RECLAMATION

Managing Water in the West

Coordination and Oversight Group (COG) Annual Report for Fiscal Year 2011

U.S. Department of the Interior
Bureau of Reclamation

April 2012

Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Coordination and Oversight Group (COG) Annual Report for Fiscal Year 2011

U.S. Department of the Interior
Bureau of Reclamation
Coordination and Oversight Group

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Acronyms and Abbreviations

CIO	Chief Information Officer
COG	Coordination and Oversight Group
D&S	Directives and Standards
DCO	Deputy Commissioner of Operations
DC-PAB	Deputy Commissioner, Policy, Administration, and Budget
ESAM	Electronic Service Agreement Module
FCCO	Four Corners Construction Office
FFA	Family Farm Alliance
FTE	Full-Time Equivalent
FY	Fiscal Year
GP	Great Plains
GP Region	Great Plains Region Engineering Design, Geology and Exploration Services, and Construction Services
LC	Lower Colorado
LC ESO	Lower Colorado Region Engineering Services Office
MP	Mid-Pacific
MPCO	Mid-Pacific Construction Office
MP Region	Mid-Pacific Region Division of Design and Construction, Division of Planning, and Division of Environmental Affairs – Environmental Monitoring Branch
NewMIS	New Management Information System
NWRA	National Water Resource Association
PN	Pacific Northwest
PN-RTS	Pacific Northwest Region - Resource and Technical Services
PAO	Provo Area Office
PMIT	Project Management Implementation Team
RDCCT	Reclamation Design and Construction Coordination Team
RLT	Reclamation Leadership Team
SA	Service Agreements
SOP	Standing Operating Procedure
SPO	Service Provider Organization
SSLE	Safety, Security, and Law Enforcement
TSC	Technical Service Center
UC	Upper Colorado
UC Region	Upper Colorado Region Engineering Services Group

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Executive Summary

The Coordination and Oversight Group (COG) is responsible for facilitating the implementation of Reclamation's business model for managing technical services and assisting the Deputy Commissioner, Operations (DCO), to ensure maintenance of adequate expertise in mission-essential technical services. The implementation of the business model and maintenance of these technical capabilities is essential for Reclamation to fulfill all of its responsibilities for delivering water and generating power, while executing program and project requirements within scope, budget, and schedule in a manner that fosters Reclamation-wide collaboration, coordination, and sharing of technical resources in an accountable and transparent manner. The COG's activities, report of findings, and recommendations for fiscal year (FY) 2011 are contained in this report.

In order to effectively measure performance as objectively as possible, a large volume of data related to technical services was collected and analyzed. The data included budget, schedule, client feedback, control of decisions for managing programs, use of employees, work planning, outsourcing, and capabilities.

While the implementation of the business model is relatively recent, many of its principles have been in practice for some time. Reclamation shows areas of strength and high competency, as well as some areas of concern, which it should closely monitor and work to maintain potentially endangered technical capabilities.

Areas of strength:

- Reclamation's technical expertise, with a few notable areas of concern, is sustainable and capable of performing the agency's mission. The skill sets identified as "endangered" capabilities all exist within the Technical Service Center (TSC). The COG, in concert with the appropriate managers, has developed "action plans" and made recommendations to address these issues.

- The number of active service agreements (SA) during FY 2011 was 2,853; however, not all of the work in these SAs was programmed to be accomplished within FY 2011. In FY 2011, 1,049 SAs were completed with a value of about $43 million. Of the 1,049 service agreements completed in FY 2011, 95% were completed within the time agreed, and 95% were completed within the agreed budget.

- In FY 2011, the percentage of technical staff direct billing to projects and/or program support ranged from 70% to 99%, with the majority above 85%. The variance is attributed to different business practices

and measurement methods among the Service Provider Organizations (SPO), and the COG considers this high utilization.

- The percentage of completed service agreements with completion reports in FY 2011 was 53%, a significant increase from FY 2010. On a scale from 1 (lowest) to 5 (highest), the average overall rating was calculated to be 4.4. Feedback from customers is important to transparency and accountability, and this overall rating validates that the SPOs are providing technical services that meet their client's needs.

- Decision-making regarding where technical services are performed remains with the program offices. Since no appeals of the workflow process were filed with the DCO, the COG concludes that any associated issues were successfully resolved at the program or Director's office level and that the "empowerment of the regions" objective is being met.

- Positive feedback was received from the service providers regarding the out year budget information published. A quantitative measure of how much of the SPO work was advance planned will be available upon the implementation of the Electronic Service Agreement Module (ESAM).

Areas of concern:

- Ability to measure and evaluate the cost effectiveness and timeliness of technical services has been hampered by delays in development of the ESAM (see status for recommendation 2010-COG-1 in table 5-1).

- There were isolated cases discovered where outsourcing occurred without consideration of Reclamation sources. This is a breach of the workload distribution process required in the business model. The COG will continue to educate managers and staff on workload distribution practices for technical services.

New Recommendations by the COG, resulting from the analysis of the FY 2011 performance and technical capability data, are shown in the following table. A list and status of all previous COG recommendations are displayed in section 5, table 5-1.

Number	Action By			COG Recommendation
	DCO	COG	Other	
2011-COG-14	X			The DCO encourages the COG to remain engaged in the Project Management Implementation Team (PMIT) to ensure the development of objectives and performance measures align with the existing Business Model. Following implementation of the PMIT processes, the COG's Annual Report should include performance measurements of project management implementation within Reclamation.
Status	New			
2011-COG-15	X			It is recommended that the DCO continue to challenge senior management to set SPO goals of achieving 75 percent of finished service agreements with completion reports in FY 2012. This will require project follow up, but very little staff time, to accomplish. The SPO's clients are critical to achieving this goal, as is the implementation of the ESAM.
Status	New			

1. Introduction

This Coordination and Oversight Group (COG) Annual Report for Fiscal Year (FY) 2011 is a comprehensive accounting of FY 2011 COG activities, summary of data collected, findings, and recommendations for consideration by the Deputy Commissioner of Operations (DCO). It is anticipated that the information contained in this report will be made available both within Reclamation and externally.

2. Background

As a result of the Managing for Excellence initiative, Reclamation formed the COG to develop a business model to provide agency-wide processes and procedures for obtaining and managing technical services. This business model was developed to improve the overall business practices that guide the management of technical services work within Reclamation's decentralized organizational structure. The goal of the business model is to maintain a balance between the desirable attributes of Reclamation's empowered, decentralized structure and our appropriately disciplined, agency-wide workload planning, scheduling, and workflow processes to efficiently utilize and manage a dispersed technical workforce. The business model is also intended to ensure the maintenance of technical capabilities within Reclamation that are necessary to accomplish the agency's mission.

Development of the business model was predicated on several important objectives:

- Empowerment of the regions
- Cost-effective and quality services
- Transparency and accountability
- Predictability of workload
- Maintenance of core technical capability
- Strategic determination of outsourcing/contracting

These objectives, developed by the COG and endorsed by the Reclamation Leadership Team (RLT), provide the foundation for the business model. Establishing an appropriate balance between these objectives is essential to successful implementation of the business model because the potential exists for achieving one objective at the expense of another. The COG was formed to facilitate this balance and assist the DCO in ensuring that Reclamation maintains the technical capabilities to fulfill all of its responsibilities for delivering water

and generating power, while executing program and project requirements within scope, budget, and schedule. This is to be accomplished in a manner that fosters Reclamation-wide collaboration, coordination, and sharing of technical resources with accountability and transparency.

A Policy and three Directives and Standards (D&S) were finalized and issued in September 2010 and are available at http://www.usbr.gov/bp/process.html.

A short description of the Policy and D&S follow:

- **Policy CMP P10 – Bureau of Reclamation's Business Model for Managing Technical Resources** outlines the major components of the business model, including a graphic illustration of the business model process, and defines responsibilities and requirements for implementation.

- **D&S CMP 10-01 – Advance Planning for Technical Services Work** directs a process for communicating future plans for the use of service providers in accomplishing Reclamation's technical services work. This D&S acknowledges the link between advance planning of technical services work and implementation of fee-for-service practices.

- **D&S CMP 10-02 – Fee-for-Service Business Practices for Technical Services Work** directs the use of standardized, fee-for-service business instruments associated with the business model and acknowledges the link between advance planning of future technical services work and implementation of fee-for-service practices. These fee-for-service practices will follow a consistent format that will generate standardized data to achieve transparency and accountability.

- **D&S CMP 10-03 – Workload Distribution Practices for Technical Services Work** directs key business practices associated with workload distribution processes for the new business model. The workload distribution practices described in this D&S are the link between advance planning of future technical services work and fee-for-service practices in utilizing Reclamation's technical resource capabilities.

The COG identified a need for a consistent set of data to facilitate analysis of technical services cost and performance information for the nine Service Provider Offices (SPO) that provide specialized technical services support to Reclamation's program offices. These nine SPOs include:

1. Great Plains Region Engineering Design, Geology and Exploration Services, and Construction Services (GP Region)

2. Pacific Northwest Region Resource and Technical Services (PN-RTS)

3. Mid-Pacific Region Division of Design and Construction, Division of Planning, and Division of Environmental Affairs - Environmental Monitoring Branch (MP Region)

4. Upper Colorado Region Engineering Services Group (UC Region)

5. Lower Colorado Region Engineering Services Office (LC ESO)

6. Technical Service Center (TSC)

7. Four Corners Construction Office (FCCO)

8. Provo Area Office (PAO)

9. Mid-Pacific Construction Office (MPCO)

In order to collect pertinent cost and schedule data using sound project management principles, the COG approached the Chief Information Officer (CIO) in the spring of 2009 to pursue development and implementation of a software application. After evaluating multiple alternatives, the CIO and COG chose to model the existing New Management Information System (NewMIS) application, currently used by the TSC, to collect similar data and develop a new Web-based program, Electronic Service Agreement Module (ESAM). This option was chosen as the most cost-effective and minimally disruptive means to achieve the goals.

The SPOs develop individual Service Agreements (SA) on a job-by-job basis to meet the needs of their customers. Several thousand SAs are developed each fiscal year, with some spanning multiple years. Each agreement has a scope of work, budget, and schedule. Work performed by the SPO is charged to the customer on a fee-for-service basis. To meet the requirement of monitoring performance measures of schedule and budget, the COG has specified that the ESAM will include the following features:

- Develop and maintain budgets and schedules for SAs

- Track both labor and nonlabor costs incurred

- Produce completion reports for Reclamation SPOs

- Produce the necessary financial data and files to support an optional billable rate methodology for charging labor costs.

A two-phase approach for this Web-based software module, ESAM, was originally planned for accomplishing the development: Phase 1 user interface (input) development and Phase 2 database (output) optimization. During production of Phase 1, several technical problems occurred which prevented the deployment of the application. In fall 2009, the decision was made to refocus production efforts combining Phases 1 and 2 into a single deliverable. Production on the ESAM continues with plans for deployment by the SPOs in FY 2012.

3. FY 2011 COG Activities

The COG held three meetings in FY 2011. The primary COG activities during FY 2011 were:

- Analyzing the FY 2010 performance and technical capability data and developing and publishing the FY 2010 COG Annual Report.

- Refining the procedures the COG has developed, including data calls, implementing the business model, monitoring the effectiveness of the business model, and addressing lessons learned from the FY 2010 COG Annual Report.

- Performing the FY 2011 evaluation of Reclamation's technical capability and maintenance thereof. The Summary Status Report for FY 2011 is included in appendix A. The FY 2011 Action Plans are included in appendix B.

- Stewarding the development and implementation of the ESAM. In addition to monthly ESAM status calls, there was extensive outreach between the COG, the ESAM development team, the TSC user testing team, and the human resources, budget, and finance communities. A training session was conducted in July 2011 for the TSC Client Liaisons in preparation for roll out of the ESAM to the SPOs. As the ESAM development progressed, increased outreach was conducted at a more frequent and detailed level with those above, as well as the SPOs through email, webinar, conference calls, and training to address identification of user lists and roles, service provider organization location codes, schedules, and additional questions and concerns.

The COG also sponsored the following two "sub-teams" to address specific requests:

- Analyzing Drill Crew Workload Issues. The PN Regional Director requested the COG evaluate and make recommendations on PN Region drill crew workload issues from a corporate perspective. To maintain a corporate perspective, the COG organized and

implemented a data call from the three regions with drill crews (UC, GP, and PN), analyzed the data, and made recommendations regarding Reclamation drill crews. A sub-team of the COG was established to lead the effort with input from the full COG and RLT members during the process. The resulting recommendations and their status are documented in Section 5, Summary, Conclusions, and COG Recommendations.

- Creating Reclamation Project Management Framework and Implementation Plan. Reclamation's Commissioner signed a Decision and Documentation Paper titled "Project Management Implementation, Action Items 20 thru 23, Managing for Excellence," dated December 28, 2006 which accepted the recommendations of the RLT and directed implementation of the recommendations included therein. In July 2009, Reclamation issued Policy establishing the use of Project Management practices within Reclamation. Since that time, additional requirements have been promulgated and further refined at the OMB and Departmental levels, which must be evaluated and integrated into an overarching project management framework that will outline the administration and practice of project management Reclamation-wide.

  At the request of the DCO, and based on discussions with the Director, Policy and Administration, the COG organized the Project Management Implementation Team (PMIT) in July 2011. The PMIT signed its charter in October 2011, and is comprised of COG members and Regional and Denver Directorate representatives, which addresses the requirements in Reclamation Policy, CMP P07 - Project Management. The PMIT is charged with creating a final Reclamation Project Management Framework and Implementation Plan by the start of FY 2013. As part of the framework, the sub-team is developing metrics to assess the practice of project management across Reclamation, and the minimum standards and requirements needed to support the practice. The draft document will begin agency review in April 2012.

FY 2011 COG outreach activities include the following:

- Dam Safety Independent Review Panel – The presentation focused on the TSC's workload planning process with the Dam Safety Office. An overview of the Business Model and the Advanced Planning data call were discussed.

- Reclamation Construction Conference – An overview of the Business Model and implementation tools, as well as a summary of the COG FY 2010 Annual Report were discussed.

- Facilities Operation and Maintenance Team – An update on the ESAM functionality and schedule were discussed.

- SPOs – In an effort to assist the SPOs with workload planning, the COG consolidates and transmits Advance Planning worksheets prepared during Reclamation's Budget Review Committee process. The worksheets transmitted in March 2011 were for FY 2012 and FY 2013.

- Business Practice Website – Extensive information is available on Reclamation's business model and practices for technical services, including the FY 2010 Annual Report, success stories, and examples. The COG membership and contact information is also posted at http://www.usbr.gov/bp/.

- Reclamation Leadership – Individual COG members are frequently asked to provide briefings to their respective Director and leadership groups on the various aspects of COG activities. Additional information regarding COG membership is provided in appendix C.

Additional outreach was provided by the DCO during a presentation at the Family Farm Alliance (FFA) Annual Meeting and Conference in February 2011, which included an overview of the Business Model.

4. Business Model Assessments

Reclamation's technical services business model is designed to meet six specific objectives. The assessment of Reclamation's performance in meeting each objective is presented in the following sections.

4.1 Business Model Objective – Empowerment of the Regions

The authority to decide where technical services work will be obtained remains with the program offices; this is the central tenet of the Workload Distribution Practices for Technical Services Work D&S. The program offices are to maintain a corporate perspective and use the Workload Distribution Flowchart in the D&S when making decisions on where to obtain technical services. If a program office decides to distribute workload outside the approach prescribed in the Workload Distribution Flowchart, written documentation is required for that decision to ensure the corporate perspective is considered. In such an instance, the Director of a SPO may appeal the decision of a program office using the appeal path outlined in the D&S.

The two performance measures for this objective are (1) the number of formal appeals by SPOs, and (2) the number of appeals sustained, per DCO decisions. In FY 2011, there were no formal appeals filed by an SPO, and, therefore, no appeals to be sustained.

While the structured model is still relatively new, based upon informal observations by the COG, it has resulted in improved communications between program offices and SPOs, which may not have occurred otherwise. Since no appeals to the DCO were filed, the COG concluded that any associated issues were successfully resolved at the program office or Director level. Therefore the COG concludes that the "empowerment of the regions" objective is being met.

4.2 Business Model Objective – Cost-Effective and Quality Services

The COG developed three performance measures to track and monitor Reclamation's SPOs in the area of cost-effective and quality services: (1) Product Delivery; (2) Customer Satisfaction (both internal and external); and (3) Percent Utilization of Services. It is important to look at the first and second measures together to fully evaluate overall SPO performance.

Most of the data for these performance measures will be gathered through the ESAM. Since the ESAM was not operable in FY 2011, the COG had to rely on manual methods of accounting that bring into question the consistency of approaches and interpretations. A spreadsheet was developed to gather the available information as consistently as possible. The spreadsheet data is summarized in the tables and graphs in appendix D and a copy of the data is available for reference at http://www.usbr.gov/bp/tr.html.

4.2.1 Product Delivery

To measure product delivery, data were gathered to (1) calculate the percentage of SAs completed within the agreed upon schedule, (2) calculate the percentage of SAs completed within the agreed upon budget, and (3) document the number of SAs with completion reports.

The number of active SAs during FY 2011 was 2,853; however, not all of the work in these SAs was programmed to be accomplished in FY 2011. In FY 2011, 1,049 SAs were completed, the value of which was about $43 million. The TSC is attributed with 81% of the active SAs and 82 percent of the SAs completed in FY 2011.

Among the SPOs, the SAs completed within schedule and budget ranged from 35% to 100% of their respective work. Overall, the percentage of SAs the SPOs completed within schedule was 95% and within budget was also 95%. The COG recognizes the need for continued improvement in this critical

objective. However, there does not appear to be a cause for apprehension based upon the COG's collective judgment, and no further immediate action is planned by the COG. The COG will continue to monitor, report, and graph the percentage of SAs completed within schedule and budget. This will provide an opportunity for a trend analysis.

