.

BPA provides over \$60 million annually in O&M expense as well as up to \$1 million for small capital activities. In addition, under a separate MOA, approximately 50 separate subagreements with BPA have been executed which have provided funding for major capital infrastructure improvements at the power facilities totaling nearly \$216 million since 1994. Average annual funding for major maintenance is \$25-30 million.

Capital Funding: Through the Joint Operating Committee (JOC), established by BPA and Reclamation, a Capital Work Group (CWG) was formed to provide direction to the Federal Columbia River Power System Capital Investment Program. The CWG makes

recommendations to the JOC on specific investment actions and to manage the budget of the program on a real-time basis. Some of the responsibilities of the CWG are to identify needs and opportunities for capital investments, provide estimated costs and schedules of potential investments, utilize analytical tools and processes to review needs, and provide oversight, management, and performance measurement for the capital investment program. One example of outyear O&M planning is the “Hopper List” created by the CWG. The “Hopper List” is an internal planning document and reflects a running list of proposed projects over the next 10 years. This list is one source of new proposals for funding and is a work in progress that is updated frequently. As work is identified by Reclamation, it is placed on the list and refined as needs are better identified, analyses performed, preliminary designs developed, and cost estimates computed. The CWG uses an analytical process to rank investments against other proposals in terms of need and value but this is only one factor that goes into the overall decision making process in reaching decisions.

Upper Colorado Region Power revenues are directly available to Reclamation to fund O&M and a substantial amount of environmental work at hydropower generation facilities, including Navajo Dam, under the Colorado River Storage Project Act. Appropriations are used to fund O&M at hydropower generation facilities on the Collbran, Provo River and Rio Grande Projects. The Power Office coordinates with field divisions and other area offices to develop five-year work plans for each site. The Power Office works with the Western Area Power Administration, power users, states and, specifically, the Colorado River Energy Distributors Association (CREDA) to review and discuss work plans. CREDA’s participation is governed by a 1992 agreement among Western, Reclamation and CREDA that provides for preliminary work plans in April and a final work plan in October. Meetings and site visits are scheduled as needed to discuss and resolve issues, thus avoiding the need for formal legal hearings during a rate adjustment process.

With respect to non-power sites and transferred projects, with the exception of Navajo Dam, the O&M is funded by a water user entity. Reclamation-appropriated non-reimbursable funds are utilized for examination of facilities, operational exercises, contract administration, and oversight of the projects. Since it is not possible for entities outside Reclamation to see budget request numbers before the President's budget is submitted to Congress, it is difficult to obtain water user interest in work plans, although some water user entities have expressed interest in seeing budget information from the Provo Area Office. Districts have offered to help get more appropriated money for these non-reimbursable functions.

There are concerns with funding the appropriated RAX program in the UC Region. There have been equipment failures at power facilities due to non-funding of RAX items; e.g., the Collbran Project. The area office had to get more money reallocated to the project to replace the equipment. RAX items are listed as the last priority in the O&M appropriated budget..

On the power side, O&M costs are reflected in the rates to CREDA. With respect to power generation RAX, Reclamation provides CREDA with justifications for each RAX

item, and then meet to discuss the RAX program. CREDA seems satisfied with the process.

From a budget formulation and management standpoint, the regional budget oversight team consists of each Area Manager or representative, all workgroup team leads, the region financial manager and the region budget officer.

The objectives of the oversight team meeting are:

- Review the priority lists of each workgroup.
- Meet with workgroup team leaders, who would make presentations about the issues from their group.
- Create a region-wide walk-down table based on priority lists from the workgroups and the presentations. This would give all offices a chance to participate and corporately decide on what should be on the table and where.
- Present recommendations to UC Leadership Team for final approval.

UC O&M personnel agreed that the best part of O&M planning was that it forced them to consider long term/priorities, FTE needs, and conflicts with funding other programs. It also helps with Regional consistency for all offices to present data in the same format. The UC Region has an O&M Work Group, consisting of representation from all Area Offices, which prioritizes all O&M work for which a budget is requested by Area Managers. Basic O&M is not allowed to be included on the Region's Walk-down (Cut) table. RAX items are allowed to be subject to cuts only if managers indicate that these items can indeed be delayed to the next budget year. This corporate approach allows agreements from all area offices on O&M budget priorities.

As expressed at the interview session, there are many concerns about the O&M program in the region as reflected by the following comments:

- We have become so concerned about "being transparent" that we are spending lots of time and money providing/formulating data - some of which is not getting looked at. General agreement that "processes have become the product" and there is too much emphasis on developing policy and process.
- Certain groups that consider themselves to be stakeholders and special interests want to provide a lot of input to operating/maintenance issues, but have no responsibility for costs or impacts from change.
- Frustration was expressed as to impacts caused from unfunded mandates and changes in priorities throughout the year.
- Last year's budget plus a 3% budget increase was irrelevant in many cases. Facilities are aging and the 3% increase does not keep pace with necessary maintenance to insure future delivery of services.
- Transferred works need to comply with some sort of standard of maintenance which doesn't exist at the moment.