The percentage of SAs with completion reports increased from 2% in FY 2010 to 53% in FY 2011. In FY 2011, there were 406 completion reports collected from 1,049 SAs completed; however, completion reports are not required for SAs less than $10,000. Since the TSC had completed 285 SAs that were for less than $10,000, the calculation for percentage of SAs with completion reports is 406/(1049-285) = 406/764 = 53%. The 53% in FY 2011 exceeds the DCO's goal of 50% which was set in the FY 2010 COG Annual Report. With the implementation of the ESAM in FY 2012, the COG believes an increased goal from 50% to 75% is achievable and recommended because the feedback from customers is so important to transparency and accountability. Increasing the goal to 75% is intended to ensure a broad client base is reached. The program offices are critical in achieving this goal.

4.2.2 Customer Satisfaction (Internal and External)

To measure customer satisfaction in FY 2011, feedback was gathered from both internal and external customers in the following areas: cost effectiveness, understanding the scope of work, timeliness, technical knowledge, problem solving, and responsiveness. The TSC used a slight variation (shown in appendix E, Figure E-2) with its customers. This feedback, combined with any additional completion reports, will provide data regarding customer satisfaction. It is recognized that these data are subjective; however, with that understanding, the COG believes this is an important endeavor.

This is the first year with a sufficient number of completion reports to evaluate, so it will serve as a baseline for future trends and conclusions. The significant increase in completion reports in FY 2011 indicates that feedback is being provided, thus improving communication between SPOs and clients and increasing accountability. The overall average rating from the 406 completion reports in FY 2011 was calculated to be 4.4 on a scale from 1 (lowest) to 5 (highest). The COG considers this a good overall rating, although maintaining and improving customer satisfaction, as well as describing/reporting how the feedback was used should continue to be emphasized. The SPO's clients are also critical to this activity. More detail regarding customer satisfaction results is provided in appendix E.

The COG received no requests to investigate, nor did the COG seek feedback regarding any SPO's performance. No electronic comments were received through the COG's Business Practice's Web site or from the DCO's presentation to the Family Farm Alliance.

Another related COG practice is to publicize lessons learned and best practices in the spirit of continuous improvement. Success stories and reports on implementation of the business model appear on the Business Practice Web site at http://www.usbr.gov/bp/tr.html. The COG will continue to post additional articles and reports in future years.

4.2.3 Percent Utilization of Services

To measure the percent utilization of services, data were gathered for the percentage of time worked under SAs, program accounts, and overhead.

These data are meant to gauge how much time is spent by technical staff that is directly billable to a program office (customer) and/or for program support. This information is used to measure workload versus staffing levels. The data for the percent of services used were gathered manually, since the ESAM was not available in FY 2011. A review of the utilization of services data indicates a range from 70% to 99%, with the majority above 85%. The variance is attributed to different business practices and measurement methods among the SPOs and the COG considers this high utilization.

In 2009, the TSC conducted a benchmarking study using private sector data published by the Professional Services Management Journal. Some adjustments were made in order to obtain a reasonable comparison between the journal's "chargeable ratio" data for private sector firms and the TSC's billability (utilization). The TSC concluded that the upper quartile of large firms (350-500 employees) had a chargeable ratio that equated to about 85% billability.

4.3 Business Model Objective – Transparency and Accountability

The COG developed three performance measures for this objective: (1) percent of time COG reporting is available to Reclamation managers in a timely manner; (2) percent of COG recommendations to DCO with documented decisions; and (3) usefulness of COG reporting in decision-making.

4.3.1 Percent of Time COG Reporting is Available to Reclamation Managers in a Timely Manner

To evaluate this performance measure, the COG maintains a list of reports the COG is required to produce, the due dates, and the date the reports are actually completed or transmitted.

In FY 2011, the due dates were self imposed, either in accordance with COG procedures or as a sound business practice. Although the COG did not meet all of its deadlines, the COG believes it has produced quality products in a timely

manner. The COG will continue to focus on achieving its goals in this area. The supporting data for this discussion are contained in appendix F.

4.3.2 Percent of COG Recommendations to DCO with Documented Decisions

To evaluate this performance measure, the COG maintains a list of the formal recommendations from the COG to the DCO and the decisions made by the DCO on those recommendations.

The COG recommendations listed in table 5-1 were accepted by the DCO. Additionally, in April 2011, the COG recommended formation of a sub-team to analyze drill crew workload issues in response to a request from the PN Regional Director and this recommendation was accepted by the DCO. This data shows that all COG recommendations have documented decisions.

4.3.3 Usefulness of COG Reporting in Decision-Making

Following publication of the FY 2011 Annual Report, the COG will request that the RLT, through the DCO, provide feedback on the usefulness of COG reporting to decision making. The COG envisions this feedback will be sought via the DCO with the intention of using the feedback to adjust and/or guide COG activities, as appropriate. This will also be done in subsequent years as part of the COG's objective for transparency and accountability.

4.4 Business Model Objective – Predictability of Workload

One of the business process objectives which guide the actions of the COG is predictability of workload. The COG developed two performance measures to track and monitor Reclamation's Program Offices and SPOs in this area: 1) Percent of service agreement work that was advance-planned; and 2) Percent of advance-planned work that resulted in service agreements. Each measures different aspects of workload predictability. The first measure assesses what volume of work performed under service agreements in any given year was planned in advance (i.e., was included on the Advance Planning Spreadsheet for that fiscal year). The balance would be considered walk-in work. The second measure assesses the reliability of what is included in the Advance Planning Spreadsheet by tracking what work included in the spreadsheet for a given year actually resulted in service agreements. Both measures require extensive effort to calculate if done manually. When the ESAM becomes available, the first measure will be easily calculated, as the ESAM contains a field allowing the SPO to indicate whether the service agreement covers work that was in the Advance Planning Spreadsheet for that fiscal year. The second measure will continue to require a degree of manual calculation. Due to the manual calculation and limited amount of the data collection for FY 2011, the COG is not able to provide

meaningful data for the two advance-planning measures for this fiscal year. The SOPs for these measures will be clarified in 2012. These clarifications, and the potential availability of the ESAM for part of FY 2012, will allow the COG to report data on this measure for FY 2012.

In addition to developing the specific measures described above, the COG established a sub-team to analyze Reclamation's drill crews' workload and associated practices. A number of the recommendations from the sub-team's report focus on more effective advance planning of drilling work and include a specific action designed to improve the effectiveness of this advance planning. The recommendations from that report and their status are presented in table 5-1.

4.5 Business Model Objective – Maintenance of Core Technical Capability

The COG is responsible for tracking Reclamation's technical services business practices and monitoring the agency's technical capability. Accordingly, the COG developed a comprehensive listing of technical capabilities that currently exist within Reclamation's nine SPOs. In September 2009, September 2010, and August 2011 the COG asked each SPO to report on the number of staff with specific technical capabilities, the experience level of the staff, whether or not their organizations were self sufficient with regard to each technical capability, and whether or not their organization can sustain that capability.

After compiling this information, the COG analyzed the data and obtained clarification from the SPOs as necessary. The COG's FY 2011 review of technical capability is included in appendix A. The findings for the FY 2011 period are summarized in the following paragraphs, and the FY 2009, FY 2010, and FY 2011 data is presented in the "Summary Table of Functional Areas and Technical Capabilities," which is also included in appendix A.

Generally, it appears that Reclamation's broad range of technical expertise is sustainable and capable of performing the agency's mission. However, during the FY 2011 analysis the COG identified the following skill sets as potential endangered capabilities: (1) Design and Analysis of Tunnels; (2) Static Analysis, Evaluation, and Design of Underground Excavations in Rock; (3) Dynamic Analysis, Evaluation, and Design of Underground Excavations in Soil; (4) Dynamic Analysis, Evaluation, and Design of Underground Excavations in Rock; and (5) Grouting Designs. Action Plans have been developed for these capabilities, and a COG team leader has been assigned to monitor Reclamation's progress in developing and implementing the plans. The first four capabilities are addressed in a single Action Plan entitled "Underground Excavation and Tunneling."

The Action Plans further analyze the issue from a corporate perspective, including analysis of any related business practices, advance planning data, outsourcing advantages and disadvantages, human resource options, long-term corporate need, organizational options, etc. Subject matter experts and managers are engaged in this process as appropriate. The Action Plans and implementation recommendations are included in appendix B.

In addition, COG team members have been assigned to continue monitoring Reclamation's implementation of Action Plans for three skill sets identified as potentially "endangered" during previous capability reviews: (1) structural analysis and design of plant facilities (powerplants); (2) analysis of hydraulic transients in power system waterways; and (3) design and analysis of temperature control/selective withdrawal structures. An update on implementation of these three Action Plans is provided in appendix B.

The COG plans to continue updating and analyzing the technical capability data annually. The next annual update to the technical capability data will be initiated in August 2012 with the report issued as part of the FY 2012 COG Annual Report.

4.6 Business Model Objective – Strategic Determination of Outsourcing/Contracting

Reviewing technical services work outsourced or contracted provides critical data which contributes to the goal of ensuring Reclamation's use of cost-effective and quality services, as well as the maintenance of core technical capability. The COG developed two performance measures to evaluate this objective: (1) the amount of technical services contracted or outsourced through single contracts greater than $100,000 (approximately $65 million in FY 2011), and (2) the dollar value of work contracted or outsourced in endangered technical capabilities ($0 in FY 2011).

The purpose of this review is to understand what work was completed by outside resources, attempt to understand the reason outside resources were used, and determine if any endangered technical capability was outsourced. Since Reclamation's workload distribution practices have been recently implemented and may not be universally understood, there could be some instances of contracting where Reclamation forces should have been considered and the proper documentation was not prepared. However, as the workload distribution practice is better understood, it is anticipated that those occurrences will decrease. This will be tracked through the COG's annual reports and will provide an opportunity for trend analysis.

Of the $65 million contracted in FY 2011, approximately 60% of these contracts (including Independent Delivery, Indefinite Quantity, task orders), or about

120 contracts over $100,000, were examined. There were isolated cases where the workload distribution practice was not completely followed, but there were no cases identified where the workload distribution practice was not considered. Additional information is provided in appendix G.

In evaluating the second performance measure, there were no cases identified that indicated any work was contracted in an endangered capability within the same sampling of contracts and task orders. In addition, there were no cases where any other agreements or grants could be identified that suggested any work was conducted in these areas by other outsourcing methods.

The COG will continue to work with the Program Offices to ensure all are educated in the workload distribution practices, but the evaluation for FY 2011 indicates that Reclamation is adhering extremely well to the established protocol. Where minor deviations were identified, COG members have discussed and resolved issues with the Program Offices.

5. Summary, Conclusions, and COG Recommendations

While the implementation of the business model is relatively recent, many of its principles have been in practice for some time. Reclamation shows areas of strength and high competency, as well as some areas of concern, which it should closely monitor and work to maintain potentially endangered technical capabilities.

Areas of strength:

- Reclamation's technical expertise, with a few notable areas of concern, is sustainable and capable of performing the agency's mission. The skill sets identified as endangered capabilities all exist within the Technical Service Center (TSC). The COG, in concert with the appropriate managers, has developed "action plans" and made recommendations to address these issues.

- The number of active SAs during FY 2011 was 2,853; however, not all of the work in these SAs was programmed to be accomplished within FY 2011. In FY 2011, 1,049 SAs were completed with a value about $43 million. Of the 1,049 service agreements completed in FY 2011, 95% were completed within the time agreed, and 95% were completed within the agreed budget.

- In FY 2011, the percentage of technical staff direct billing to projects and/or program support ranged from 70% to 99%, with the majority

above 85%. While the variance is attributed to different business practices and measurement methods among the SPOs, the COG considers this high utilization.

- The percentage of completed service agreements with completion reports in FY 2011 was 53%, a significant increase from FY 2010. On a scale from 1 (lowest) to 5 (highest), the average overall rating was calculated to be 4.4. Feedback from customers is important to transparency and accountability and this overall rating validates the SPOs are providing technical services that meet their client's needs.

- Decision-making regarding where technical services are performed remains with the program offices. Since no appeals of the workflow process were filed with the DCO, the COG concludes that any associated issues were successfully resolved at the level of the program or Director's office and that the "empowerment of the regions" objective is being met.

- Positive feedback was received from the service providers regarding information published on out-year budgets. A quantitative measure of how much of the SPO work was advance planned will be available when the ESAM is implemented.

Areas of concern:

- Ability to measure and evaluate the cost effectiveness and timeliness of technical services has been hampered by delays in development of the ESAM (see status for recommendation 2010-COG-1 in table 5-1).

- There were isolated cases discovered where outsourcing occurred without consideration of Reclamation sources. This is a breach of the workload distribution process required in the business model. The COG will continue to educate managers and staff on workload distribution practices for technical services.

COG Recommendations and status, sorted by fiscal year, are shown in the following table. Recommendations 2011-COG-1 through 2011-COG-13 are a result of the COG's analysis of drill crew workload issues. Recommendations 2011-COG-14 and 2011-COG-15 are a result of the COG's FY 2011 Annual Report, including the COG's analysis of FY 2011 performance and technical capability data. Additions and updates to this table will be reflected in succeeding annual reports.

Table 5-1. COG Recommendations and Status

Number	Action By			COG Recommendation
	DCO	COG	Other	
2011-COG-1			X	All three regional drill crews should work with their respective Human Resources representatives to develop formalized succession plans.
Status	Ongoing. GP Region: The GP Region will complete their succession plan over the next two years as they prepare for the retirement of their drill crew supervisor. In the interim, opportunities are being provided to existing staff to learn business practices of the GP Region Drill Crew. PN Region: The PN Region has begun working with a Human Resources representative to develop a draft succession plan. A draft plan is set for completion by April 1, 2012. A final plan will be completed following the hiring of, and review by, the new Drill Crew supervisor, but no later than September 30, 2012. UC Region: Efforts have been made to evaluate the human resource and future succession planning needs of the UC Region Drill Crew. The UC Region will develop a written succession plan by September 30, 2012.			
2011-COG-2			X	The PN Region should review their drill crew staffing levels, particularly in terms of supervision and administrative support, to determine if the workload supports this level of staffing. Methods of reducing staffing levels that do not negatively impact succession planning and sustainability should be considered. Staffing levels for GP Region and UC Region drill crews appear appropriate but should be closely monitored to ensure adequate succession planning.
Status	Ongoing. The PN Region review of Drill Crew staffing levels is being performed as part of succession plan development. Final decisions will not be made until after hiring of, and review by, a new Drill Foreman III. Plan to complete review no later than September 30, 2012.			
2011-COG-3			X	Program offices should be encouraged to utilize a Field Exploration Request (FER) process similar to that required by the DSO. This includes current year as well as out-year planning. In addition, Directives and Standards (D&S) FAC 03-03 Design Activities should be revised to include more specific language regarding the FER process and incorporating that process into Design Activity Plans and Design Data Collection. The revisions should incorporate a FER request process similar to that used for the SOD program for Reclamation's non-SOD work.
Status	Ongoing. Changes have been incorporated into the D&S, and it is going through the review process.			

Table 5-1. COG Recommendations and Status

Number	Action By			COG Recommendation
	DCO	COG	Other	
	GP Region utilizes the FER process where a FER style scope of work is appropriate. This is evidenced by the proposed Arkansas Valley Conduit investigations where the Regional Office, Area Office, and the TSC have agreed on a FER investigation layout with the service agreement scope of work. PN Region Drill Crew/Geology has implemented this recommendation in its business model. This is evidenced by the use of the FER process for the elevated groundwater issue in Idaho in October 2011. The PN Region will continue to encourage the use of the FER process in other activities. UC Region Drill Crew/Geology will continue to use the FER process in its business model. This is evidenced by the use of the FER process of all SOD drilling work. SOD drilling work encompasses a large portion of UC Drill Crew Region work. The UC Region Drill crew will establish similar FER processes for non-SOD drilling activities.			
2011-COG-4			X	The COG recommends that all regional drill crew service providers and their respective finance representatives work together with the Management Services Office to standardize, unless compelling reasons justify otherwise, the structure of their working capital funds and to establish standard billing practices and procedures. Following implementation, the COG should be advised in order to close out the recommendation.
Status	On Hold. In November 2011, Reclamation's Chief Financial Officer initiated a business process assessment of the Working Capital Fund (WCF) that is to be completed as part of the implementation of the Financial Business Management System (FBMS). In the memorandum informing of this assessment, he requested that no changes be made to the WCF. Final products of this assessment are due to Reclamation by June 30, 2012. Thus, no decisions should be implemented until the Management Services Office concurs and the assessment is complete. Drill crew service providers met in Boulder City on December 2, 2011, to discuss COG report recommendations and agreed to bring this recommendation to the attention of their finance representatives. A conference call will be scheduled following the completion of the WCF assessment to discuss options and determine if there are compelling reasons for not pursuing this further.			
2011-COG-5			X	PN Region should consider alternatives to maintain a higher WCF balance to ensure they can sustain the crew through unforeseen situations.
Status	Complete. The PN Region Drill Crew management reviewed the WCF balance and how costs were recovered. Through that review, and at the recommendation of the Regional Finance Officer, it was decided to maintain the daily shift rate at $3300/shift due to the current budget climate, but add a surcharge of $300 per day			

Table 5-1. COG Recommendations and Status

Number	Action By			COG Recommendation
	DCO	COG	Other	
	to account for variations in commercial airfare, fuel prices, non-CONUS travel costs, etc., beginning in FY 2012. The surcharge will be evaluated periodically throughout the fiscal year to determine the need for adjustment due to economic constraints. The PN Region Drill Crew management also increased rates for work shifts not involving the use of drilling equipment to ensure an adequate recovery of appropriate costs.			
2011-COG-6			X	The COG recommends that drill issues and coordination become part of the RDCCT's regular agenda.
Status	Complete. Drilling issues have become a standing agenda item for the RDCCT.			
2011-COG-7	X			Allow the Regional Directors, working with the Management Services Office, to create a limited Advanced Funding Agreement (AFA) process for drill crews. This should begin with a plan of how the AFA would be created and take into account lessons learned from the TSC and LC Region's pilot AFA program. The plan should also provide for a trial period.
Status	On Hold. This recommendation is on hold until after the Management Services Office evaluates the LC Region's pilot AFA program and until the business process assessment of the WCF is complete (scheduled for June 30, 2012).			
2011-COG-8		X		The COG should revise the table of functional areas and technical capabilities to ensure future annual evaluations of technical capability consider drill crew staffing levels.
Status	Complete. Beginning in FY 2011, the table of functional areas and technical capabilities has separate categories for geologist/geotechnical versus drilling staff.			
2011-COG-9		X		For the FY 2014 Budget Review Committee (BRC) notebook, the COG will modify the advance planning tables to align the drill crews with Regional Offices and include a tab within the table file to provide offices with consistent, clear instructions of the information being requested and details to be included. For BRC notebooks beyond FY 2014, the COG will reevaluate this process.
Status	Complete. The COG modified the advance planning tables as described for the FY 2014 BRC notebook and will reevaluate in future years.			
2011-COG-10		X		The COG will revise the FY 2014 BRC Notebook Guidance for development of the advance planning tables to provide offices improved instructions and information regarding the level of detail to include in their advance planning tables. The Notebook Guidance will also emphasize drill crew work and need for programs to include estimates for that work.

Table 5-1. COG Recommendations and Status

Number	Action By			COG Recommendation
	DCO	COG	Other	
Status	Complete. The COG improved the BRC notebook guidance related to the advance planning tables by revising the instructions and information regarding the level of detail to be included and adding emphasis to providing estimates for drill crew work.			
2011-COG-11		X		The COG should review advance planning tables each year and compare to the previous year's to ensure activities are being detailed further in each program area. The COG will work with the offices to ensure errors are corrected and data gaps are filled.
Status	Complete. The COG revised the Advance Planning Standing Operating Procedure (SOP) to include the reviews of advance planning tables and follow-up communication.			
2011-COG-12		X	X	Appropriate representatives from individual SPOs and Drill Crews should formally meet annually with individual offices (i.e., DSO, Area Offices, etc.) to review activities identified in the advance planning tables, identify activities not included, and begin planning/scheduling drilling work for upcoming FY. The appropriate regional COG member should ensure these meetings are scheduled and participate in the discussions.
Status	Complete. The COG revised the Advance Planning Standard Operating Procedure (SOP) to include a requirement for the COG members to ensure these meetings and the review and coordination activities occur.			
2011-COG-13		X		COG members should work with their respective budget and program offices to ensure systems used in budget formulation/activity planning include drill crews as a service provider that can be specifically identified with a budget as part of an activity or work plan.
Status	Complete. Regional databases and systems used for planning work were reviewed, and where necessary revised, to ensure Drill Crew services could be specifically identified.			
2011-COG-14	X			The DCO encourages the COG to remain engaged in the Project Management Implementation Team (PMIT) to ensure the development of objectives and performance measures align with the existing Business Model. Following implementation of the PMIT processes, the COG's Annual Report should include performance measurements of project management implementation within Reclamation.
Status	New			
2011-COG-15	X			It is recommended that the DCO continue to challenge senior management to set SPO goals of achieving 75 percent of finished service agreements with completion reports in FY 2012. This will

Table 5-1. COG Recommendations and Status

Number	Action By			COG Recommendation
	DCO	COG	Other	
				require project follow-up, but very little staff time, to accomplish. The SPO's clients are critical in achieving this goal, as is the implementation of the ESAM.
Status	New			
2010-COG-1	X			Closely monitor the development and implementation of ESAM. This system is a critical element of the business model, and success is the only option. In order to make the business model more meaningful, full implementation of ESAM is required. One-hundred percent participation by the SPOs is required by the start of FY 2012. While this is a significant departure from most SPO's current business practices, it is recommended that the DCO make this a senior management priority.
Status	Incomplete. The DCO is actively engaged; however, ESAM development was not complete in order to enable deployment of the system by the start of FY 2012. The system has now been declared substantially complete. The recommendation is revised to deploy and implement the system at all nonbillable rate SPOs by July 30, 2012. Remaining ESAM billable rate module issues will continue to be addressed with the goal to have it available for use by the billable rate SPOs no later than July 30, 2012.			
2010-COG-2	X			Participate in developing strategies to address the loss of Reclamation dam safety and risk management staff to other agencies, outside companies, and retirement. It is recommended that the DCO directly engage with targeted staff and all levels of the impacted managers to explore available opportunities, including innovative methods, to maintain this expertise. These strategies must ensure that Reclamation is able to maintain its ability to accomplish its mission-related workload and its smart buyer capabilities.
Status	Complete. The DCO met with leadership and management in the Technical Resources organization on succession planning. The TSC addressed the points requested by the DCO in their succession plan.			
2010-COG-3	X			Each SPO reported their cost and schedule performance with the data contained herein. Although the performance is considered good, it is important that the DCO challenge senior management to ensure consistent and credible cost and schedule data reporting.
Status	Complete. The DCO had this conversation with the Regional Directors.			
2010-COG-4	X			Encourage program offices and SPOs to perform project closeout work, including completion reports. Performance of project closeout work in FY 2010 was exceptionally low. It is recommended that the DCO challenge senior management to set SPO goals of achieving 50 percent of finished service agreements with completion reports in

Table 5-1. COG Recommendations and Status

Number	Action By			COG Recommendation
	DCO	COG	Other	
				FY 2011. This will require project follow-up but very little staff time to accomplish. It should be stressed in setting these goals that the SPO's clients are critical in this activity.
Status	Complete. The SPOs achieved 53% of finished service agreements with completion reports in FY 2011.			
2010-COG-5	X			Make efforts to ensure the transparency of Reclamation's business model practices and the self-assessment results made herein by discussing in key stakeholder forums (i.e., NWRA, FFA, etc.).
Status	Complete. The DCO communicated this during conferences he attended and in one-on-one discussions.			

The COG considers the business model implemented. Work still remains to ensure full implementation and maintenance of the model at a high level of performance. Immediate future work by the COG includes the ESAM implementation, followup to the "endangered capability" Action Plans, and focus work towards high quality data collection. Additionally, the COG will continue to identify areas of needed attention to maintain Reclamation's technical capabilities to ensure mission accomplishment.

Appendix A

Technical Capabilities Within Reclamation – Summary Status Report for FY 2011

RECLAMATION

Managing Water in the West

Technical Capabilities Within Reclamation – FY 2011

U.S. Department of the Interior
Bureau of Reclamation

April 2012

Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Technical Capabilities Within Reclamation – FY 2011

U.S. Department of the Interior
Bureau of Reclamation
Coordination Oversight Group

April 2012

Executive Summary

A Coordination Oversight Group (COG) responsibility is to track Reclamation's technical services business practices and monitor the agency's technical capability. Accordingly, the COG developed a comprehensive listing of technical capabilities that currently exist within Reclamation's nine Service Provider Organizations (SPO). In September 2009, September 2010, and August 2011 the COG asked each SPO to report on the number of staff with specific technical capabilities, the experience level of those staff, whether or not their organizations were "self sufficient" with regard to each technical capability, and whether or not their organization could sustain that capability.

After compiling this information, the COG analyzed the data and obtained clarification from the SPOs as necessary. The data reported for fiscal year (FY) 2009, FY 2010, and FY 2011 are presented in the attached "Summary Table of Functional Areas and Technical Capabilities."

Generally, it appears that Reclamation's broad range of technical expertise is sustainable and capable of performing the agency's mission. However, during the FY 2011 analysis the COG identified the following skill sets as potential "endangered" capabilities: (1) Design and Analysis of Tunnels; (2) Static Analysis, Evaluation, and Design of Underground Excavations in Rock; (3) Dynamic Analysis, Evaluation, and Design of Underground Excavations in Soil, (4) Dynamic Analysis, Evaluation, and Design of Underground Excavations in Rock; and (5) Grouting Designs.

Action Plans have been developed for these capabilities, and a COG team leader has been assigned to monitor Reclamation's progress in developing and implementing them. The first four capabilities are being addressed in a single Action Plan entitled "Underground Excavation and Tunneling." The Action Plans will further analyze the issue from a corporate perspective, including analysis of any related business practices, advance planning data, outsourcing advantages and disadvantages, human resource options, long-term corporate need, organizational options, etc. Subject matter experts and managers will be engaged in this process as appropriate. The Action Plans and implementation recommendations will be presented to the Deputy Commissioner of Operations.

In addition, the COG is continuing to monitor Reclamation's implementation of Action Plans for three skill sets identified as potentially endangered during previous capability reviews: (1) structural analysis and design of plant facilities (powerplants); (2) analysis of hydraulic transients in power system waterways; and (3) design and analysis of temperature control/selective withdrawal structures. Implementation of these three Action Plans is ongoing, and a COG team leader has been assigned to monitor Reclamation's progress. Action Plan implementation has been completed for a fourth endangered capability identified

in previous reviews, “Structural and/or Hydraulic Analysis, Evaluation, and Design of Concrete Dams (Nonlinear Structural Analysis).”

The COG plans to continue updating and analyzing the technical capability data annually. The next update to the table will be initiated in August 2012, with a report issued as part of the FY 2012 COG Annual Report.

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Background

One of the principal responsibilities of the Coordination and Oversight Group (COG) is to monitor Reclamation's corporate and business processes for technical services by gathering data to track workload distribution and maintenance of technical capability. To this end, the COG has developed the attached Summary Table of Functional Areas and Technical Capabilities and has evaluated capability data reported for fiscal year (FY) 2009, FY 2010, and FY 2011 by Reclamation's Service Provider Organizations (SPOs) to identify possible "endangered capabilities" within the agency.

The COG considered a number of automated approaches to identify these "endangered capabilities," each having its own limitations and shortcomings. Since there is no viable automated approach to obtain this information, the COG has determined the most reliable means to gather this data is to solicit input from managers of SPOs regarding their technical capabilities and the workforce planning of their respective organizations.

The COG developed a comprehensive listing of technical capabilities that currently exist within Reclamation's technical resources, specifically within the SPOs, and issued data calls at the close of FY 2009, FY 2010, and FY 2011 for each of the SPOs to complete. Using this information, the COG has been monitoring Reclamation's technical resources to identify areas where the agency appears to be at greatest risk of losing expertise. When developing the Table of Functional Areas and Technical Capabilities, the COG focused on "critical" capabilities where Reclamation must have in-house capability to accomplish its mission and/or remain a "smart buyer" when procuring technical services. The COG will continue to add (or eliminate) technical capability categories in this table during future updates to reflect the changing needs and capabilities of the agency. As each SPO completes its annual update to the table, it will be asked to suggest changes to the table such as addition (or elimination) of technical capability categories from the table, or addition of more specialized technical capability subcategories. The criticality of a capability to Reclamation's mission will be a key consideration as the COG evaluates requests to modify the table.

Process

On August 24, 2011, a data call, as defined in Reclamation's CMP P10, Reclamation's Business Model for Managing Technical Services, was sent to each of the SPOs through their respective COG team members and alternates with a due date of October 3, 2011. The SPOs are listed below.

- Great Plains Region Engineering Design, Geology and Exploration Services, and Construction Services (GP Region)
- Pacific Northwest Region Resource and Technical Services (PN-RTS)
- Mid-Pacific Region Division of Design and Construction, Division of Planning, and Division of Environmental Affairs – Environmental Monitoring Branch (MP Region)
- Upper Colorado Region Engineering Services Group (UC Region)
- Lower Colorado Region Engineering Services Office (LC ESO)
- Technical Service Center (TSC)
- Four Corners Construction Office (FCCO)
- Provo Area Office (PAO)
- Mid-Pacific Construction Office (MPCO)

The COG recognizes that much of Reclamation's technical capability resides outside of these SPOs in program offices such as Area Offices, Safety, Security, and Law Enforcement (SSLE), and non-service provider organizations within the Regional Offices. However, these program offices are typically only retaining the technical services staff needed to manage the programs and projects for which they are responsible. They generally do not have highly specialized technical capability and/or the capacity to support other Reclamation offices and, therefore, were not included in this analysis. If the data indicate a potential endangered capability, these resources may be more fully considered at that time.

Discussion of Data

The data call was in the form of an Excel spreadsheet. Each service provider was asked to identify the number of staff with specific technical capabilities within their organization, the level (entry level, journeyman level, or senior level) at which these capabilities exist, whether or not their organization was self sufficient with regard to the capability, and whether or not they expect to sustain the capability.

In the data calls for FY 2009 and FY 2010, managers were asked to use their professional judgment when determining the skill level of their employees. Based on the data received and discussion with the SPOs, the COG determined that further guidance was needed to ensure consistency of data reporting between offices. To that end, the COG included the following guidance for classifying Senior, Journeyman, and Entry level employees in the FY 2011 data call.

Senior Level:

- Has 15 years or more experience specific to the capability on projects of at least moderate scope with complex features.
- Works independently on projects, at least in terms of the specific capability.
- Associated experience is current, having produced or collaborated on designs and technical work products related to the specific capability over the preceding 10 years.
- Uses advanced techniques and theories in developing designs and technical work products related to the specific capability.
- Applies knowledge and expertise acquired through progressive experience associated with the specific capability.
- Individual's work is accepted as authoritative.

Journeyman Level:

- Has 5 to 15 years of experience specific to the capability on conventional projects with few complex features.
- Is able to apply standard engineering techniques specific to the capability for conventional projects with few complex features.
- Has prepared complete designs and technical work products specific to the capability under the guidance of a senior level engineer.
- Has experience working independently on small projects or components of larger complex projects associated with the capability.
- Associated experience is generally current, having produced or collaborated on designs and technical work products related to the specific capability within the last 3 years -or- has substantial but not current experience (i.e. functioned at a high journeyman level or senior level with regard to the specific capability no more than 5 years ago).

Entry Level:

- Has less than 5 years experience specific to the capability.
- Performs routine technical work on projects or components of projects related to the capability that doesn't require previous experience.

- Applies standard techniques, procedures, and criteria to perform assigned tasks as part of a broader assignment (project) associated with the specific capability.

- Performs basic tasks specific to the capability under the guidance of senior or journeyman level staff.

Including this guidance resulted in several substantial changes in the number and level of employees reported by SPOs. Unless otherwise noted in this report, large changes in staffing levels (either increases or decreases) can be attributed to the clarifications in reporting instructions and subsequent reinterpretation of organizational capability by the SPO managers.

It is also important to note that the number of capable employees reported in the table does not relate in any way to the number of full-time equivalents (FTEs) in an organization. One FTE may be capable of performing a wide range of technical work and, therefore, would be counted multiple times in the table.

The data presented in the attached Summary Table of Functional Areas and Technical Capabilities shows totals for each of the SPOs individually and collectively for FY 2009, FY 2010, and FY 2011. For the purposes of this report, the following definitions are provided:

CAPABLE: An organization that can complete identified work in-house to accomplish its mission and/or remain a “smart buyer" when procuring technical services.

SUSTAINABLE: An organization’s technical capability is considered sustainable, as determined by the appropriate manager, if it can be maintained in the long term given its workload projections, funding, anticipated attrition, and staffing and succession plans.

SELF SUFFICIENT: An organization, as determined by the appropriate manager, is considered self-sufficient if it is fully capable of performing technical work of standard complexity (reports, analyses, designs, etc.) to develop implementable plans, other final technical work products, or technical conclusions without regularly soliciting outside assistance. This definition assumes that intermittent collaborative outreach may be required due to an organization’s resource availability or developmental needs, and/or due to the need for specific subject matter expertise.

POSSIBLE ENDANGERED CAPABILITY: An identified work category, as determined by the COG’s analysis, where Reclamation is either not self-sufficient or the existing capability is not sustainable, or both.

The "SUM" columns in the table present the combined number of capable employees at each skill level for all Reclamation SPOs, and the "RECLAMATION TOTAL" column presents the total number of capable employees at all skill levels within Reclamation's SPOs by fiscal year.

Table cells are color coded to identify capability and sustainability. Cells highlighted in green indicate that a Service Provider Organization is self-sufficient in a particular technical capability and expects to sustain that capability in the long term. Yellow highlighting indicates that a Service Provider Organization is not considered self-sufficient in a particular technical capability but expects to sustain their current level of technical capability in the long term. Red highlighting indicates that the SPO, regardless of the degree to which they are currently self-sufficient, does not expect to sustain a technical capability in the long term.

Analysis

After compiling the data, the COG performed a comprehensive review. Based on that review, the COG identified several capabilities that appeared endangered and/or required further clarification. These capabilities are highlighted in orange in the "RECLAMATION TOTAL" column of the table to indicate that further investigation and analysis were required. The results of this further investigation are presented in the following paragraphs.

Numbers marked with an "*" in the "RECLAMATION TOTAL" column indicate situations where a significant change in the reported number of capable employees does not actually reflect a change in capability but, rather, a reinterpretation of capability resulting from the COG refining instructions to improve reporting consistency between offices. The COG will further refine definitions to improve consistency of reporting between offices in future data calls.

a) **1.1.5 – Risk Analysis.** While evaluating this capability, the COG noted there was no means for distinguishing whether the number of capable employees reflected those that facilitate risk analysis meetings versus those that perform risk analysis for CFRs. This capability will be divided into two subcategories in FY 2012 to allow for distinguishing between "Risk Analysis Facilitators" and "Risk Analysis for CFRs".

b) **1.2.3 – Design of Early Warning Systems (EWS).** Design, installation, and maintenance of early warning systems capabilities have not changed substantially in the TSC in the past year; however, one new resource has been hired at the GS-9 level and will be starting in November 2011. The EWS workload is primarily for other Government Agencies (OGA) and TSC has adequate capability for any Reclamation requests for support in this area.