- Budget limitations limit the ability to hire more people. For example, WACO is in a reactive mode with respect to assistance for operations on transferred works.
- Funding constraints affect what can be done to help operators of transferred works. For example, Reclamation pays 50% of the O&M by Grand Valley I.D. As O&M costs go up, Reclamation is stressed to pay its part. The area offices are recommending additional funding for O&M/RAX items and that water users put some money away for future rehab work.

Lower Colorado Region The Hoover implementing agreements should be considered a best practice within Reclamation. The implementing agreement clearly defines the roles, responsibilities, and time frames in developing an annual and 10-year plan for both operation and maintenance (O&M) and replacements and extraordinary maintenance (RAX).

The Technical Review Committee meets two days each September to review a preliminary 10-year plan. During that meeting, each major item is discussed for the budget year that is being developed. Comments are solicited and the plan revised based on the comments. In January or February, at the Engineering and Operating Committee meeting (the EOC meets three times per year), the plan is approved. There are monthly reports on planned-to-actual accomplishments and dollars. In addition, there is an annual executive level meeting. The facility has also used benchmarking with other generation companies to assure that O&M costs are competitive. In addition, since Hoover power rates are set annually, a rate analysis is included.

Hoover Dam personnel believe that their work plan process has assured that all customers have involvement to the extent they wish and has resulted in additional funding from beneficiaries. The work plan review processes have resulted in additional workload for the Facility Manager and the Budget Analyst.

Another internal best practice for Hoover was the development of a visualization of the work plan and funding. This has become the way the plan is communicated with customers. Customers are also given work plan books that contain a great deal of detail.

The goal of the work plan review is to seek consensus. The challenge to budgeting for major repairs has been to develop processes and tools to identify major repair needs and determine if they are justified. The end goal of the process is to have transparency, stakeholder involvement and that all understand the who, what and why of decisions. Stakeholder input early in the decision process is key to understanding the impacts of those decisions. Hoover considers the cost, the long-term impacts, and the consequences of failure as it makes these decisions. A serious effort is made to balance the costs so there are not wild swings in the rate from one year to the next.

Mid-Pacific Region With respect to hydropower generation, the area offices use MAXIMO to estimate budget and resource requirements (time, staff, etc.). Power customer funding has provided less cyclical funding, but requires more detail to justify needs to power customers. With customer funding on the power side, they are not budget short - customers get to review work plans and get involvement in decisions and review

of facilities. Regional directors have cost per MWH in performance plans. There is pressure from the power users to keep down costs. However, power users will support and pay for more power staff.⁹

With regard to water facility work planning, the maintenance staff look at the previous year and determine what is different and plan accordingly. Unfortunately, they are often short of time and staff to perform more detailed planning. They believe they should be estimating budget based on actual needs/priorities. Instead, they add 3% to previous year's budget and do what can get done. The 3% indexing is seen as inadequate since facilities are aging and increasing needs are exponential while budget increases are linear.

Districts are operating transferred works but major rehabilitation is funded under RAX. A district submits a RAX priority list for the upcoming year and as the year progresses, meets with Reclamation quarterly to review progress and adjust the RAX budget (Fund Utilization Reports). However, because of budget limitations, getting RAX items budgeted is difficult, especially for big-ticket items.

Water users feel they can run the facilities better, cheaper, and accomplish the work faster. Reclamation feels that water users perform "failure maintenance" rather than preventive maintenance. Ninety percent of failures are funded from RAX. Therefore, customers have a "safety net" when they don't perform adequate maintenance because they know Reclamation will step up with RAX money or will resume Reclamation maintenance of the facilities to insure delivery of services and public safety.

Water users have opposite philosophy from the power users; i.e., less Reclamation staff means less costs. Customers may not recognize or acknowledge that part of the cost responsibility of Reclamation is environmental commitment, NEPA, and cultural resources, and this is not considered by Reclamation customers when they compare costs of Reclamation performing work with costs of contractors. Reality is someone still has to complete Safety of Dams, NEPA, cultural resources, etc. components of work and customers are not always comparing apples to apples.

With respect to metrics and performance tracking, the region uses Facility Review Programs - CFR, PFR, DSIS, PRIS, BAP (Budget Activity Plan), metric benchmarking with external power producers, priority table, power statistics (forced outage rate), FCAS (Facility Condition Assessment - GPRA), HydroAMP (helps evaluate "low hanging fruit", and time-based maintenance. Budget estimates are made for 3 years out.

There is frustration with the budget process. Too much detail draws attack on budget items, and too little causes confusion. The BRC process is too scripted - creates problems (e.g. Klamath) where there is no history to work from. There are inefficiencies

⁹ It should be noted that during the interview with the technical committee for funding the CVP power program, the customers expressed strong support for maintenance of Reclamation's technical power expertise in-house, and took a very dim view of outsourcing that expertise in favor of a "contract oversight" model. The customers also allowed that they had stretched the regional O&M personnel in executing the power O&M and RAX program, and were grateful and satisfied with the response they received from those people.

in planning and budgeting due to problems related to our contracting processes. Multi-year projects sometimes get messed up due to carryover RAX priorities. Managers wish the backlog in O&M budget would be more synced to the budget. For example, Folsom has 1,700 items backlogged but not reflected in the budget because they believe they will never get funds for them.

The Mid-Pacific Region annual assesses its accomplishments through the annual power, SOD and security reports. The power program does monthly financial accountability report and a triannual report on power program accomplishment.

Regarding customer involvement in O&M planning and budget, there is a formal governance board for power O&M funding which meets twice a year. The technical committee for the power funding program meets every two months.¹⁰ Contractually, power users have to meet funding level request. The Klamath Project has a loose customer association with low interest level. The area office receive input on ad-hoc basis. The Central Valley Project Water Association (CVPWA) submits questions through a financial committee. However, as welcome as customer review of the water O&M program may be, there is also a feeling that too much detail encourages the customers to micromanage and ask more and more questions that are often superfluous.

Great Plains Region The Great Plains Region has responsibility for O&M of both power and non-power facilities. There are slightly different processes of work planning and budget preparation that occur for Power and Non-Power Facilities.

O&M of hydropower facilities is planned and budgeted with the help of tools including: MAXIMO, MS Project and HydroAMP to maintain and track data that is developed from both routine O&M and annual maintenance program reviews. DSIS (Dam Safety Information System) and PRIS (Power Resource Information System) software are also used to track and schedule maintenance. A number of industry standards are used to gauge the relative importance and urgency of maintenance, repair or replacement items. Costs of Power O&M are generally 100% reimbursable by power customers. The three primary power customer groups in GP are Loveland Area Customer Association (LACA), Mid-west Electric Consumers Association, and Western States Power Corporation (WSPC). All power generated by Reclamation projects is marketed by the Western Area Power Administration (Western).

The O&M Replacement Book (power), which is used by Reclamation, the Corps of Engineers, Tennessee Valley Authority, and many private power companies, provides guidance on lifecycle costs and expected failure intervals for equipment. In addition, electrical and mechanical testing programs conducted as part of Reclamation's O&M program provide input to trend analysis and imminent failure by detecting vibration levels, wear tolerances, and other mechanical conditions. Data from the O&M

¹⁰ The technical committee is comprised of representatives from Western Area Power Administration, the City of Roseville, the City of Palo Alto, Silicon Vally Power, the Sacramento Municipal Utility District, irrigation power users, the Bay Area Rapid Transit District, the City of Redding, the Lassen Municipal Utility District, the Northern California Power Agency, the Central Valley Project Water Association, and the Bureau of Reclamation. See later section of this report documenting feedback from the power funding technical committee.

Replacement Book is also used to project replacement costs. Figuring lifecycle costs and predicting timing of replacements is complicated by the fact that industry standards indicate that a lot of Reclamation equipment has outlasted its expected life. For instance, transformers normally have a useful life of 35-40 years and many of ours are 50-80 years old.

Work plans for power facilities are developed to reflect ongoing O&M work as well as non-routine work or Replacements, Additions and Extraordinary Maintenance (RAX) for the current budget year and the five years following the current year. Extraordinary items over \$25,000 are normally requested from the RAX budget at the Regional level. We try to maintain the RAX costs relatively level from year to year so that the power customers don't experience large fluctuations.

Customer input to the power facility budget and work-plan process occurs through several channels. Reclamation holds an annual meeting with power customers to go through budgets, show actual costs and talk about differences in costs. Power managers in the Region meet with power customers to review the O&M program per the MOU with the customers. So far in FY06, there have been six meetings with the power customers. Western States Power typically coordinates overall customer input to Reclamation.

The three GP power customer groups also coordinate their reviews of Reclamation budget and planning data internally. They sometimes hire consulting firms to analyze such items as justifications for RAX items that Reclamation is requesting up-front funding for. Their questions typically deal with actual data, trends, out-year planning, alternatives to proposed plans, and Federal funding. The power customers currently choose which proposed RAX activities they will fund up-front, up to \$3.5 million each fiscal year.

Non-power O&M planning is similarly determined by ongoing O&M requirements from the facility Standing Operating Procedures (SOPs) and from observations made during facility reviews (Annual Facility Review – AFR, Periodic Facility Review – PFR, and Comprehensive Facility Review – CFR) with AFRs conducted annually and PFRs and CFRs conducted every three years on an alternating schedule. District personnel and managing partners participate in these reviews which include a thorough evaluation of the storage facilities (embankment and concrete dams) and associated structures as well as the mechanical equipment associated with the dams. Associated facility reviews are also conducted to evaluate the condition of the irrigation distribution systems and associated facilities.

Reclamation staff and district personnel meet in the field regularly to review facilities and coordinate specific projects or repairs. These meetings provide excellent opportunities for input and exchange of ideas and concerns which are used to formulate work and set budget priorities. Experience and familiarity with our facility's history play a large part in determining maintenance priorities and potential for failure or loss of service of particular assets. Software tools including: DSIS, MS Project, and MS Access databases are used to track and plan O&M of non-power facilities. Costs of non-power O&M are typically reimbursable.

Work plans for non-power facilities are developed for the current year plus 3 out-years. Formulation starts at the Field Office and Area Office level with input and collaboration from our customers and managing partners. A40 budget plans cover routine operations with some maintenance included. A50 budget plans cover extraordinary maintenance and vary according to needs and priorities that receive input at both the Area Office level and through corporate decision making and priority process of the Facilities Operation Maintenance and Rehabilitation (FOMR) Team at the Regional level.