Though the number of individuals with these capabilities is small, the TSC believes that the current and future workload will be sufficient to sustain the capability and train new staff. These skills are interrelated, so an employee capable of one function is also capable in the others. This capability is self-sufficient and sustainable at the current staffing levels, and no further action is planned by the COG at this time.

c) **3.1.1 – Architectural Design of Buildings and Other Structures.** This capability exists in several service provider organizations, but at low staffing levels. The TSC reports that the capability is not sustainable because they have only two capable employees and one is eligible for retirement. The current TSC workload for architectural design does not justify adding staff at this time, and this is a capability which can readily be contracted if a need arises. The COG will continue to monitor this capability in the future, but no further action is planned at this time.

d) **3.1.2 – Landscape Architectural Design.** This capability exists in several service provider organizations, but at low staffing levels. The TSC reports that the capability is not sustainable because they have only one capable employee who is eligible for retirement. The current TSC workload for landscape architectural design does not justify adding staff at this time, and this is a capability which can readily be contracted if a need arises. The COG will continue to monitor this capability in the future, but no further action is planned at this time.

e) **3.2.2.c – Structural Analysis and Design of Plant Facilities (Power Plants).** The COG has identified this as an endangered capability and has developed an Action Plan to ensure Reclamation does not lose this capability. The TSC backfilled positions vacated due to recent retirements, but the volume of new plant design work coming to the TSC is very limited and it is difficult to train newer staff. The TSC plans to update/revise the design standards for powerplants in 2012 as an additional resource. A COG team leader has been assigned to monitor Reclamation's progress in implementing the Action Plan.

f) **3.2.3.a/b/c/d – Structural and/or Hydraulic Analysis, Evaluation, and Design of Spillways, Outlet Works, and Concrete Dams.** While evaluating these capabilities, the COG noted there was no means for distinguishing between those employees capable of performing structural analysis and those who perform hydraulic analysis. Because they are entirely different skill sets, these capabilities will be divided into separate categories in FY 2012 to allow for distinguishing between structural analysis and hydraulic analysis.

g) **3.2.4.e – Design and Analysis of Tunnels.** Tunnel work in Reclamation is sporadic, which makes it difficult to keep tunnel expertise 100% billable. Maintaining Reclamation's ability to be a "smart buyer" and informed owner is necessary to ensure quick response to concerns with our existing tunnel

inventory and to provide assistance with future planning studies. The TSC reported that this capability is not sustainable, and that current workload for tunnels does not justify adding additional staff at this time. The COG has identified this as an endangered capability and will develop an Action Plan. A COG team leader has been assigned to monitor Reclamation's progress in developing and implementing the Action Plan.

h) **4.1.1.c(2) – Static Analysis, Evaluation, and Design of Underground Excavations in Rock.** Most geotechnical engineers are capable of performing static design and analysis of underground excavations in soil, and the COG does not view this capability as endangered. However, Reclamation's capability to perform static design and analysis of underground excavations in rock is limited, primarily because there is less workload and fewer engineers who have the expertise to perform this type of analysis and design. To maintain the static rock mechanics capability, TSC is training additional engineering staff, but without a steady workload for underground excavations it will be difficult to maintain this expertise. The COG has identified this as an endangered capability and will develop an Action Plan. A COG team leader has been assigned to monitor Reclamation's progress in developing and implementing the Action Plan.

i) **4.1.2.b(1) – Dynamic Analysis, Evaluation, and Design of Underground Excavations in Soil, and 4.1.2.b(2) – Dynamic Analysis, Evaluation, and Design of Underground Excavations in Rock.** Dynamic design and analysis of underground excavations in soil and rock are performed by a subset of Reclamation's geotechnical engineering staff. Several TSC geotechnical engineers are capable of dynamic design and analysis, but the number of engineers experienced in such design is declining. Reclamation's capability to perform dynamic design and analysis of underground excavations is limited primarily by the availability of workload. To maintain the dynamic soil and rock mechanics capabilities, TSC is training additional engineering staff, but without a steady workload for underground excavations it will be difficult to maintain this expertise. The COG has identified these as endangered capabilities and will develop an Action Plan. A COG team leader has been assigned to monitor Reclamation's progress in developing and implementing the Action Plan.

j) **4.2.5 – Grouting Designs.** This capability exists in several service provider organizations, but at low staffing levels. The TSC reported this capability is not sustainable due to lack of workload, and they are currently working with a retired Reclamation expert to develop a Design Standard for grouting design. The COG has identified this as an endangered capability and will develop an Action Plan. A COG team leader has been assigned to monitor Reclamation's progress in developing and implementing the Action Plan.

k) **5.2.4 – Arc Flash Analysis.** The COG determined this technical capability should be added to the matrix in FY 2011. The TSC does not have adequate staff to address the workload that exists. Data collected by the COG

indicates most of Reclamation's capability in arc flash analysis resides outside of the SPOs (i.e., in Area or Power Offices); however, upon discussion it appears there is not consensus on what constitutes "capable" for this skill set. Since the technical capability data call goes only to the identified service providers, the non-SPO capability is not captured in the table. Most of the non-SPO capability resides in MP Region, which reported self-sufficient and sustainable. UC Region also reported self-sufficient and sustainable for their one journeyman and one senior level employee. PN Region reported two entry level employees that are self sufficient on less complicated analysis but not likely sustainable due to limited workload. Considering the current staffing in Area and Power Offices, and the resources available from the SPOs, this function should be sustainable; but the COG believes there is not sufficient capacity within Reclamation. There is a need to develop agency guidance and a peer review process. Upon completion of the guidance, the COG will re-evaluate the capability.

l) **5.3.1, 5.3.2 and 5.3.3 – Other Renewable Energy: Design and Analysis (Electrical Engineering) of Wind Turbines (5.3.1), Solar Power Systems (5.3.2), and Geothermal Generation Systems (5.3.3).** Reclamation does not currently have workload in these areas but does have the potential to develop these capabilities, including the ability to be a "smart buyer." This category was included in the COG study to allow evaluation of Reclamation's capability, considering the U.S. Department of the Interior's (Department's) emphasis on the renewable development needs of the Nation. While this expertise could be further developed within Reclamation, the COG is simply presenting these findings, and no further action is planned by the COG at this time.

m) **6.1.6 – Analysis of Hydraulic Transients in Power System Waterways.** Reclamation has one senior level engineer in the TSC who completes these analyses using in-house developed computer models and software. The workload is minimal (approximately 5% to 10% of one FTE), but it is critically important in determining the safety and performance for new designs, operational changes, and upgrades at powerplants, pumping plants, and pipe systems, especially considering the current increase of FERC permits and Lease of Power Privilege requests for new powerplants on Reclamation facilities. The COG identified this as an endangered capability in FY 2010 and developed an Action Plan. A market search was performed in FY 2011 for suitable current software to replace the in-house developed software (WHAMO). WHAMO was developed jointly by the U.S. Army Corps of Engineers and Reclamation in the 1970s and updated in the 1990s. The available software evaluated was more user friendly but did not have the full capabilities of WHAMO. The WHAMO software has the capabilities to perform the analyses needed in Reclamation but will require intensive training for junior engineers. The goal of the TSC Hydraulic Equipment Group is to complete training in FY 2013. A COG team leader has been assigned to monitor Reclamation's progress in implementing the Action Plan.

n) **6.2.4 – Design and Analysis of Temperature Control/Selective Withdrawal Structures.** There is not sufficient workload to sustain an FTE or train new employees specifically in this field; however, the TSC currently maintains the individual skills and capabilities required to properly analyze and design temperature control/selective withdrawal structures. The COG identified this as an endangered capability in FY 2010 and developed an Action Plan to ensure Reclamation does not lose this capability. The proposed recommendation is to develop a design standard that documents the procedures, design considerations, design stresses and codes, and other factors required to perform design and analysis of temperature control/ selective withdrawal structures. The TSC plans to begin developing this document in 2012. A COG team leader has been assigned to monitor Reclamation's progress in implementing the Action Plan.

o) **6.3.1, 6.3.2, and 6.3.3 – Other Renewable Energy: Design and Analysis (Mechanical Engineering) of Wind Turbines (6.3.1), Solar Power Systems (6.3.2), and Geothermal Generation Systems (6.3.3).** Reclamation does not currently have workload in these areas but does have the potential to develop these capabilities, including the ability to be a "smart buyer." This category was included in the COG study to allow evaluation of Reclamation's capability considering the Department's emphasis on the renewable development needs of the Nation. While this expertise could be further developed within Reclamation, the COG is simply presenting these findings, and no further action is planned by the COG at this time.

p) **8.1 – Environmental Studies.** While the "Environmental Studies" Functional Area was not identified as potentially endangered by the COG in the FY 2011 analysis, the reported capabilities reflect only those capabilities located within SPOs and not program offices. Since Reclamation's capability to complete environmental studies primarily resides within program offices (area offices and field offices, in this case), the number of capable employees shown in the spreadsheet generally under represents Reclamation's technical capability to complete this type of work. The TSC indicated their water quality workload is increasing, and they may consider increasing capability in that area. No further action is planned by the COG at this time.

q) **8.1.5 – Fish Hatchery Evaluations.** Reclamation's capability for completing fish hatchery evaluations is very limited and is dispersed throughout the agency. TSC reported two entry level and two journeyman level employees, with a sustainable workload but not fully self-sufficient. MP Region's apparent loss of three staff from the previous year was the result of employees being reassigned from a SPO to a program office, so no actual loss of capability occurred. The COG will continue to monitor this capability in the future, but no further action is planned at this time.

r) **8.2 – Economics.** While the "Economics" Functional Area was not identified as potentially endangered by the COG in the FY 2011 analysis, the

types of requests for economics assistance that are coming into the TSC are more complicated and address a greater number of resource issues than in the past. In addition to the need to address these increasing workload requests, there is also a need to consider hiring additional staff from the perspective of succession planning in order to maintain the current areas of technical expertise. For example, the four most senior economists in the TSC are eligible to retire within the next 7–8 years. Much of this work is inherently governmental workload, and loss of this capability could have possible negative consequences. A COG member was assigned to further investigate the increasing need for economic analysis support for Reclamation, and the findings support the TSC's 2012 Staffing Plan which includes two projected hires (Economist GS 9/11) and considers a third (Economist, GS 12). The economics group and TSC leadership should continue to coordinate closely with Policy and Administration, SSLE, and the regional offices to monitor workload and assess the effectiveness of how the staffing for this workload is distributed among TSC, Policy and Administration, and the regional offices. No further action is planned at this time, but the COG will continue to closely monitor this capability in the future.

s) **9.3.1.c – Research, Testing, and Specifications for Geotextiles.** TSC has one expert in the materials properties of geotextiles and geosynthetics located in the Materials Engineering and Research Lab. This position is responsible for testing and research and has been fully billable for many decades. The position works on a wide variety of issues, including canal linings, containment structures, waterstop, joint sealants, concrete dam repair, and roofing materials. This position works closely with TSC geotechnical design engineers on a number of these issues. The TSC Geotechnical Services Division has several engineers who have used geotextiles in design and construction for embankment dams and other facilities, but who do not typically perform research or testing of geotextiles or geosynthetics. For clarification, the COG recommends future data calls include an additional category to capture Reclamation's geotextile/geosynthetic design capability as follows: "4.1.6 Geotextiles/Geosynthetics analysis and design." This capability is currently sustainable and no further action is planned at this time.

t) **9.4.2 – Greenhouse.** This category was included in the Summary Table of Functional Areas and Technical Capabilities to ensure it was considered in light of the Department's emphasis on global warming, and with respect to the ongoing need for control and management of invasive plant species. The greenhouse work has been phased out over the past several years, and it is anticipated the site will be turned back to GSA in FY2012. However, trained and experienced ecology and plant biology technical specialists are available in the TSC, and the technical capability will continue to exist. While this expertise could be further developed within Reclamation, the COG is simply presenting the current status, and no further action is planned by the COG at this time.

Trend Analysis from Previous Report

This is the third COG report on technical capability, and data from FY 2009 and FY 2010 was reported alongside the new FY 2011 data to help the COG identify trends and/or areas where significant loss in capability had occurred. When reviewing the table, the COG noted several instances where a significant increase or decrease in capability was reported. However, in most cases, the reported decreases did not actually reflect a loss of capability but, rather, a reinterpretation of capability resulting from the COG refining instructions to improve reporting consistency between offices. These cells were marked with an "*" to denote that the changes in reported capability did not actually represent material changes in the number of employees capable of performing such work. The COG will continue to include past data along with future updates so that trends can be readily identified.

Conclusions and Recommendations

During the FY 2011 review, the COG identified the following capabilities as "endangered". Action Plans are developed for these capabilities, and a COG team leader has been assigned to monitor Reclamation's progress in developing and implementing them.

1. Design and Analysis of Tunnels – Item no. 3.2.4.e.
2. Static Analysis, Evaluation, and Design of Underground Excavations in Rock – Item No. 4.1.1.c(2).
3. Dynamic Analysis, Evaluation, and Design of Underground Excavations in Soil, and Dynamic Analysis, Evaluation – Item No. 4.1.2.b(1).
4. Design of Underground Excavations in Rock – Item No. 4.1.2.b(2).
5. Grouting Designs – Item No. 4.2.5.

The first four capabilities are being addressed in a single Action Plan entitled "Underground Excavation and Tunneling". The Action Plans will further analyze the issue from a corporate perspective including analysis of any related business practices, advance planning data, outsourcing advantages and disadvantages, human resource options, long-term corporate need, organizational options, etc. Subject matter experts and managers will be engaged in this process as appropriate. The Action Plans and implementation recommendations will be presented to the Deputy Commissioner of Operations.

In addition, the COG is continuing to monitor Reclamation's implementation of Action Plans for three skill sets identified as potentially "endangered" during previous capability reviews:

1. Structural analysis and design of plant facilities (power plants) - Item No. 3.2.2.c.
2. Analysis of hydraulic transients in power system waterways - Item No. 6.1.6.
3. Design and analysis of temperature control/selective withdrawal structures - Item No 6.2.4.

A COG team leader has been assigned to monitor implementation progress for each of these. Action Plan implementation has been completed for a fourth "endangered" capability identified in previous reviews, "Structural and/or hydraulic analysis, evaluation, and design of concrete dams (nonlinear structural analysis)."

The COG plans to continue updating and analyzing the technical capability data annually. The next update to the table will be initiated in August 2012, with a report issued as part of the FY 2012 COG Annual Report.

With only a few exceptions, it appears that Reclamation's broad range of technical expertise is generally sustainable and capable of performing the agency's mission. A wider breadth of information, such as staff utilization, workload predictability, and strategic outsourcing will be analyzed in concert with the capability data in the future.

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SUMMARY TABLE OF FUNCTIONAL AREAS AND TECHNICAL CAPABILITIES
FOR ALL RECLAMATION SERVICE PROVIDER ORGANIZATIONS

NUMBER OF CAPABLE EMPLOYEES — ENTRY LEVEL

FUNCTIONAL AREAS		TECHNICAL CAPABILITY	GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11
1.0 GENERAL																																
1.1 Dam Performance Monitoring	1.1.1	Design of performance monitoring instrumentation													5				1											5	1	0
	1.1.2	Installation of performance monitoring instrumentation														2	2	1	1			2	3							1	5	5
	1.1.3	Maintenance of performance monitoring instrumentation					3	3							1			1	1			2	3							2	6	6
	1.1.4	Analysis and evaluation of performance monitoring data				2	3	3			1				4			6	7	2										12	10	6
	1.1.5	Risk Analysis					2	2							4	4	3	6		7										10	6	12
1.2 Early Warning and Hazard Classification	1.2.1	Downstream hazard classification assessment				2	2	2							4	4	3	2												8	6	5
	1.2.2	Downstream consequence analysis including life loss				1	2	2							4	4	4	2		4										7	6	10
	1.2.3	Design of early warning systems													4															4	0	0
	1.2.4	Installation of early warning systems													4															4	0	0
	1.2.5	Maintenance of early warning systems													4															4	0	0
1.3 Examinations	1.3.1	On-site safety of dams examinations (CFR, PFR, ASI)				2	2	2			3	3	3	2	4				1	8				4	4	4				13	10	19
	1.3.2	Senior Engineer for Dam Safety CFR					1	1							1	4	1			5										1	5	7
	1.3.3	On-site mechanical examinations								1		1	1	1	1					4			2	4	4	4				6	6	11
	1.3.4	Examination of inaccessible features using remote equipment														2	1								2	2				0	4	3
	1.3.5	Underwater examination of inaccessible features by dive team						1																						0	0	1
	1.3.6	High scale examination of inaccessible features by climb team				2	3	3					1	1	2	2				1										4	6	5
	1.3.7	On-site O&M examination			2	2	2	2		2	2	3	3	2	4	2	2			13				4	4	4				13	13	27
	1.3.8	On-site examination of canals	3	3	2	1	1	1		3	2				2	2	2	3	1	1		5	5	4	4	4				13	19	17
	1.3.9	On-site examination of bridges	2	2			2	1						1	2	1				1				4	4	4			1	8	9	8
	1.3.10	Site security assessments					3	3				1	1	1	1			2	1	4				4	4	4				8	9	12
	1.3.11	Power O&M reviews				1	1	2			2				2			1	1	1	2	2	2							6	4	7
1.4 Site Security	1.4.1	Physical barrier analysis design					2	4		1		1	1	1		1	1													1	5	6
	1.4.2	Intrusion detection systems													1	2	2							4	4	4				5	6	6
	1.4.3	Design and analysis of security systems				1	1	1		1					2	2	2		1											3	5	3
1.5 Cost Estimating	1.5.1	Preparation of government cost estimates				2			2	2					4	4	4		1	2	1	6	5	1	1	1			8	10	14	20
1.6 Emergency Management	1.6.1	Emergency Action Plans				2		1							1			2		1				4	4	4				9	4	6
	1.6.2	Emergency management exercises				2		1							1			2		1										5	0	2
2.0 HYDROLOGY AND RIVER HYDRAULICS																																
2.1 Hydrology	2.1.1	Development of inflow design hydrographs				3	1	1	2	1					3	2	3	2	1	4				1	1	1				11	6	9
	2.1.2	Cross-drainage analysis	2	2	3	2	2	4	3	1					3	1	2	2	1					3	3	3				15	10	12
	2.1.3	Water supply forecasting													2		1		1	3										2	1	4
	2.1.4	Climate change impacts to supply and demand						3							1					4				1	1	1				2	1	8
	2.1.5	Snow (runoff) and precipitation estimating													3	1	1	2	1	3										5	2	4
	2.1.6	Flood frequency and statistical hydrologic analysis	2	2	3			3	2						2	1	2	4	3	2				1	1	1				11	7	11
	2.1.7	Extreme precipitation and flood event analysis up to the PMF							1						3	1	2	4	1	1				2	2	2				10	4	5
	2.1.8	Paleo-hydrologic flood analysis													1															1	0	0
	2.1.9	Flood inundation mapping					2	4							3	1	3	2		1					2	2				5	5	10
	2.1.10	Groundwater modeling				1		1							2		1			2				1	1	1				4	1	5
	2.1.11	Reservoir yield analysis													2		1		1	2				3	3	3				5	4	6
2.2 Sedimentation & River Hydraulics	2.2.1	1D river hydraulic modeling			3	5	5	6			1				3	1	1	1	2	3				3	3	3				12	11	17
	2.2.2	2D & 3D river hydraulic modeling	3	3	4					1					3	1	2	1	1	4				1	1	1				8	7	11
	2.2.3	River and reservoir numerical simulation				1	1	1				1			3	1	1			6				2	2	2				7	4	10
	2.2.4	Sediment transport numerical modeling and analysis						1							3	1	1			3										3	1	5
	2.2.5	River restoration analysis & design	2	2	3			3							3	1	1			2										5	3	9
	2.2.6	Geomorphologic analysis of river systems													2	1	1			2										2	1	3
3.0 ARCHITECTURE AND CIVIL ENGINEERING																																
3.1 Architecture	3.1.1	Architectural design of buildings and other structures							2			1	1	1	1															4	1	1
	3.1.2	Landscape architectural design	3	3	5				2			3	3	2	2															10	6	7
3.2 Civil Engineering	3.2.1	Structural design of buildings and other structures	2	2	3	2	2	4		1					5	6	5	4	6	4				2	2	2				15	19	18
	3.2.2	Structural analysis and design of plant facilities:																														
	3.2.2.a	water and wastewater treatment systems										1	1	1	5			1	1					2	2	2				9	4	3
	3.2.2.b	pumping plants						1				1	1	1	5	5	5	5	9	4				1	1	1				12	16	12
	3.2.2.c	power plants						1				1	1	1	3			3	7	7										7	8	9
	3.2.2.d	switchyards													3			3	4	6										6	4	6
	3.2.3	Structural and/or hydraulic analysis, evaluation, and design of:																														

NUMBER OF CAPABLE EMPLOYEES — JOURNEYMAN LEVEL

TECHNICAL CAPABILITY	GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11
1.1.1			2										5		1	5	4	4		1	1							10	5	8
1.1.2	2	2	2										3	2	3	5	4	4	3	2	2	2	2	2				15	12	13
1.1.3	2	2	2		4	4							4	2	2	5	4	4	3	3	3	2	2	2				16	17	17
1.1.4			2	1	1	1			5				5	3	3	5	4	6					1	1				11	9	18
1.1.5							2	2					3	1	1	10	12	18										15	15	19
1.2.1				1	1	1							4	1	1	11	4	4										16	6	6
1.2.2													3	1	1	14	17	22										17	18	23
1.2.3							2						5				2											7	2	0
1.2.4													2				2	1				1	1	1				3	3	2
1.2.5													2				2	1				1	1	1				3	3	2
1.3.1				1	1	1	2		2				6			10	5	6	2	2	2	2	2	2				23	10	13
1.3.2							2	2	2				2		2	12	11	16										16	13	20
1.3.3				2	1	1	1	2	2				1			3	3	2	2	2	2	2	2	2				11	10	9
1.3.4							3	3	2				1					1										4	3	3
1.3.5				2	5	4							1		1	1	1	1										4	6	6
1.3.6	1	1	2	1					2				1	1	2		1	3	4	3	3						1	7	6	13
1.3.7	3	3		1	1	1	6	6	9				5	8	8	3	4	8	3	3	3	2	2	2				23	27	31
1.3.8	1	1	3	1	1	1	5	2	9				7	10	10	9	4	4	4	3	6	2	2	2				29	23	35
1.3.9				1			2	1	3				5	4	5			1				2	2	2			2	10	7	13
1.3.10				1												11	17	10				2	2	2				14	19	12
1.3.11				3	3		1		3				1					4										5	3	7
1.4.1				7	5	5	3	4	5	1	1	1						1										11	10	12
1.4.2													1					1				2	2	2				3	2	3
1.4.3				3	3		3	4	5									1										6	7	6
1.5.1	6	6	5	11	1	1	4	6	7	3	4	4	4	5	6	9	7	7	1	8	6	6	6	6			5	44	43	47
1.6.1				1	1	1	2		4				2	2	2	4	3	3	1	1	1	1	1	1				11	8	12
1.6.2				1	1	1			4				1	1	1	4	3	3				1	1	1				7	6	10
2.1.1				7		3		4	5				2	1	1	8	5	5				2	2	2				19	12	16
2.1.2	2	2		11	5	8		4	4				2	3	3	8	5	5										23	19	20
2.1.3				3				1	3				3	1	2		3	5				1	1	1				7	6	11
2.1.4				2										1	1	4	2	5										6	3	6
2.1.5				2	2	3		1	1				2			8	5	5				1	1	1				13	9	10
2.1.6	2	2		8	8	10		2	2				2	1	1	17	15	5										29	28	18
2.1.7								1	1				2			8	6	2										10	7	3
2.1.8														1	1	1	2	1										1	3	2
2.1.9				7	5	6			1	1	1	1	2	1	1	12	4	5										22	11	14
2.1.10						1	2	2					1		1		2											3	4	2
2.1.11				3	3	3	3	3	3				1	1	1	3	2											10	9	7
2.2.1	3	3		8	6	7	2	1	2				3	2	2	11	8	1										27	20	12
2.2.2	2	2	1	2	1	1		2	2				3	2	2	11	9	1										18	16	7
2.2.3				4	4	4	3	3	4				1	2	2	15	9											23	18	10
2.2.4				2	2	5							2	2	2	10	8											14	12	7
2.2.5	1	1		4	4	5	3		1				2	2	2	10	8											20	15	8
2.2.6				1	1	3							2	1	1	4	2	3										7	4	7
3.1.1				1	1			1	1	3	3	2	1	1	1			1				2	2	2				7	8	7
3.1.2								2	2				1															1	2	2
3.2.1	2	2	1	6	6	5	5	5	6				1	1		11	11	5				2	2	2				27	27	19
3.2.2																														
3.2.2.a				2	2	3				1	1	1	1			2	2	5				3	3	3				9	8	12
3.2.2.b				2			2	2	2	1	1	1	1			1	1	4				1	1	1				8	5	8
3.2.2.c							2	2	2				2					3										4	2	5
3.2.2.d								2	2				2			1	1	2										3	3	4
3.2.3																														

NUMBER OF CAPABLE EMPLOYEES — SENIOR LEVEL, AND RECLAMATION TOTAL

TECHNICAL CAPABILITY	GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11	RECLAMATION TOTAL FY09	RECLAMATION TOTAL FY10	RECLAMATION TOTAL FY11
1.1.1			2	3	3	4			1							3	5	6										6	8	13	21	14	21
1.1.2	7	7	9	3	3	4			1							3	5	6		1	1							13	16	21	29	33	39
1.1.3	7	7	9	3	3	3			1							3	5	6		1	1							13	16	20	31	39	43
1.1.4	5	5	2	7	7	7			6				1			3	5	9										16	17	24	39	36	48
1.1.5				1	1	3			2				1			27	24	22										29	25	27	54	46	58
1.2.1				5	5	5							1			6	2	1										12	7	6	36	19	17
1.2.2				1	1	1							1			41	36	14										43	37	15	67	61	48 *
1.2.3				2	2	2		2	1				2			6	2	3										10	6	6	21	8	6
1.2.4				2	2	2							1			4	2	3										7	4	5	14	7	7
1.2.5				2	2	2							1			4	2	3										7	4	5	14	7	7
1.3.1	7	7	7	4	4	4		3	9				3			41	24	18				1	1	1				56	39	39	92	59	71 *
1.3.2				1	1	1		2	2				2			41	33	36										44	36	39	61	54	66
1.3.3				4	4	4			2				1	1	1	9	9	4				1	1	1				15	15	12	32	31	32
1.3.4				1	1	1		1	4				1			4	4	3										6	6	8	10	13	14
1.3.5					1			1	2				1	1	1	2	3	3										3	6	6	7	12	13
1.3.6	2	2	3	4	2	2							2	1	1			1		1	1							8	6	8	19	18	26
1.3.7	9	9	10	4	4	4	8	8	12				3			11	15	20				1	1	1				36	37	47	72	77	105
1.3.8	9	9	10	4	4	4		5	13				5			14	12	2				1	1	1				33	31	30	75	73	82
1.3.9	5	5	5	2	2	2		1	3	1	1		5	1	1			1				1	1	1				14	11	13	32	27	34
1.3.10				4	4	4							1			4	4	1				1	1	1				10	9	6	32	37	30
1.3.11	15	15	15			4	2	2	4				1			5	6	5										23	23	28	34	30	42
1.4.1								3	3																			0	3	3	12	18	21
1.4.2								2	1													1	1	1				1	3	2	9	11	11
1.4.3						3		5	5				1				1											1	6	8	10	18	17
1.5.1	3	3	2				8	7	10				10	9	8	3	2	2	2		1	2	2	2				28	23	25	82	80	92
1.6.1	3	3	3	4	1	1		2	2				2			2	1	2					1	1				11	8	9	31	20	27
1.6.2	3	3	3	4	1	1							1			3	3	1					1	1				11	8	6	23	14	18
2.1.1				2	6	2		3	3				3	1	1	6	2	7										11	12	13	41	30	38
2.1.2	2	2	2		5	1		4	3				3			6	2	3										11	13	9	49	42	41
2.1.3				3	8	3							2				2	8										5	10	11	14	17	26
2.1.4				1	1		1	1	1				1			4	2	6										7	4	7	15	8	21
2.1.5				3	8	4	1	1	1				3	1	1	6	2	8										13	12	14	31	23	28
2.1.6	2	2	1		5	1			1				3	1	1	18	15	7										23	23	11	63	58	40 *
2.1.7					5								3	1	1	8	2	3										11	8	4	31	19	12 *
2.1.8													1			2	3	4										3	3	4	5	6	6
2.1.9					5	1							3	2	2	6	2	4										9	9	7	36	25	31
2.1.10				1	1		2	3	3				2	1	1	1		6										6	5	10	13	10	17
2.1.11				1	1	1							2	1	1	5	4	3										8	6	5	23	19	18
2.2.1	2	2	2		5	1		1	1				3	2	2	6	8	15										11	18	21	50	49	50
2.2.2								1	1				3			2	8	12										5	9	13	31	32	31
2.2.3				1	7								2	1	1	14	9	15										17	17	16	47	39	36
2.2.4					6	1							3			6	8	11										9	14	12	26	27	24
2.2.5	2	2	2	1	8	2		2	2				3			6	8	15										12	20	21	37	38	38
2.2.6				3	8	1							1			6	3	18										10	11	19	19	16	29 *
3.1.1						1		1	1							1	1	1										1	2	3	12	11	11
3.1.2	1	1														1	1	1				1	1	1				3	3	2	14	11	11
3.2.1	1	1	1				2	2	2	2	2	2	5			9	9	3				1	1	1				20	15	9	62	61	46 *
3.2.2																																	
3.2.2.a													5			2	6	5										7	6	5	25	18	20
3.2.2.b								1	1				5			5	6	4										10	7	5	30	28	25
3.2.2.c													3			4	5	2										7	5	2	18	15	16
3.2.2.d									2				3			2	2	2										5	2	4	14	9	14
3.2.3																																	

Green = Self sufficient and sustainable. Yellow = Not self sufficient, but sustainable. Red = Capability is not sustainable. Orange = Possible endangered capability - See report.

NUMBER OF CAPABLE EMPLOYEES — ENTRY LEVEL

FUNCTIONAL AREAS	TECHNICAL CAPABILITY		GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11
	3.2.3.a	spillways										2	2	1	4	4	4	3	6	12				2	2	2				11	14	19
	3.2.3.b	outlet works							2			2	2	1	3	4	5	2	6	12				2	2	2				11	14	20
	3.2.3.c	concrete dams (basic)						1				1	1		1	6	6	3	2	6				3	3	3				8	12	16
	3.2.3.d	concrete dams (non-linear structural analysis)																	1	3											1	3
	3.2.4	Design and analysis of:																														
	3.2.4.a	fish facilities				2	3	4	2	2		3	3	2	4			2	4	4				3	3	3				16	15	13
	3.2.4.b	diversion structures				2	3	4	3	1		2	2	1	3					1				2	2	2				12	8	8
	3.2.4.c	canals			2	2	3	3	2	1		1	1	1	3	2	2	1	1	3				2	2	2			3	11	10	16
	3.2.4.d	pipelines			3	2	6	2	1	1		1	1	1	3	1	2	1	1	3	1	3	3	2	2	2			3	11	15	19
	3.2.4.e	tunnels														5	5	1	1	1				3	3	3				4	9	9
	3.2.5	Roads	2	2		2	3	1	3	1		1	1	1	4	1	1	1	1	1				2	2	2				15	11	6
	3.2.6	Bridges	4	4	4		2	3	4			1	1	1	4	6	5			2				2	2	2			1	15	15	18
4.0 GEOTECHNICAL/GEOLOGICAL ENGINEERING SERVICES																																
4.1 Geotechnical Engineering	4.1.1	Static analysis, evaluation, and design of:																														
	4.1.1.a	embankment dams													3	6	4	7	4	12				6	6	6				16	16	22
	4.1.1.b	foundations				2	2	4							5	4	3	7	3	9				6	6	6				20	15	22
	4.1.1.c	underground excavations:																														
	4.1.1.c(1)	soil				2	2	4			3				6	1	2	1						3	3					12	6	9
	4.1.1.c(2)	rock									2						1															3
	4.1.1.d	soil and rock slopes	2	2	3			1			2				4	1	1	7	5	7				3	3	3				16	11	17
	4.1.2	Dynamic analysis, evaluation, and design of:																														
	4.1.2.a	embankment dams														1	1	5	2	11				2	2	2				7	5	14
	4.1.2.b	underground excavations:																														
	4.1.2.b(1)	soil													3			1						2	2					6	2	0
	4.1.2.b(2)	rock																														0
	4.1.2.c	foundations													3	1	1	5	4	8				2	2	2				10	7	11
	4.1.2.d	soil and rock slopes													3			7	3	7				2	2	2				12	5	9
	4.1.3	Numerical modeling of seepage														3	3	7	2	9				2	2	2				9	7	14
	4.1.4	Dewatering evaluation and design									4				1	5	5	5		5				2	2	2				8	7	16
	4.1.5	Irrigation drainage analysis and design				2									4	4	4							2	2	2				8	6	6
4.2 Engineering Geology	4.2.1	Field mapping								1	1				2			1	1		1	1	1	3	3	3				7	6	5
	4.2.2	Field Exploration by:																														
	4.2.2.a(1)	Hard rock drilling and sampling (Geologist/Geotech)				2	2			1	1				1			1	1				3	1	1	1				5	5	5
	4.2.2.a(2)	Hard rock drilling and sampling (Drilling Staff)			3			3																								6
	4.2.2.b(1)	Augering (Geologist/Geotech)				2	2			1	1				1	1	1	7	1					1	1	1				11	6	3
	4.2.2.b(2)	Augering (Drilling Staff)			3			3																								6
	4.2.2.c(1)	SPT's (Geologist/Geotech)				2	2			1	1				1	1	1	7	1				3	1	1	1				11	6	6
	4.2.2.c(2)	SPT's (Drilling Staff)			3			3																								6
	4.2.2.d(1)	CPT's (Geologist/Geotech)								1	1				1			3	1				3							4	2	4
	4.2.2.d(2)	CPT's (Drilling Staff)						3																								3
	4.2.3	Geologic logging and analysis of soil and rock								1	1							5	1		1	1	3	1	1	1				7	4	5
	4.2.4	Blasting analysis and design													1		1	2	1		1	1	3							4	2	4
	4.2.5	Grouting designs							1						1			1	1		1	1	3							4	2	3
	4.2.6	Borrow material investigations														1	1	7	1		1	1	3	1	1	1			2	9	4	7
	4.2.7	Groundwater investigations								1	2				3	1	1	1	1		1	1	3							5	4	6
	4.2.8	Foundation modeling (2-D and 3-D)													1			5	2											6	2	0
4.3 Seismotectonics & Geophysics	4.3.1	Earthquake loading and response:													2			1												3		
	4.3.1.a	Fault source characterization						1									1		2												2	2
	4.3.1.b	Probabilistic seismic hazard assessment														3	2														3	2
	4.3.1.c	Earthquake time histories and response spectra																	1												1	0
	4.3.2	Geophysical site characterizations													1			2	3	3										3	3	3
5.0 ELECTRICAL ENGINEERING																																
5.1 Electrical Design	5.1.1	Electrical design for rotating machinery (generators and motors) and appurtenant equipment										1	1	1	1			1	2	2										3	3	3
	5.1.2	Design and analysis for electrical features of mechanical equipment				1	1	1			1	1	1	1	1	1	1	1	1	1		1	1							4	5	6
	5.1.3	Design and analysis of Plant electrical equipment				1	1	1							1	1	1	1	1	2		1	1							3	4	5
	5.1.4	Design and analysis of outdoor electrical distribution systems				1	1	1							1			1	1	2										3	2	3
	5.1.5	Design and analysis of substations, switchyards, transformers and circuit breakers				1	1	1				1	1	1	1	1	1	2	2	2		1	1							5	6	6
	5.1.6	Factory inspections of major electrical equipment				1	1	1							1			1	2	2										3	3	3