Strengths of Current Budget and Work Plan Process

- Corporate strategy for RAX allows us to move projects from one fiscal year to another in the out-years to make best use of available funds and capability to perform the work in a given year.
- Customer input up-front helps plan both short- and long-term work and encourages good coordination between Reclamation and our customers. This also gives everyone a stake in the process and develops better relationships so that when problems arise, they are easier to solve together.
- Work plans provide sufficient detail to allow us to track progress and make adjustments prior to the end of the fiscal year. We can provide information to districts to allow them to adjust their program in coordination with us.
- Given all of the unknowns involved in the work plans and budget process, Reclamation does a remarkable job of expending the available funding that we receive on valuable work that is consistent with our project priorities and stated agency mission. This is a testimony to the dedication of Reclamation staff to stay flexible and serve the public.
- Water users are comfortable with existing processes and, with the exception of wanting to see more detail in budget and work plans, they trust Reclamation and see value in our services.

Weaknesses of Current Budget and Work Plan Process

- Water customers are often limited in their ability to pay and consequently irrigation is heavily subsidized. At the same time, they want more input and control of projects which requires time, coordination, and cost on Reclamation's part. This impacts Reclamation's ability to perform work because we are creating an expectation of more customer involvement but Reclamation's budget is not increasing to cover the additional workload created by this expectation.
- Increasing burden of new reporting requirements and unfunded mandates such as accessibility program, asset inventory, and others take staff and budget resources away from planned work.
- Deferred maintenance list is a paper exercise that does not consider why priorities may change – an example of process driving wrong product or priority.
- The current budget process is artificial. We back into budget by adding 3% to the previous year's budget to cover inflation. Aging infrastructure and skyrocketing costs of materials, labor, fuel, etc. required to perform operations and maintenance in the field are not covered by 3% per year. We are facing increasing costs on facilities, many of which are now exceeding their design life, and are trying to cover this work with what amounts to a decreasing budget.
(Reclamation should seek legislation to allow other sources of funding to

come back to Reclamation for multi-use projects, ie: recreation component which now exceeds irrigation value of many projects is currently not paying for any of the benefits enjoyed on Reclamation projects.)

- We sometimes focus more on process than product in order to meet self-imposed policies or deadlines. Reclamation's business is complex, and extremely dynamic – dependent even on the whims of weather, drought, flood, etc. As we seek to remain relevant for the future, we must become more rather than less flexible and maintain our ability and willingness to apply strong technical expertise, improved communication and collaborations skills, and professional judgment to solve problems.

The GP Region uses the BRC process to manage O&M budget planning. Our general strategy is to keep the O&M budget as large as possible relative to Resources and Rural water system write-in funding. O&M is the core mission. To execute this strategy, GP will stay out front on resource issues, particularly ESA issues.

Because Reclamation's authorizations are a patchwork of unique legislation, ex: Pick-Sloan, CBT, etc., there is inherent inconsistency in the requirements of individual contracts under the various laws authorizing the projects. As a result, individual costs from project to project can vary dramatically and it makes it challenging to manage budget consistently across Reclamation.

In order to track the development of the budgets and the subsequent accomplishment of the work projected, we use a variety of tools including: Excel spreadsheets, MAXIMO, HydroAMP, and standard work plans.

In the past, Reclamation has done a poor job of tracking and assessing budget and work plan performance. To help resolve this issue, GP is putting more robust performance indicators in place for the area managers. They will focus on three key metrics for all responsible activities/programs: on time, on budget, and within scope delivery on commitments (specific, measurable, concrete goals). One of Reclamation's weaknesses is that we typically fund organizations instead of funding work. Example: Power O&M RAX funding – GP has large power plants we should be investing in. Instead, we spread funding across organizations, often funding small, low-capacity plants that operate for only a few months per year.

Transferred works vs. Reserved works: Reclamation reviews/approves budgets for transferred work entities. A dilemma we often encounter is that we request transferred work entities to do certain work, then when they are prepared and have budget, we come back to them and say we cannot fund our portion. We end up spreading/phasing work over a number of years. Solution is good communication with entities and long lead times in the planning process. Another issue is that currently, RAX funding is power-focused in the GP region; non-power work is falling off the funding schedule due to lower priority.

We need to do a better job at being consistent in our message. We need to also be consistent with coordinated messages and practices from other federal agencies. Where are we headed as an agency and collectively as Feds on water-related issues? How do

pending changes affect them? Reclamation does not have a good track record of clear or consistent communications. Summary message: Reclamation operations are unique and, at times, very complex and fluid. Managers, particularly managers who engage customers, must make the effort and take the time to become well versed in the operational and financial elements of customer projects or programs.

7. Input from stakeholders who either finance O&M /capital work or pay for it

Western Area Power Administration Reclamation and the Western Area Power Administration (Western) have developed detailed work plan review processes for all five Reclamation Regions. Generally, these review processes involved developing a work plan for the rate-setting system (sometimes a single project, sometimes multiple projects) and presenting these work plans to the customer groups for their review and comment. Adjustments to the plans are made in response to the comments and the work plans are then finalized. The processes, for the most part, work fairly well. During the review, an estimate of rate impacts is also provided to the customers. In several cases, five- or ten-year projections are provided.