NUMBER OF CAPABLE EMPLOYEES — JOURNEYMAN LEVEL

TECHNICAL CAPABILITY	GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11
3.2.3.a				4			2		4	1	1	1	4	3	3	14	14	17										25	18	25
3.2.3.b										1	1	1	3	3	3	15	16	15										19	20	19
3.2.3.c													1			13	8	8				2	2	2				16	10	10
3.2.3.d																	5	5											5	5
3.2.4																														
3.2.4.a				10	4	1		3	5				2	1	1	4	4	3				1	1	1				17	13	11
3.2.4.b	3	3	1	10	4	2		5	5	1	1	1	2	5	5													16	18	14
3.2.4.c	3	3	1	9	4	6	1	3	5				2	5	5	3	3	1				2	2	2			1	20	20	21
3.2.4.d	3	3		9		3	2	2	5	2	2	1	2	5	5	6	6	2				2	2	2			1	26	20	19
3.2.4.e																4	3	1										4	3	1
3.2.5	2	2	3	7		2	4	5	5	2	2	1	3	4	4	2	2	2				2	2	2				22	17	19
3.2.6				4	1	2	2	1	1	1	1		2			2	3	2				1	1	1			1	12	7	7
4.1.1																														
4.1.1.a						1		3	5				1			10	19	18				2	1	1				13	23	25
4.1.1.b	3	3	4	7	5	6	6	4	5	2	3	2	6			10	19	17				3	2	2				37	36	36
4.1.1.c																												0	0	
4.1.1.c(1)				7	6	6			1				5			2	2					2	2					16	10	7
4.1.1.c(2)									1									2												3
4.1.1.d	3	3	2	3	1	1	4	4	6				5		1	10	21	19				1	1	1				26	30	30
4.1.2																														
4.1.2.a						1										7	15	13				3	2	2				10	17	16
4.1.2.b																														
4.1.2.b(1)													1			2	2					2	2					5	4	0
4.1.2.b(2)																		1												1
4.1.2.c													1			9	18	16				2	2	2				12	20	18
4.1.2.d													1			12	20	14				2	2	2				15	22	16
4.1.3						2										11	16	17				2	2	2				13	18	21
4.1.4			2			2	4		4				2			8	9	12				2	2	2				16	11	22
4.1.5				5		1	3						3	1	1							2	2	2				13	3	4
4.2.1			2	1	3	3	4	5	5				2	1		5	5	2	1	2	2							13	16	14
4.2.2																														
4.2.2.a(1)			2	7	7			5	4				1	1		5	5	3										13	18	9
4.2.2.a(2)			2			4																								6
4.2.2.b(1)			2	7	7			5	4				1	2	1	14	5	4										22	19	11
4.2.2.b(2)			2			4																								6
4.2.2.c(1)			2	7	7			5	4				1	2	1	14	4	3										22	18	10
4.2.2.c(2)			2			4																								6
4.2.2.d(1)			2		3			5	4					2	1	7	3											7	13	7
4.2.2.d(2)						1																								1
4.2.3			2	1	1		4	5	4				1	2	2	14	5	3	1	2	2							21	15	13
4.2.4			2					1	1							2	3		1	2	2							3	6	5
4.2.5							1	1	1				1			2	3	1	1	2	2							5	6	4
4.2.6			2	1	1		4	4	4				1			16	4	3	1	2	2						4	23	11	15
4.2.7			2	3	3		1	8	6				1	1	1	6	5	3	1	2	2							12	19	14
4.2.8				1			4	4	3				1			3	3											9	7	3
4.3.1													1			2						2						5		
4.3.1.a																	2	2											2	2
4.3.1.b																	1	1											1	1
4.3.1.c																	1	1											1	1
4.3.2							1						1				1	2				2	2	2				4	3	4
5.1.1							3		2							1	1	1										4	1	3
5.1.2				3	3		1									3	3	4	1	1	1							8	7	5
5.1.3				3	3				1							4	4	4	1	1	1							8	8	6
5.1.4				3	3				1							2	2	2										5	5	3
5.1.5				3	3		1	1	1					1	1	2	2	2										6	7	4
5.1.6				3	3	2			3							6	6	6	1	2	3							10	11	14

NUMBER OF CAPABLE EMPLOYEES — SENIOR LEVEL AND RECLAMATION TOTAL

TECHNICAL CAPABILITY	GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11	RECLAMATION TOTAL FY09	RECLAMATION TOTAL FY10	RECLAMATION TOTAL FY11
3.2.3.a								2	2				1			20	20	23				2	2	2				23	24	27	59	56	71
3.2.3.b								1	1				1			20	20	18				2	2	2				23	23	21	53	57	60
3.2.3.c													1			14	12	12										15	12	12	39	34	38
3.2.3.d																	2	4											2	4		8	12
3.2.4																																	
3.2.4.a						3		2	4				1	1	1	5	5	4				1	1	1				7	9	13	40	37	37
3.2.4.b	2	2	2			3		5	4				3			1	1					2	2	2				8	10	11	36	36	33
3.2.4.c	2	2	2					3	3				3			3	3	1										8	8	6	39	38	43
3.2.4.d	2	2	2					4	4				3			4	4	7	1	1	1	2	2	2				12	13	16	49	48	54
3.2.4.e			1			1										2	2	4										2	2	6	10	14	16
3.2.5	1	1	2			1		4	4				3					2										4	5	9	41	33	34
3.2.6	1	1	1					1	1				4			1	1	5										6	3	7	33	25	32
4.1.1																																	
4.1.1.a								3	3							23	21	21				2	1	1				25	25	25	54	64	72
4.1.1.b	3	3	2			1		3	3				1			23	22	22				1						28	28	28	85	79	86
4.1.1.c																																	
4.1.1.c(1)	2	2	1			1		1	5				1			2	5											5	8	7	33	24	23
4.1.1.c(2)			1			1			5									4												11			17
4.1.1.d	2	2	1					3	7				1			23	22	26										26	27	34	68	68	81
4.1.2																																	
4.1.2.a								1	1							23	19	18										23	20	19	40	42	49
4.1.2.b																																	
4.1.2.b(1)			1			1		1	1							2	3	1										2	4	4	13	10	4
4.1.2.b(2)			1			1			1									4												7			8
4.1.2.c			1			1		1	1							23	21	19										23	22	22	45	49	51
4.1.2.d			1			1		1	1							24	22	21										24	23	24	51	50	49
4.1.3								1	1							16	22	12				3	2	2				19	25	15	41	50	50
4.1.4			1					1	1							13	15	9					1	1				13	17	12	37	35	50
4.1.5	1	1	1					1	1				2															3	2	2	24	11	12
4.2.1	4	4	1	6	6	4	4	5	6						1	6	3	6	1	1	1	3	3	3				24	22	22	44	44	41
4.2.2																																	
4.2.2.a(1)	4	4	1	5	5	3		5	5						1	6	4	6			1	3	3	3				18	21	20	36	44	34
4.2.2.a(2)			3			3																								6			18
4.2.2.b(1)	4	4	1	5	5	3		5	5				1		1	29	4	6			1	3	3	3				42	21	20	75	46	34
4.2.2.b(2)			3			3																								6			18
4.2.2.c(1)	4	4	1	5	5	3		5	5						1	29	4	6			1	3	3	3				41	21	20	74	45	36
4.2.2.c(2)			3			3																								6			18
4.2.2.d(1)	4	4	1	1	1	1		5	5							20	4	1										25	14	8	36	29	19
4.2.2.d(2)																														0			4
4.2.3	4	4	1	6	3	3	4	5	5				1			23	4	7	1	1	1	3	3	3				42	20	20	70	39	38
4.2.4	4	4	1					4	4							3	2	3	1	1	1							8	11	9	15	19	18
4.2.5	4	4	2	2	3	1		4	4							4	5	6	1	1	1	1	1	1				12	18	15	21	26	22
4.2.6	4	4	1	6	3	3	4	4	4				1	1	1	29	6	7	1	1	1	3	3	3				48	22	20	80	37	42
4.2.7	4	4	1				1	9	9				2		1	6	4	6	1	1	1	3	3	3				17	21	21	34	44	41
4.2.8	1	1	1	6	3	3	4	4	4								1	5				3	3	3				14	12	16	29	21	19
4.3.1																4												4			12		
4.3.1.a																	3	3											3	3		7	7
4.3.1.b						1											2	3											2	4		6	7
4.3.1.c						1											5	2											5	3		7	4
4.3.2																4	2	3										4	2	3	11	8	10
5.1.1								2	1				1			2	1	1										3	3	2	10	7	8
5.1.2						3	2	2	2				1	1	1	3	3	3										6	6	9	18	18	20
5.1.3						3	3	2	2				1	1	1	3	3	3										7	6	9	18	18	20
5.1.4						3	3	2	2				1	1	1	2	2	2										6	5	8	14	12	14
5.1.5						3	2	2	2				1			2	2	2	1	1	1							6	5	8	17	18	18
5.1.6						3							1	1	1	5	5	5	3	1	1							9	7	10	22	21	27

Green = Self sufficient and sustainable. Yellow = Not self sufficient, but sustainable. Red = Capability is not sustainable. Orange = Possible endangered capability - See report.

NUMBER OF CAPABLE EMPLOYEES

ENTRY LEVEL

Functional Areas	No.	Technical Capability	GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11
5.2 Hydropower Technical Services	5.2.1	High voltage insulation testing (AC, DC, Doble) of winding, bus, and cable systems				1	1	2							1	1	1	1	1	1										3	3	4
	5.2.2	Analysis, condition assessment, trouble-shooting, diagnostics, and testing associated with generators and appurtenant electrical components				1	1	1							2	2	2		2	2										3	5	5
	5.2.3	Analysis, condition assessment, trouble-shooting, diagnostics, and testing associated with power apparatus						1							1			2	2	2										3	2	3
	5.2.4	Arc flash analysis															2			2												4
	5.2.5	SCADA system design and analysis							1						1				1	4	1	1	1							3	2	5
	5.2.6	Analysis, condition assessment of mechanical components of pumping and hydroelectric powerplants						1	1		1	1	1	1	1	2	2													3	3	5
	5.2.7	Analysis, condition assessment of penstocks and outlet works						1	1			1	1	1	2				1	1	1	1	1							5	3	4
5.3 Other Renewable Energy	5.3.1	Design and analysis of wind turbines													1															1	0	0
	5.3.2	Design and analysis of solar power systems										1	1	1	1	1	1	1	1	1										3	3	3
	5.3.3	Design and analysis of geothermal generation systems													1															1	0	0
6.0 MECHANICAL ENGINEERING																																
6.1 Hydraulic Equipment	6.1.1	Design and analysis of hydraulic control systems						1	2	1					1	1	1		1	1	1	1	1							4	4	4
	6.1.2	Design and analysis of pumps, turbines						1	1	1		1	2	1	2	3	2		1	1	1	1	1							5	8	6
	6.1.3	Design and analysis of gates and valves				2	2	4	1	1		2	3	2	2	2	3	1	1	2	1	1	1							9	10	12
	6.1.4	Design and analysis of penstocks and manifolds						1	3			1	2	1	1	1	1			1	1	1	1							6	4	5
	6.1.5	Design and analysis of steel tanks (air chambers, surge tanks, etc.)						1	3	1		2	3	2	2					1	1	1	1							8	5	5
	6.1.6	Analysis of hydraulic transients in power system waterways																												0	0	0
6.2 Mechanical Equipment	6.2.1	Design of heating, ventilation, and air conditioning systems						1	2						1	3	2													3	3	3
	6.2.2	Design analysis of stoplogs, gatehoists, trash racks, etc.						2	1	1		3	3	2	1	4	4	1	1	2	1	1	1							7	10	11
	6.2.3	Design and analysis of fire detection and suppression systems										1	1	1	1	2	2	1	1	3										3	4	6
	6.2.4	Design and analysis of temperature control/selective withdrawal structures							2	1					1			5	5	5										8	6	5
	6.2.5	Design and analysis of cranes	2	2	2							2	2	1	1					1										5	4	4
	6.2.6	Design and analysis of fish screens					1	2		1		2	2	2	1	1	1	1	2	3										4	7	8
	6.2.7	Turbine/pump performance and uprate analysis																		1										0	0	1
	6.2.8	Factory inspections of mechanical equipment						2							3	2	1			7				1	1	1				4	3	11
	6.2.9	On-site testing/inspection and assessments for startup and performance of:																														
	6.2.9.a	pumps and turbines						2	1						1	5	3					4	4	2	2	2				4	11	11
	6.2.9.b	penstocks						1	1						1	2	2		1					2	2	2				4	5	5
	6.2.9.c	outlet works						1	1						1	2	2							2	2	2				4	4	5
	6.2.9.d	pressure vessels													1	1			1	1				3	3	3				4	5	4
6.3 Other Renewable Energy	6.3.1	Design and analysis of wind turbines													1															1	0	0
	6.3.2	Design and analysis of solar power systems										1	1	1	1	2	1													2	3	2
	6.3.3	Design and analysis of geothermal generation systems													1															1	0	0
7.0 CONSTRUCTION AND OTHER SERVICES																																
7.1 Construction Management	7.1.1	Resident Engineer				1		2							2		4					2	2	2	2	2	4	5	6	9	9	16
	7.1.2	Field Engineer				1	2	2							2	1	5										4	5	6	7	8	13
	7.1.3	Construction inspection of:																														
	7.1.3.a	Grouting	2	2	1							1			2	2	7									5	3	3	2	8	7	15
	7.1.3.b	Rapid Tunneling	5	5	3										1	2	3							1	1	5	4	4	3	11	12	14
	7.1.3.c	Controlled Blasting										1			2	3	4							3	3	5	4	6	7	10	12	16
	7.1.3.d	Dam Embankment Const.	2	2	3		2								7	4	4	2		3	3	3	3			3	5	10	9	19	21	25
	7.1.3.e	Dam Concrete Const.	2	2	3		2					1	1	1	7		5				3	5	5	3	3	5	5	8	7	21	21	26
	7.1.3.f	Rock Bolts/Tendon Install	2	2	3										5	2	2	2						2	2	5	4	7	7	15	13	17
	7.1.3.g	Large Pump/Turbine Install	2	2	2		1								4	3	4		1	1	4	3	3	2	2	3	2	3	5	14	15	18
	7.1.3.h	Generator Rewinds				1		2							4	2	3										2	2	3	7	4	8
	7.1.3.i	Medium/High Voltage Equipment Install	6	6	4	1		1							4	3	6							1	1	1	2	3	3	14	13	15
	7.1.3.j	Electrical Control System Install	6	6	4	1	1	1							4	6	9	1	1		1	1	1	1	1	1	2	3	4	16	19	20
	7.1.3.k	Plant Startup						2							4	1	1		1		5	5	5				3	4	4	12	11	12
	7.1.3.l	NACE Coatings Inspect.	3	3	5		1	1							4	2	3				4	4	4							11	10	13
	7.1.3.m	Steel NDT Inspect.				1		1							4		1													5	0	2
	7.1.3.n	Structural Concrete	2	2	3	1	1	1				1	1	1	7	3	5				4	4	4			4	7	11	12	22	22	30
	7.1.3.o	Pipelines															2									4			5			11
	7.1.3.p	Pipeline Factory Inspection															4									2						6
	7.1.4	Construction claims analysis					1	4				1	1	1	2		1			3	6	7	4	1	1	1	5	6	10	15	16	24
	7.1.5	Construction Contract administration					1	4							2	9	9			1	5	3	4	1	1	1	6	9	9	14	23	28
	7.1.6	Construction scheduling				1	1	2							2	8	8		1	3	2	5	2	3	3	3	5	9	9	13	27	27
	7.1.7	Constructability reviews and guidance				1		2							2	5	5				5	5	3	1	1	1	4	6	6	13	17	17

JOURNEYMAN LEVEL

No.	GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11
5.2.1				3	3	1	1	1	2				1	1	1	1	1	1	3	3	3							9	9	8
5.2.2				3	3		1	1	2				1			1	1	3										6	5	5
5.2.3									1				1			2	2	2										3	2	3
5.2.4																		1												1
5.2.5							2		2					1	1	1	1	1					2	2				3	4	6
5.2.6							2						1			3	3	3	4	3	3							10	6	6
5.2.7							1		2				1				1	1	1	1	3							3	2	6
5.3.1													1															1	0	0
5.3.2													1			2	2	2				1	1	1				4	3	3
5.3.3													1															1	0	0
6.1.1							1	1	2				1			2	2	1										4	3	3
6.1.2				2	2	2	2	1	2	1	1	1	4	2	2	2	2	2										11	8	9
6.1.3				10	8	7	2	1	2	1	1	1	4	3	3	1	2	1										18	15	14
6.1.4													1			1	1	2										2	1	2
6.1.5								1	1				3					2										3	1	3
6.1.6																		2										0	0	2
6.2.1				2	2	2	1	1	1	1	1	1	1			2	2	2										7	6	6
6.2.2				5	6	4	2	1	2	1	1	1	1	2	2	2	2	1										11	12	10
6.2.3				2					1				1			1	1											4	1	1
6.2.4				1	1	1	2	1	1				1			4	4	2										8	6	4
6.2.5				2	2	2	2	1	1				1															5	3	3
6.2.6				5			2	1	1				1			3	3	5										11	4	6
6.2.7				1						1	1	1				2	2	2	1	1	1							5	4	4
6.2.8						2	2	1	2				1	1	1	4	4	4	1			2	2	2				10	8	11
6.2.9																														
6.2.9.a						1	1	1	1				1	2	2	1	1	1	2									5	4	5
6.2.9.b							1	1	1				1	3	3			1				1	1	1				3	5	6
6.2.9.c					1	1	1	1	1				1	3	3			1	1	1	1	1	1	1				4	7	8
6.2.9.d													1		2													1	0	2
6.3.1													1															1	0	0
6.3.2													1									1	1	1				2	1	1
6.3.3													1															1	0	0
7.1.1	3	3	5	2	2	2							3									1	1	1	4	4	5	13	10	13
7.1.2	3	3	5	4	1	3							3	3	2							1	1	1	4	4	5	15	12	16
7.1.3																														
7.1.3.a	3	3	3	5	3	3							5	2	2					3	3	2	2	2	2	2	2	17	15	15
7.1.3.b	2	2		5	3	3							2						2	2	2	2	2	1	2	2	2	15	11	8
7.1.3.c			2	5	3	3							1	2	2				2	2	2	2	2	4	3	4	4	13	13	17
7.1.3.d	4	4		5	3	3							6	1	2	9		4	7	7	7	3	3	3	5	6	6	39	24	25
7.1.3.e	4	4		5	3	3							6	2	4				7	6	6	1	1	2	3	4	4	26	20	19
7.1.3.f	3	3		5		1			3				4	3	4	7	3		2	2	2	2	2	2	3	4	4	26	17	16
7.1.3.g				7	2	2							4	3	3	2	2	2	1	1	1	1	1	2	1	1	1	16	10	11
7.1.3.h				2	1								4	3	3										2	2	2	8	6	5
7.1.3.i	2	2	2	2	1								4	1	3				3	2	2			1	1	2	2	12	8	10
7.1.3.j	2	2	2	2	1								4	1	3	2	2		1	1	1			1	2	2	2	13	9	9
7.1.3.k				2	1	1							4	1	1				2	2	2	1	1	1	2	3	3	11	8	8
7.1.3.l	5	5	2	5	3	3							3	1	3				1			1	1	1			1	15	10	10
7.1.3.m				5	2	2							3		2				2	2	2	2	2	2				12	6	8
7.1.3.n	4	4		5	3								4	3	5				4	6	6	2	2	2	4	5	7	23	23	20
7.1.3.o															2									2			1			5
7.1.3.p															3			1						2			1			7
7.1.4				5	2	2							3	8	7	1	1		1	5	3	2	2	2	2	2	2	14	20	16
7.1.5				5	3	2							3	3	2				2	6	4				4	3	4	14	15	12
7.1.6				1	1	1							3	7	6	2	2		2	2	2	1	1	1	3	6	6	12	19	16
7.1.7				3	5	6							3	4	4			1	6	6	6	1	1	1	4	4	4	17	20	22