All of the work plan review processes involve a joint working group among Reclamation, Western and the power customers. These groups typically meet quarterly to discuss work plans and accomplishments.

The main concern raised was that Reclamation information should be presented earlier in the budget process in order for the customers to feel they have meaningful input into the work plan prior to final budgets being prepared. There is also a need, in some instances, to provide feedback to the customers regarding how and why Reclamation has made the decision it has on the budget. It is also very important to communicate when work is re-prioritized or when there are cost increases during the year, along with the resulting impact(s) to the agreed-upon work plan. It is clear that excellent communication between Reclamation and Western is key to successful relationship-building with the customers.

Customers continue to be very concerned with the repayment of security costs over which they have no control. The situation is made worse in that Reclamation is not able to be transparent about what these improvements are and how the money is being spent. Recently, in response to this concern, Reclamation has apparently offered security clearances to preference customers in order to have them better understand. For the most part, Western is comfortable with the information they are receiving from Reclamation, as well as Reclamation's accountability and the ability to adequately explain variances.

While customers have sometimes requested very granular data, such as individual staffing, timesheets, and dollars, the existing processes do not provide this level of detail. This should be communicated to the M4E team that is working on the issue of transparency.

Central Valley Project Preference Power Customers In June 1998, CVP preference power customers executed an agreement with Reclamation and the Western Area Power Administration (Western) to finance O&M and capital work on CVP power facilities.

The customers were concerned about cost and reliability of the power system serving them. In the late 1990s, the PG&E integration contract expired, and PG&E would no longer take the swings in power demand that would occur if Reclamation facilities had an unscheduled outage. Reclamation's backlog of maintenance was \$80-90 million in the late 1990s. The biggest concern at that time was the lack of Reclamation funding to address this backlog.

Central Valley Project power customers wish to make sure that they have reliable power generating facilities. Therefore, they work with Reclamation and Western to identify activities they want to get funded and ensure the funding is available. The funding is made available after a group assessment by the customers. Most of the first-priority maintenance and RAX items have been addressed, and a technical committee¹¹ is now focusing on prioritization of secondary items. There appears to be an excellent working relationship between and among the customers and federal entities. The committee helps develop the customer O&M funding plan, four years out.

Budget review and work planning is accomplished through the joint technical committee. The committee discusses different options available, and determines the benefit/cost of funding a particular piece of work; i.e., costs from Reclamation and benefits determined by the customers. Early work items had relatively higher benefits than costs; i.e., the "low-hanging fruit" was funded first.

The technical committee is quite satisfied with the quality and quantity of information provided by Reclamation, including follow-up actions on requests for additional information. Actual execution of the budget decisions is provided by Reclamation three times per year.

In the funding profile, there are working funds, governance funds and rapid return to service funds. Working funds are for normal O&M. Governance funds are for RAX and upgrades. Reclamation and Western identify funding needs through work plan development, however, customers also come up with own ideas for funding. The Federal agencies have to stay within the working fund total, unless the customers agree otherwise. Rapid return to service funds overtime work to get a unit back in service. An Excel spreadsheet has been set up by the technical committee to evaluate benefit/cost of such rapid return. Generally, the parties have a conference call, but Reclamation or Western have independent decision making in a situation where quick action is required. Customers recognize that priorities can change over time, so that they provide for flexibility. For example, the operating configuration has changed. The technical committee helps redirect funding.

Bonneville Power Administration Bonneville Power Administration (BPA) funds both direct O&M and capital improvement activities. BPA has a responsibility for the performance and reliability of the Federal Columbia River Power System. BPA also needs to be able to plan and develop rates and provide transparency to their customers. The work plans that Reclamation prepares assists in those processes.

¹¹ See Footnote 9 for a list of technical committee members.

Communication of work plans and associated budget proposals occur through Joint Operating Committee forums, subcommittee connections, budget updates, email, phone calls and face-to-face meetings. BPA feels that Reclamation listens to them. However, BPA occasionally has issues in that sometimes even though Reclamation listens, they do not always feel Reclamation makes changes based on what was said. BPA feels like sometimes they have to “impose” on Reclamation before it agrees to change. BPA likes the forums that have been created since they help with feedback and gives Reclamation an understanding of why BPA asks for things. They characterized the relationship as “positive tension.”

Regarding the quality and quantity of information provided by Reclamation for direct funding of O&M, BPA believes the quality and quantity are good. BPA observed that improvement could be made on end-of-year forecasts and change projections could be more realistic.

On the capital improvement program, BPA again believe the quantity of information is good. Reclamation and BPA have a fully developed Capital Work Group process. Items are identified early on through the “hopper list”; i.e., identification of all proposed capital work items. A Decision Support document is used to prioritize results. There is full disclosure in open forums. This results in sub-agreements that include specific tasks, dollars, and schedule. BPA is provided with preliminary financial numbers at the beginning of the month and more solid numbers are provided later in the month. During the participation in the Capital Work Group Meetings, Reclamation always provides actual figures. BPA is kept updated through the Joint Operating Committee, the Capital Work Group, and regular exchange of electronic information. This results in full disclosure of Reclamation’s plans.

However, BPA indicated there are sometimes issues with the quality in terms of timing. In order to be more comprehensive and relevant, BPA needs more comprehensive non-financial technical quarterly reports. Right now, the quarterly reports are too brief and in not enough detail. BPA also indicated the reports could be more timely. BPA also wants detail on future projections. Sometimes, BPA feels that Reclamation comes in with an activity that is estimated on the low side resulting in cost increases. To address these concerns, Reclamation is implementing a Phase I and Phase II process whereby estimates will be more accurate. This will help alleviate asking for more money and project creep.

BPA appreciated when Reclamation joined the Capital Work Group to aid in decision-making from a more system-wide perspective. BPA stressed that this is a partnership - - determining resource requirements, articulating to customers, and working on an asset management model. Reclamation/BPA has a 20 year planning process and is now working on an asset management model that will look 50 years out. BPA indicated that Reclamation managers are very receptive to planning that far ahead and using an asset planning modeling. They perceive that Reclamation is always very responsive in answering questions.

On the capital side, BPA thought that Reclamation could improve by including BPA’s project representative as an observer. They used the example that the Corps and projects representatives from BPA have quarterly meetings. On the direct funding side, BPA felt

that through the direct funding agreement, there are specific requirements that make the process easy. They did mention there should be improvement through institution of asset plans.

Overall, BPA indicated that the relationship they have with Reclamation is positive which is brought about by good communication. They mentioned that by Reclamation interviewing them for the Managing for Excellence team shows how Reclamation values their input.

Great Plains Power and Water Customers Feedback from Mid-West Electric: They are concerned about impacts of the Pick-Sloan legislation on operations. Power customers pay the difference, or net, after water users' O&M costs are paid. They are also concerned about paying for non-core activities such as ESA mitigation. To summarize, they want to know what their role and influence will be under *Managing for Excellence* and any related changes in the way Reclamation does business. GP perspective: power customers are getting power at a reduced rate, there is more power available than was projected, and they still pay for the additional power at reduced rates because all planned irrigation under Pick-Sloan was not developed.

8. O&M Planning Tools and Processes Used by Others

Central Arizona Water Conservancy District Central Arizona Water Conservation District (CAWCD) operates and maintains the Central Arizona Project, which includes a broad array of facilities including a dam with a pump-generating plant, 14 pumping plants and 336 miles of aqueduct and associated facilities including tunnels, siphons, wildlife crossings, overchutes and culverts, and protective dikes.

Recently, CAWCD has, as part of a Maintenance Excellence (ME) program, reorganized the maintenance structure in the organization to focus on its preventative maintenance procedures. It moved from a vertical hierarchical organizational structure to the creation of Asset Management Teams that consist of planners, maintenance engineers, and maintenance supervisors that it believes will allow it to be more efficient in its performance of the maintenance. It has developed this structure to best support its business processes and establish clear functional roles and responsibilities. The idea is to empower the asset management teams to make decisions, take ownership, and achieve efficiency.

CAWCD utilizes Datastream 7i and Oracle systems for financial and maintenance management. It has moved away from using calendar-driven maintenance to the ranking of assets and asset assessments to ensure availability of equipment for performance when called on. It has taken a hard look at "for profit" industry "best practices" and has developed performance metrics to measure itself against those, where possible. Backlog management is an important measure of the organization's outstanding work expressed in terms of its weekly capacity to perform the tasks. The best practice metrics it has adopted are as follows:

- 100% of each maintenance worker's time is covered by a work order.

- 90% of all work orders are generated by PM inspections.
- 30% of all man-hours are in PMs
- 90% of planned and scheduled work completed in compliance
- 85% of available man-hours assigned to planned and scheduled work each week

Maintenance budgeting is developed at the lowest level and rolled up through the Senior Management Team for review. It has now moved to a two-year budget process rather than a single year at a time. There is no stakeholder involvement in the development of the budget; the maintenance group considers the operations group and the elected Board of Directors as their stakeholders. The CAWCD does hold customer workshops once a year when establishing the operations plan and rate setting. This meeting is for information sharing on the water availability and maintenance activities that might have an impact on water deliveries and to share the makeup of the budget that is driving the OM&R rates for the next year.

Metropolitan Water District of California (MWD) MWD is one of the largest water suppliers in the United States. The group we visited is responsible for planning the maintenance for the entire organization, although planners are located in the field in some instances. Maintenance planning is done on a centralized basis. MWD operates a large aqueduct, many pumps, valves, gates and electrical instrumentation, as well as powerplants. It operates and maintains over 2,100 miles of pipe, 78 inches in diameter. Its ideal ratio of preventive to corrective maintenance is 75/25, which is similar to Reclamation's internal guidance. It presently has about 1/3 splits among preventive, corrective and special projects. Its maintenance philosophy is similar to Reclamation's and focuses on preventive maintenance, with an eye to increasing or decreasing time intervals based on condition.