SENIOR LEVEL and **RECLAMATION TOTAL**

No.	GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11	RECLAMATION TOTAL FY09	RECLAMATION TOTAL FY10	RECLAMATION TOTAL FY11
5.2.1	1	1	1			3	2	2	1							1	1											4	4	5	16	16	17
5.2.2						3	2	2	1							2	2	1										4	4	5	13	14	15
5.2.3						3		2	2							1	1	1										1	3	6	7	7	12
5.2.4																		1												1			6
5.2.5								2	1				1			2	2	2					1	1				3	5	4	9	11	15
5.2.6								2	2							6	6	6										6	8	8	19	17	19
5.2.7							1	2	1							1	1	1										2	3	2	10	8	12
5.3.1																												0	0	0	2	0	0
5.3.2								1	1							1	1	1										1	2	2	8	8	8
5.3.3																												0	0	0	2	0	0
6.1.1								1	1							4	4	2										4	5	3	12	12	10
6.1.2								1	1				5			3	3	2										8	4	3	24	20	18
6.1.3								1	1				5			4	4	4										9	5	5	36	30	31
6.1.4																2	2	1										2	2	1	10	7	8
6.1.5								1	1				4			2	2	1										6	3	2	17	9	10
6.1.6																2	2	2										2	2	2	2	2	4
6.2.1								1	1									1										0	1	2	10	10	11
6.2.2							1	1	1							1	1	2										2	2	3	20	24	24
6.2.3																1	1	1										1	1	1	8	6	8
6.2.4								1	1							2	2	4										2	3	5	18	15	14
6.2.5	1	1	1					1	2							1	1	1										2	3	4	12	10	11
6.2.6					3	3		2	2							1	1	3										1	6	8	16	17	22
6.2.7																1	1	3										1	1	3	6	5	8
6.2.8								1	1							4	4	5	2	2	2	1	1	1				7	8	9	21	19	31
6.2.9																																	
6.2.9.a						4		1	1					1	1	3	3	1	3	2	2							6	7	9	15	22	25
6.2.9.b								1	1							1	1	1	2	2	2	1	1	1				4	5	5	11	15	16
6.2.9.c								1	1							2	2	1	2	2	2	1	1	1				5	6	5	13	17	18
6.2.9.d																1	1	1	2	2	2							3	3	3	8	8	9
6.3.1																												0	0	0	2	0	0
6.3.2																												0	0	0	4	4	3
6.3.3																												0	0	0	2	0	0
7.1.1	2	2	1	1	3	3		1	1				2	1	1										1	2	3	6	9	9	28	28	38
7.1.2	2	2	1	1	1	3		1	1				2	1	1				1	1	1	1	1	1	1	2	3	8	9	11	30	29	40
7.1.3																																	
7.1.3.a	6	6	3					1	1				3	1				1	4	4	4	4	5	3	1	1	1	18	18	13	43	40	43
7.1.3.b			1					1	1										1	1	1	4	5	4	2	2	2	7	9	9	33	32	31
7.1.3.c	1	1	1					1	1										3	3	3		1	1	3	3	3	7	9	9	30	34	42
7.1.3.d	3	3	5					1	1				2	2	2	20		3	3	3	3	3	4	3	4	5	5	35	18	22	93	63	72
7.1.3.e	2	2	4					1	1				2						3		1			3	3	4	3	10	7	12	57	48	57
7.1.3.f	3	3	5		1				2				2			8			3	3	3	4	5	3	3	3	3	23	15	16	64	45	49
7.1.3.g					1	2							2	1	1	3	3	2	4	4	4				2	2	2	11	11	11	41	36	40
7.1.3.h					1	3							2	1	1										1	1	1	3	3	5	18	13	18
7.1.3.i					1	2			1				2	1	1				3	1	1				1	1	1	6	4	6	32	25	31
7.1.3.j					1	2			1				2	1	1	3	3		2	1	1				1	1	1	8	7	6	37	35	35
7.1.3.k						3			1				3			1	1	1	3	2	2				2	3	3	9	6	10	32	25	30
7.1.3.l									1				5						4	3	3	1	1	3				10	4	7	36	24	30
7.1.3.m													3						2	2	2	1	1	3				6	3	5	23	9	15
7.1.3.n	2	2	4			3							2	3	3				2	2	4	4	4	3	3	4	3	13	15	20	58	60	70
7.1.3.o			1												3			1						6			2			13			29
7.1.3.p																								4						4			17
7.1.4	5	5	5	1	2	7			1				4	3	2	1	1	1	2	1	1	2	2	2	4	4	4	19	18	23	48	54	63
7.1.5	5	5	4	4	7	7							4	5	3			1	4	1	1	2	2	2	2	3	3	21	23	21	49	61	61
7.1.6	5	5	4	1	1	1							4	3	2	2	1	1	1						2	3	3	15	13	11	40	59	54
7.1.7	5	5	4	1		4							4	6	4	2	1	1	4	4	4	1	1	1	4	5	5	21	22	23	51	59	62

Green = Self sufficient and sustainable. Yellow = Not self sufficient, but sustainable. Red = Capability is not sustainable. Orange = Possible endangered capability - See report.

NUMBER OF CAPABLE EMPLOYEES — ENTRY LEVEL

FUNCTIONAL AREAS	TECHNICAL CAPABILITY		GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11
	7.1.8	Field Testing of:																														
	7.1.8.a	soil	2	2	1						1	1	1	1	3	1	7	6			3	1	3				4	4	4	19	9	17
	7.1.8.b	concrete	2	2	1							1	1	1	3	1	7				3	1	3				4	4	4	13	9	16
7.2 Surveys, Mapping, & GIS/Remote Sensing	7.2.1	Land Surveys (GPS)				2		6	2	2	5		1	1	3	3	3													7	6	15
	7.2.2	Land Surveys (Lidar)			1				2	2	1				3									1	1	1				6	3	3
	7.2.3	Construction surveys				2	2	2	2	2	2				3	11	5													7	15	9
	7.2.4	Photogrammetry							2	2	2				2	1	1	1						1	1	1				6	4	4
	7.2.5	Reservoir sedimentation surveys													1	1	1	5	5											6	6	1
	7.2.6	Bathymetric surveys of rivers and reservoirs						2	1	1	1				1	2	2	5	5											7	8	5
	7.2.7	Hydroacoustic surveys													1	1	1	5	5	1										6	6	2
	7.2.8	GIS	1	1	1		3	5			1				2	1	1													3	5	8
	7.2.9	Remote Sensing									1				2	1	1													2	1	2
8.0 ENVIRONMENTAL AND ECONOMIC SERVICES																																
8.1 Environmental Studies	8.1.1	Limnological studies													1									1	1	1				2	1	1
	8.1.2	Aquatic habitat analysis																2	2	2				1	1	1				3	3	3
	8.1.3	Fish and wildlife population analysis																		2										0	0	2
	8.1.4	Field bio-assessments																		2				1	1	1				1	1	3
	8.1.5	Fish hatchery evaluations						1												2										0	0	3
	8.1.6	Invasive species research and management													1					3				1	1	1				2	1	4
	8.1.7	Aquatic ecology research																1	1	2				1	1	1				2	2	3
	8.1.8	ESA Consultation						1												1										0	0	2
	8.1.9	NEPA (EA/EIS Preparation)									1				2	1	1			1				1	1	1				3	2	4
	8.1.10	Water quality modeling																							1	1				0	1	1
	8.1.11	Water quality studies						1		6	8									3					1	1				0	7	13
	8.1.12	Cultural resource assessments							1	2	2				1															2	2	2
8.2 Economics	8.2.1	Economic impact analysis													1															1	0	0
	8.2.2	Cost/Benefit analyses for project planning													1	2	1													1	2	1
	8.2.3	Payment capacity determinations													1															1	0	0
	8.2.4	Cost allocation analysis and computation													1															1	0	0
9.0 LABORATORY SERVICES																																
9.1 Water Quality	9.1.1	Research and development for water desalination processes																1	1	1										1	1	1
	9.1.2	Research and development of other impaired water treatment processes																1	1	1										1	1	1
	9.1.3	Lab analysis of substances in soil, sediment and water					3	4		1	1																			0	4	5
	9.1.4	Field Sampling						1		2	2				2			1		3										3	2	6
9.2 Hydraulic Laboratory Services	9.2.1	Hydraulic research, testing, analysis using:																														
	9.2.1.a	Computational modeling													1			1	2	4										2	2	4
	9.2.1.b	Physical modeling																1	3	3										1	3	3
	9.2.1.c	Erosion and sediment deposition modeling													2				1	3										2	1	3
9.3 Materials Research and Engineering	9.3.1	Research, testing and specifications for:																														
	9.3.1.a	Concrete													2	2	2	1	1	4				1	1	1				4	4	7
	9.3.1.b	Soils/rock													2	2	3	6	2	3				1	1	1				9	5	7
	9.3.1.c	Geotextiles																1												1	0	0
	9.3.1.d	Coatings																1	1	1										1	1	1
	9.3.1.e	Corrosion																1	1	1										1	1	1
9.4 Environmental Laboratories	9.4.1	Fish laboratory																1	1	1										1	1	1
	9.4.2	Greenhouse																1	1											1	1	0
	9.4.3	Invasive species						2												2										0	0	4

NUMBER OF CAPABLE EMPLOYEES — JOURNEYMAN LEVEL

TECHNICAL CAPABILITY		GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11
7.1.8	Field Testing of:																														
7.1.8.a	soil	4	4	3						3				2	1	4	11	3		4	6	6	2	2	2	2	3	2	25	19	20
7.1.8.b	concrete	4	4	3										2	1	4				4	5	5	2	2	2	2	3	2	14	15	16
7.2.1	Land Surveys (GPS)				11	12	2	2	2	3				2	1	1	6	9	4		2	2	2	2	2				23	28	14
7.2.2	Land Surveys (Lidar)							1	2	4				1	1	1	1	1	3										3	4	8
7.2.3	Construction surveys				5	5	5	2	2	2				2	4	3						1	2	2	2				11	13	13
7.2.4	Photogrammetry			2				2	2	6				1	1	1	2	6	3										5	9	12
7.2.5	Reservoir sedimentation surveys								1	3				1			1	8	1										2	9	4
7.2.6	Bathymetric surveys of rivers and reservoirs							1	1	3				1			1	8	3										3	9	6
7.2.7	Hydroacoustic surveys													1			5	9	2										6	9	2
7.2.8	GIS	1	1		3			2	3	3	1	1	1	1	1	1	11	5	4										19	11	9
7.2.9	Remote Sensing							1	2	3	1	1	1	1					1										3	3	5
8.1.1	Limnological studies				1	1	1										2	2											3	3	1
8.1.2	Aquatic habitat analysis					1		3		1							5	5	4										8	6	5
8.1.3	Fish and wildlife population analysis					1		3									8	8	2										11	9	2
8.1.4	Field bio-assessments					1		5	2	3							4	4	2										9	7	5
8.1.5	Fish hatchery evaluations					1		2				1							2										2	2	2
8.1.6	Invasive species research and management				1	1	2							1			6	6	3										8	7	5
8.1.7	Aquatic ecology research				3	1		3									7	7	2				2	2	2				15	10	4
8.1.8	ESA Consultation				1	1		6	5	6							1	2	2										8	8	8
8.1.9	NEPA (EA/EIS Preparation)				1	1	1	6	1	2				4			2	2	3										13	4	6
8.1.10	Water quality modeling				2		1		2	4						2													2	2	7
8.1.11	Water quality studies				2		2		7	5						2	3	2	4										5	9	13
8.1.12	Cultural resource assessments							4	2	4								2	5										4	4	9
8.2.1	Economic impact analysis													2			6	6	3				1	1	1				9	7	4
8.2.2	Cost/Benefit analyses for project planning									1				1		3	4	4	4				1	1	1				6	5	9
8.2.3	Payment capacity determinations				1	1	1			1				1			2	2	2				1	1	1				5	4	5
8.2.4	Cost allocation analysis and computation				2	2	2			1				1			1	1	1				1	1	1				5	4	5
9.1.1	Research and development for water desalination processes																6	7	9										6	7	9
9.1.2	Research and development of other impaired water treatment processes																6	7	9										6	7	9
9.1.3	Lab analysis of substances in soil, sediment and water				1	1	1		2	2				1			2	2											4	5	3
9.1.4	Field Sampling				1	2		1	6	5				4	1	1	6	5	9										12	14	15
9.2.1	Hydraulic research, testing, analysis using:																														
9.2.1.a	Computational modeling					1	1							2			11	9	1										13	10	2
9.2.1.b	Physical modeling					1	1										3	3	3										3	4	4
9.2.1.c	Erosion and sediment deposition modeling					1	1							3			11	9	2										14	10	3
9.3.1	Research, testing and specifications for:																														
9.3.1.a	Concrete													3			3	3	2				1	1	1				7	4	3
9.3.1.b	Soils/rock													3			6	2	4				1	1	1				10	3	5
9.3.1.c	Geotextiles																2												2	0	0
9.3.1.d	Coatings																2	2	1										2	2	1
9.3.1.e	Corrosion																1	1	1										1	1	1
9.4.1	Fish laboratory																		2										0	0	2
9.4.2	Greenhouse																												0	0	0
9.4.3	Invasive species													1					1										1	0	1

NUMBER OF CAPABLE EMPLOYEES — SENIOR LEVEL AND RECLAMATION TOTAL

TECHNICAL CAPABILITY		GP FY09	GP FY10	GP FY11	PN FY09	PN FY10	PN FY11	MP FY09	MP FY10	MP FY11	UC FY09	UC FY10	UC FY11	LC FY09	LC FY10	LC FY11	TSC FY09	TSC FY10	TSC FY11	FCCO FY09	FCCO FY10	FCCO FY11	PROVO FY09	PROVO FY10	PROVO FY11	MPCO FY09	MPCO FY10	MPCO FY11	SUM FY09	SUM FY10	SUM FY11	RECLAMATION TOTAL FY09	RECLAMATION TOTAL FY10	RECLAMATION TOTAL FY11
7.1.8	Field Testing of:																																	
7.1.8.a	soil	3	3	3						5				3	3	3	18	4		2	2	2	3	3	3	3	4	4	32	19	20	76	47	57
7.1.8.b	concrete	2	2	2						1				3	2	3				2	2	3	3	3	3	3	4	4	13	13	16	40	37	48
7.2.1	Land Surveys (GPS)			1				2	2	2				1			5	6	16	3	1	4	2	2	2				13	11	25	43	45	54
7.2.2	Land Surveys (Lidar)				4	4	4	1	2	2				1			1	1	4										7	7	10	16	14	21
7.2.3	Construction surveys			4			1	1	2	2				1	1	1				3	3	3	2	2	2			1	7	8	14	25	36	36
7.2.4	Photogrammetry			1				1	1	2							2	1	6										3	2	9	14	15	25
7.2.5	Reservoir sedimentation surveys								2	2							3	4	8				2	2	2				5	8	12	13	23	17
7.2.6	Bathymetric surveys of rivers and reservoirs							1	1	2							4	5	11				2	2	2				7	8	15	17	25	26
7.2.7	Hydroacoustic surveys																6	4	3										6	4	3	18	19	7
7.2.8	GIS	1	1	1	4	4	4			2							9	5	7				1	1	1				15	11	15	37	27	32
7.2.9	Remote Sensing				4	4	4	1	1	2							1	1	1										6	6	7	11	10	14
8.1.1	Limnological studies				2	1	3		1	1							4	4	3				2	2	2				8	8	9	13	12	11
8.1.2	Aquatic habitat analysis				4	1	2	2	6	3							5	5	5				3	3	3				14	15	13	25	24	21
8.1.3	Fish and wildlife population analysis				2	1	2	2	5	5							4	4	3				2	2	2				10	12	12	21	21	16
8.1.4	Field bio-assessments				2	1	2		6	5								5	4				3	3	3				5	15	14	15	23	22
8.1.5	Fish hatchery evaluations				1				3								1	1											2	4	0	4	6	5
8.1.6	Invasive species research and management				1	1			1	1							2	2	4				2	2	2				5	6	7	15	14	16
8.1.7	Aquatic ecology research				3	1	2	2	6								9	7	10										14	14	12	31	26	19
8.1.8	ESA Consultation				4	1	2	2	9	10									2				2	2	2				8	12	16	16	20	26
8.1.9	NEPA (EA/EIS Preparation)				3			2	11	14							1	2	2				2	2	2				8	15	18	24	21	28
8.1.10	Water quality modeling				1	2	1		4	4								1	3										1	7	8	3	10	16
8.1.11	Water quality studies				3	1	3		9	10							6	5	11										9	15	24	14	31	50
8.1.12	Cultural resource assessments				1	1	1	2	5	6													1	1	1				4	7	8	10	13	19
8.2.1	Economic impact analysis							1	3	1							4	4	4				1	1	1				6	8	6	16	15	10
8.2.2	Cost/Benefit analyses for project planning							1	1	1				4			4	4	5				1	1	1				10	6	7	17	13	17
8.2.3	Payment capacity determinations							1	1	1				4			1	1	1				1	1	1				7	3	3	13	7	8
8.2.4	Cost allocation analysis and computation							1	1	1				4			2	2	2				1	1	1				8	4	4	14	8	9
9.1.1	Research and development for water desalination processes																6	5	5										6	5	5	13	13	15
9.1.2	Research and development of other impaired water treatment processes																6	5	5										6	5	5	13	13	15
9.1.3	Lab analysis of substances in soil, sediment and water				3	2	2		3	4							1	1	4										4	6	10	8	15	18
9.1.4	Field Sampling				4	2	2	7	6	7					1	1	5	3	11										16	12	21	31	28	42 *
9.2.1	Hydraulic research, testing, analysis using:																																	
9.2.1.a	Computational modeling													3			6	9	16										9	9	16	24	21	22
9.2.1.b	Physical modeling																7	7	7										7	7	7	11	14	14
9.2.1.c	Erosion and sediment deposition modeling																8	10	13										8	10	13	24	21	19
9.3.1	Research, testing and specifications for:																																	
9.3.1.a	Concrete																4	4	4										4	4	4	15	12	14
9.3.1.b	Soils/rock																20	4	5										20	4	5	39	12	17
9.3.1.c	Geotextiles																5	1	2										5	1	2	8	1	2
9.3.1.d	Coatings																1	1	1										1	1	1	4	4	3
9.3.1.e	Corrosion																1	1	1										1	1	1	3	3	3
9.4.1	Fish laboratory																		2										0	0	2	1	1	5
9.4.2	Greenhouse																		2										0	0	2	1	1	2
9.4.3	Invasive species																	3	3										0	3	3	1	3	8

Cells marked with "*" indicate a significant change in reported number of capable employees due to refinement of reporting instructions, rather than actual changes in staffing levels.