It uses MAXIMO to plan and schedule its O&M. One of its big pushes has been to get its inventory and parts into the system, which impacts the amount of "wrench" time by decreasing the crew wait time. It attempts to enter everything into MAXIMO, including the mandatory training and travel time to the job site. What it has discovered is that its employees have about 54% "wrench" time, and 46% non-working time due to training, travel time, and leave.

MWD personnel also stressed the importance of getting paper records of maintenance personnel into the system since this represents the institutional knowledge for many functions. It is using a standardized equipment hierarchy and failure causes and remedies. Quick-pick lists have enforced its business practices. Its business processes permit only a team leader or manager to create a work order. It is also important to have usable, useful reports. It develops an annualized schedule for all preventive maintenance required and plan the work. Progress is tracked on the maintenance. It reports on what didn't get done, as well as what did get done.

When a unit of its infrastructure is out of service, the entire sub-unit is replaced. This eliminates a great number of outages for minor repairs. Cross-team work is difficult to schedule and operators must be included. Since outages are now relatively rare, when a scheduled outage occurs, it brings most of its O&M folks in to hit the unit for OM&R in

order to minimize the outage time. This approach appears to be working well for it and may be a Best Practice for consideration.

Its two drivers are reliability of supply and compliance with water quality standards. Its OM&R budget is split 50-50 between O&M and Replacements. Major construction is not managed in MAXIMO. Its prioritization of both activities is based first on the criticality of the facility, the potential for decrease in capacity, safety/environmental requirements and impact on water quality.

Imperial Irrigation District Imperial Irrigation District (IID) IID is presently operating and maintaining a broad array of facilities including a dam, desilting basin, a major canal and head works, large laterals, a number of regulating reservoirs, over a dozen pumps and an extensive drainage system. It is presently developing a maintenance manual which documents routine maintenance and provided a copy to the team. The manual is focused on type of task, such as disking, concrete lining repair for each type of facility maintained, etc.. In its present form, it is a large spreadsheet which includes the defect to be addressed, the frequency, the maintenance standard, the needed equipment, procedures and safety training, required permitting and any required licensing and certification of employees for the work.

It has an SAP enterprise financial and maintenance management system in place, but it appears to be used largely on the financial side of the house. The maintenance staff is using MS Project. Budgeting starts at the Division Level, which is organized around types of facilities. Budgets are based on what was spent the prior year. O&M is scheduled around the cut-out times for the canals. About 90% of its O&M work is handled in-house and about 10%, including pest & vegetation control, is contracted out. There is no stakeholder involvement in the development of the budget, other than the Board of Directors, who are elected from the District.

IID personnel stated that it is working on a process to assure long-term asset viability and trying to move into a preventive maintenance mode to prevent failures. It presently has 189 people in the O&M group, 21 in its engineering group and 205 in the Operations group. There are also 49 heavy equipment operators.

In order to lower replacement costs, it has worked with concrete pipe manufacturers to develop a standard design for all concrete structures with drop ship delivery to the job site. The cost savings are substantial. This is a Best Practice that may bear consideration.

Hydro-Quebec Reclamation has had a power O&M partnership with Hydro-Quebec for the past six years. During this time, Hydro-Quebec has shared the processes and decision-making matrices it uses with Reclamation.

Hydro-Quebec's approach is founded in plant diagnostics and condition assessment. These detailed technical engineering assessments form the basis of all that is done during its budgeting for the upcoming year. These assessments are conducted from a centralized office.

The next factor considered is how the particular plant is used-- i.e., for selling into the northeast US market, baseload service to Quebec customers, ancillary services such as frequency control or VAR support, etc. The first level of prioritization is the performance of the units and their reliability. Another key consideration at this first level is the risk of loss of these services in terms of revenue, which includes the time to return to service. The next level of consideration is whether or not the work can actually be accomplished during the year. This assure that projects that are ready to go and are high priority receive higher consideration. The final item is whether the project corrects a legal or regulatory deficiency.

Prioritization is done on a corporate-wide basis annually. While there is an attempt to balance dollars across regions, just as there is in Reclamation, there is a corporate effort to assure that high-priority items are ranked consistently at the top of the list. Prioritization is done by type of equipment/facility across the corporation.

The ability to re-program work has been re-centralized. Regional managers now have the authority to re-program work up to \$500,000. Construction and rehabilitation work is being done internally. The basis for all rehabilitation is the plant diagnostic, followed by risk of loss. A common process is used for both water and power, although water plays a very small role at Hydro-Quebec. There is also some acknowledgement that there are projects and rehabs which have high social value, but low economic value. A portion of the budget is spent on these types of projects each year.

Hydro-Quebec has a Plant Manager's "Dashboard" which is displayed in each plant and is based on data from its MAXIMO system. The dashboard includes O&M costs, accomplishments, safety record, etc. and is visible to all employees and managers. Hydro-Quebec is now looking at plant outages with impacts as a way to assess the effectiveness of its OM&R program. These two items may be Best Practices which we may wish to consider. Another trend is tracking where the money for rehabs (type of equipment) and O&M is spent over the years, so it can refine it planning.

9. Reclamation Budget Review Committee (BRC) Process

The Budget Review Committee (BRC) is an ad hoc committee formed each year to develop Reclamation's Budget Year Plus Two (BY+2) program and budget. The BRC is normally chaired by one of Reclamation's five Regional Directors or other senior Bureau executive, and otherwise consists of representatives from each Region, the Denver Office and the Washington Office. The BRC coordinates Reclamation budget activities through the formulation phase. BRC notebooks and related budget documents provide line-item descriptions of O&M activities to be accomplished for specific projects and programs within Reclamation. Furthermore, a corporate O&M Team, which serves as the OM&R Workgroup for the BRC, provides an independent overview of O&M activity program formulation. The BRC itself also provides for a similar overview of the program activities on an annual basis.

Upon completion of budget formulation activities, the Regions or Offices consolidate program and budget information for all appropriations budgets into a single document. This document is the BRC Notebook (BRC regional notebooks also outline O&M

funding provided by non-Federal entities for multi-purpose facilities). The regions' BRC Notebooks are then submitted to the BRC for review.

The BRC, with input from the BRC Workgroups (Operations and Maintenance Workgroup and Resource Management Workgroup), reviews initial data in the regions' BRC Notebooks and develops questions for each Region about individual programs. The BRC reviews annual zero-based budgets to establish overall priorities. Budgets for Hoover, Parker, Davis, Grand Coulee, and Glen Canyon Dams are off-budget operations and all funding requirements are paid by power customers therefore these budgets are not prioritized by the BRC. Once questions from the BRC have been answered by the respective regions, the BRC conducts on-site visits to each Regional Office to evaluate their respective program and budget requests.

At the conclusion of the on-site visits, the BRC develops final budget recommendations for presentation to the Reclamation Leadership Team (RLT). Prior to that, however, the Deputy Regional Directors and other managers participate in a walk-down process for the entire budget. While the ordering of the walk-down table appears reasonably logical based on information available to the BRC, it is not supported by a set of quantifiable data aggregated into one source.

The RLT consists of the Commissioner, Deputy Commissioners, all Regional Directors, and all other Reclamation senior executives. The Leadership Team deliberates on BRC recommendations and then prepares final recommendations for decisions by the Commissioner. In summary, Reclamation devotes an extensive amount of time and people to the BRC process each year, and the result is a detailed, comprehensive compilation of information that is assessed by the Senior Executives so that they can make appropriation funding recommendations to the Commissioner and Departmental officials.

10. GPRA/PART and Draft Performance Measures

Presently, Reclamation has a limited number of O&M-related performance metrics that have been negotiated with the Office of Management and Budget as a result of OMB's Program Assessment and Review Technique (PART) program. These performance measures are:

- Acre-feet of water (measured in million acre-feet) delivered consistent with applicable substantive and procedural requirements of Federal and State water law.
- Increase the amount of time Reclamation hydroelectric generating units are available to the interconnected Western electrical system during daily peak summer demand periods. Long-term goal is to increase from the present baseline average of 92 percent to 94 percent over the next 10 years.
- Maintain a forced outage rate on hydropower units that is lower than the industry average for similar units. In FY 2003, attain a 3 percent or lower rate for Reclamation hydropower units.

- Percentage of water infrastructure in fair to good condition as measured by the Facilities Reliability Rating.
- Amount of restricted reservoir capacity.
- Improve the overall condition and long-term reliability of Reclamation power plants by reducing the total amount of generating capacity that has a major generator/turbine related component rated in poor condition from the present 46 percent to 40 percent over the next ten years.
- Perform a comprehensive, periodic, or annual review at each required (power) facility in Reclamation yearly.
- Perform annual condition assessments at all power facilities.
- Percent increase in Reclamation's cost to operate and maintain its water storage infrastructure compared to (over) the five-year rolling average.
- Reclamation base Operation and Maintenance (O&M) costs for power, expressed as \$/MW, will not increase annually beyond the 5-year rolling average increase in cost, + or -5%.

In addition, Reclamation is required to report on performance metrics associated with the Government Performance and Results Act (GPRA). Those metrics which are not already reflected in PART metrics are:

- Percent of decision documents related to dam safety issues at high and significant hazard dams completed within 60 days of source document completion.
- Shorten the average time to correct/mitigate higher priority O&M deficiencies of reserved works facilities.

However, most of these metrics are not conducive to the type of budget decision making at the regional or BRC level. Those decisions require metrics that better reflect the performance and condition of the asset work to be funded. In addition, the Facilities Condition Index (FCI), one of the performance metrics in the FRPP, is looked upon by the Department of the Interior (DOI) and other DOI agencies as an appropriate metric for budget prioritization, but has little relevance for the high-value, mission-critical assets Reclamation operates and owns. The FCI was designed to gage the condition of buildings and whether they should be repaired or disposed of. Therefore, Reclamation requires a better set of metrics to quantitatively tie its budget decisions to the condition and performance of its assets, and to supplement or populate the FRPP.

The team notes that the Maintenance Services Office in the Office of Program and Policy Services is developing a "Service Risk Management Assessment Worksheet" which is intended to gather quantifiable data on assets and "score" those assets in terms of their priority for funding. This would primarily apply to A40 and A50 budget categories, and focus on non-power, non-safety of dams work.