Green = Self sufficient and sustainable. Yellow = Not self sufficient, but sustainable. Red = Capability is not sustainable. Orange = Possible endangered capability - See report.

Appendix B

Action Plans and Status

Appendix B

Action Plans and Status

Table B-1 provides an update on the incomplete Endangered Capability Action Plans sorted by the fiscal year (FY) in which they were identified. The Action Plans for those capabilities identified as endangered in FY 2011 follow the table.

Table B-1. Update on Incomplete Endangered Capability Action Plans

FY 2009 Technical Capability Data Analysis	
Endangered Capability:	**Structural Analysis and Design of Plant Facilities (Powerplants)**
Action Plan:	In COG FY 2010 Annual Report, http://www.usbr.gov/bp/tr.html
Implementation Status:	The COG has drafted a memo for transmittal by the DCO after the FY 2011 endangered capabilities action plans are completed so the memo can address all endangered capabilities. The TSC anticipates staff, including rehired annuitants, will begin updates/revisions to the design standards for powerplants at or near the beginning of calendar year 2012. A draft Memorandum of Understanding (MOU) with Hydro Quebec was transmitted. The MOU was subsequently redrafted to include the U.S. Army Corps of Engineers Hydroelectric Design Center in Portland, Oregon, as a third signatory and was transmitted to both parties. Reclamation is awaiting comments.
Endangered Capability:	**Design and Analysis of Temperature Control/Selective Withdrawal Structures**
Action Plan:	In COG FY 2010 Annual Report, http://www.usbr.gov/bp/tr.html
Implementation Status:	The proposed recommendation is to develop a design standard that documents the procedures, design considerations, design stresses and codes, and other factors required to be able to perform the design and analysis of Temperature Control/Selective Withdrawal Structures. The TSC has identified personnel with the appropriate expertise to prepare this document; however, this task has not started due to workload constraints. The TSC, Civil Engineering Services Division, has funding and is tentatively planning to begin this work in calendar year 2012.

Table B-1. Update on Incomplete Endangered Capability Action Plans

FY 2010 Technical Capability Data Analysis	
Endangered Capability:	**Analysis of Hydraulic Transients in Power System Waterways**
Action Plan:	In COG FY 2010 Annual Report, http://www.usbr.gov/bp/tr.html
Implementation Status:	In FY 2011, the TSC conducted a survey of available hydraulic transient analysis software, assuming the vendors would offer training in the use of their product. The evaluation of the available software determined it to be more user-friendly; however, it did not have the full capabilities of Reclamation's existing software and could not perform the analyses needed by Reclamation. Therefore, training in Reclamation's existing software is the recommended course of action. The goal of the TSC, Hydraulic Equipment Group, is to complete training in FY 2013.
FY 2011 Technical Capability Data Analysis	
Endangered Capability:	**Underground Excavation and Tunneling** **This action plan addresses the following capabilities:** **1. Design and Analysis of Tunnels** **2. Static Analysis, Evaluation, and Design of Underground Excavations in Rock** **3. Dynamic Analysis, Evaluation, and Design of Underground Excavations in Soil** **4. Dynamic Analysis, Evaluation, and Design of Underground Excavations in Rock**
Action Plan:	Follows this table.
Implementation Status:	New
Endangered Capability:	**Grouting Designs**
Action Plan:	Follows this table.
Implementation Status:	New

Reclamation Coordination and Oversight Group Action Plan for Endangered Capabilities

Underground Excavation and Tunneling

April 2012

Purpose

This Action Plan will create a business case to address endangered capabilities identified as a result of the Coordination and Oversight Group (COG) FY 2011 Technical Capability Report (Report), including a recommended preferred approach. The effort will include the formation of a small team to complete the Action Plan. The team will include a COG member, subject matter experts, and management representative identified by the Technical Service Center (TSC).

Elements of the Action Plan

1. Endangered Capability and Organization Code:

- Design and Analysis of Tunnels, 86-68140
- Static Analysis, Evaluation, and Design of Underground Excavations in Rock, 86-68300
- Dynamic Analysis, Evaluation, and Design of Underground Excavations in Soil; 86-68300
- Dynamic Analysis, Evaluation, and Design of Underground Excavations in Rock, 86-68300

Action Plan Team Response

This action plan addresses four capabilities that are closely related. Although four distinct capabilities were identified as endangered, they have similarities and the same approach for resolution.

Underground excavation analysis and design and tunnel analysis and design have been identified as endangered due to a lack of sufficient workload to sustain this capability into the future. There are several individuals employed in the TSC who have a strong background in these areas and, as opportunities allow, particular

efforts are made to provide mentoring and training to less experienced engineers to assist with the transfer of knowledge.

2. Action Plan Team

- Team lead and COG member: Rick Scott (transitioning to Dick LaFond)
- Team members and subject matter experts: Jeanne Major, Dom Galic, Michael Romansky.
- Scope: Perform the analysis in this Action Plan necessary to propose a solution to address the endangered capability.

3. Is the Endangered Capability a Capability Required by Reclamation?

Considerations

The Report states (page 1) that "… the COG focused on 'critical' capabilities where Reclamation must have in-house capability to accomplish its mission and/or remain a 'smart buyer' when procuring technical services." The Report goes on to say that updates to the capability listing will be made to reflect the changing needs of the organization. The intent of this element in the Action Plan is to discuss the subject endangered capability to confirm the mission criticality of the capability. The discussion should include coordination with regional service providers (as appropriate) to confirm the distribution of the capability throughout the organization.

Action Plan Team Response

Underground excavations and tunnel design and analysis are technical capabilities that should be maintained by Reclamation. With the current emphasis on obtaining clean energy sources, hydroelectric power is being considered on a more frequent basis. When hydroelectric power options are explored, there are three options (1) a pipeline through the embankment, (2) a tunnel within the abutment, or (3) a lake tap arrangement through the foundation. Since pipelines through existing embankments create significant problems and issues related to safe operation of the dam, they are rarely, if ever, pursued. Therefore, the two remaining options, an abutment tunnel or a lake tap, are used in the development of hydroelectric power on existing facilities. Both of these methods require expertise and technical capability in tunneling and underground excavation. Whenever these options are being explored on Reclamation dams, it is critical that Reclamation staff possess the technical expertise required to ensure that any potential modifications are performed in accordance with Reclamation and industry standards.

Additionally, there are areas of the country where water supply infrastructure has not been fully developed. Where tunnels are being considered for such projects, Reclamation may be involved from both a design and construction perspective.

4. Clients of the Endangered Capability

Considerations

The business case made by this Action Plan should include a listing of the clients of the endangered capability. Are there clients from organizations outside of Reclamation? If so, what proportion of the total workload for the endangered capability is associated with these external clients?

Action Plan Team Response

Clients for this capability include those Reclamation offices that will be involved with tunnels and/or underground excavations within their respective area of responsibility.

5. Contracting of the Endangered Capability

Considerations

Discuss the proportion of the total workload for the endangered capability that is being contracted to resources outside of Reclamation. Sources to determine the amount of contracting can be the Reclamation Design and Construction Coordination Team or procurement database queries. In some cases, the Action Plan team members may be aware of the complete contracting environment without any additional research.

Action Plan Team Response

The only potential for outsourcing these services is in Indian Water Rights Settlement projects. When Tribes have the ability to contract for technical services, the source of those services is at the respective Tribe's discretion.

6. Is the Endangered Capability a Short-Term or Long-Term Need?

Considerations

Short term could be considered 4 years or less.

Action Plan Team Response

As previously noted, underground excavation and tunneling have been identified as endangered capabilities due to lack of workload. Future opportunities are likely to arise, and therefore the need to maintain this capability is considered to be a long-term need. However, short-term needs capabilities are also important to bridge the gap until an underground excavation project is initiated.

7. Results of Short-Term and Long-Term Workload and Staffing Projections

Considerations

The Report includes staffing levels for the capabilities and the assessment of the sustainability of that capability by the appropriate manager. This element of the

Action Plan will update that analysis with the results of specific short- and long-term workload and staffing projections with a reconsideration of the sustainability assessment.

Action Plan Team Response

Unless there is a significant increase in underground excavations and tunneling work, it is not recommended that additional staff be pursued. However, as noted in the proposed recommendation below, existing personnel with technical capabilities in these areas should be identified. Additionally, personnel with rock mechanics capability should be identified because they may be capable of underground excavation design, determining whether the complexity of the work is beyond Reclamation's capability and whether the assistance of a non-Reclamation expert should be sought.

8. Strategies Considered to Maintain the Capability

Considerations

Feasible alternatives should be developed to consider as solutions to address the endangered capability. The identified alternatives below include pros, cons, and associated risks, and the position of the affected parties (service provider and clients).

Action Plan Team Response

Alternatives to be considered:

1. Seek opportunities to perform this type of work for other local, state, and Federal agencies such as the U.S. Army Corps of Engineers, Department of Energy, EPA, Tribes, or water districts. These opportunities should not be limited to water resource applications only. Any agency engaged in underground excavation should be considered. The advantage of this alternative is that it would provide on-the-job experience, which is the optimal way to develop and maintain expertise. However, since Reclamation's existing staff with these technical capabilities is fully allocated to other types of work in the interim, reprioritization of workload would be necessary to accommodate non-Reclamation work.

2. Ensure design standards and best practices manuals are up to date and current so that less experienced staff can utilize these tools when opportunities become available. Updating design standards is covered under the Managing For Excellence, Team 16, recommendations and is an ongoing process that is funded within the TSC. As part of the process, the need for new design standards or manuals, covering more specific topics, may be identified if the information is not available commercially.

3. Provide funding for underground excavation and tunneling staff to review and evaluate design and construction documentation for existing projects. Specific types of activities envisioned include independent design and

analysis checks, comparing theoretical designs with actual design and construction documentation, identifying issues encountered during construction and "lessons learned," and assessing how a feature might be different if completed using current design and construction techniques. These activities would allow more experienced engineers to work with, oversee, and mentor others and provide a mechanism to transfer knowledge and experience while providing an opportunity for realistic design experience. Products would include design documentation and lessons learned. Prioritizing these activities with ongoing project work would likely present a challenge. Additionally, if actual design work involving underground excavations does not materialize, the duration and extent to which these activities are funded would need to be assessed.

4. Form a Reclamation group consisting of senior, journey, and entry-level staff with expertise in engineering geology, geotechnical engineering, and civil engineering related to tunnels. The group would be led and facilitated by senior engineers who have extensive experience in underground excavations and tunnels. Two alternatives for the goal of this group were considered:

   a. Maintain Smart Buyer Capability: Through current and existing workload and sufficient training, the goal of this group would be to retain Reclamation's "smart buyer" capability (i.e., to know when a design is beyond Reclamation's capability but be able to provide expertise to hire a contractor, or for large or very complex projects to hire a non-Reclamation expert to assist in hiring and checking the work of a contractor). The annual budget for this option is estimated to be $15,000–20,000 and would be funded within the TSC.

   b. Maintain Full (Design) Capability: In addition to activities described above to retain "smart buyer" capability, provide additional funding for the group to address and perform the activities described in No.3. The first year estimated budget for this option is up to $90,000 and is envisioned to be shared among each of the regions and the TSC.

   Pros and Cons: Maintaining "smart buyer" capability should be relatively easy to accomplish. For Reclamation to maintain full design capability, additional funding would be required, and current workload and priorities could interfere with the activities required to do so.

9. Proposed Recommendation

Considerations

A preferred alternative should be recommended with time frames for implementation.

Action Plan Team Response

The issue facing Reclamation is how much underground excavation and tunneling expertise should be maintained given the current lack of work in this area. To the extent non-Reclamation work in these disciplines could be accommodated, management should seek opportunities for design work. As a result of their discussions and considerations, the Action Plan Team makes the following recommendations:

a. Review and update existing Design Standards, preferably by the end of FY 2013, so these tools are available for less experienced staff when opportunities become available. This is in progress, and it is scheduled to be sent for internal Reclamation review in September 2012.

b. Within 90 days of the FY 2011 COG Annual Report being published, identify the group of Reclamation staff charged with the goal to maintain smart buyer capability and specifically identify the activities planned thru at least FY 2013 for accomplishing the goal. The plan should include, as appropriate, specific assignments, milestones, Individual Development Plans, training, budget, source of funds, etc.

The sufficiency and sustainability of underground excavation and tunneling capabilities will continue to be monitored annually by the COG.

Reclamation Coordination and Oversight Group Action Plan for Grouting Design

April 2012

Purpose

This Action Plan will create a business case to address the endangered capabilities identified in the Coordination and Oversight Group (COG) FY 2011 Technical Capability Report (Report), including a recommended preferred approach. The effort will include the formation of a small team to complete the Action Plan. The team will include a COG member, a subject matter expert, and management representative identified by the service provider with the endangered capability.

Elements of the Action Plan

Endangered Capability and Organization Code: Grouting Design 86-68311, 86-68130, and 86-68180

Action Plan Team Response

Grouting design has been identified as endangered, due more to a lack of workload than a lack of expertise. Although the Bureau of Reclamation (Reclamation) has lost some key staff with specific, hands-on, grouting design and construction experience to retirement, the Technical Service Center (TSC) currently maintains the individual skills and capabilities required to properly analyze and design a grouting program because this expertise is not exclusive to grouting design. Grouting design would be accomplished by a team approach because there are several areas of expertise involved. If grouting design work was pursued outside Reclamation, the TSC would require additional staff to accomplish it because of current high workload levels.

Action Plan Team

- Team lead and COG member: Kent Kofford
- Team members and subject matter experts: Christopher M. Slaven, Kurt F. Von Fay, Walter E. Heyder, Les Stone, and Kent Kofford.
- Scope: Perform the analysis in this Action Plan necessary to propose a solution to address the endangered capability.

Is the Endangered Capability a Capability Required by Reclamation?

Considerations

The Report states (page 3) that "… the COG focused on 'critical' capabilities where Reclamation must have in-house capability to accomplish its mission and/or remain a 'smart buyer' when procuring technical resources." The Report goes on to say that updates to the capability listing will be made to reflect the changing needs of the organization. The intent of this element in the Action Plan is to discuss the subject endangered capability to confirm the mission criticality of the capability. The discussion should include coordination with regional service providers (as appropriate) to confirm the distribution of the capability throughout the organization.

Action Plan Team Response

Grouting design is a capability that should be maintained by Reclamation. Whenever modifications are performed on Reclamation facilities, particularly dams, it is critical for Reclamation to maintain the expertise required to ensure that the modification is done correctly and will not adversely impact the dam or its intended purposes. This is particularly critical in regard to the potential for increased risk or introduction of a failure mode that may result from the modification.

Clients of the Endangered Capability

Considerations

The business case made by this Action Plan should include a listing of the clients of the endangered capability. Are there clients from organizations outside of Reclamation? If so, what proportion of the total workload for the endangered capability is associated with these external clients?

Action Plan Team Response

Clients for this capability include those Reclamation offices that have a need for grouting design on the dams within their respective area of responsibility. As noted previously, grouting design is generally not prevalent, and this does not appear to be limited to Reclamation. As such, there are limited opportunities to pursue this type of work outside of Reclamation.

Contracting of the Endangered Capability

Considerations

Discuss the proportion of the total workload for the endangered capability that is being contracted to resources outside of Reclamation. Sources to determine the amount of contracting can be the Reclamation Design and Construction Coordination Team or procurement database queries. In some cases, the Action Plan team members may be aware of the complete contracting environment without any additional research.

Action Plan Team Response

Currently, there is no outsourcing of grouting design within any Reclamation office. Because of the critical nature of grouting design for Reclamation dams, the team feels it is unwise to hire an outside entity to perform this work.

Is the Endangered Capability a Short-Term or Long-Term Need?

Considerations

Short term could be considered 4 years or less.

Action Plan Team Response

As previously noted, grouting design has been identified as endangered due to a lack of workload and not the result of available expertise. The need to maintain this capability is considered to be a long-term need.

Results of Short-Term and Long-Term Workload and Staffing Projections

Considerations

The Report includes staffing levels for the capabilities and the assessment of the sustainability of that capability by the appropriate manager. This element of the Action Plan will update that analysis with the results of specific short- and long-term workload and staffing projections with a reconsideration of the sustainability assessment.

Action Plan Team Response

If grouting design work was pursued outside of Reclamation, the TSC would require additional staff to accomplish it because all of the disciplines required to perform this type of work are fully utilized at present. Because the expertise currently exists and is being fully utilized, an increase in staffing levels is not recommended at this time.

Strategies Considered to Maintain the Capability

Considerations

Feasible alternatives should be developed to consider solutions to address the endangered capability. The alternatives should include pros, cons, the risks associated, and the position of the affected parties (service provider and clients).

Action Plan Team Response

Three alternatives listed below were identified to address this issue.

a. Actively pursue Grouting Design work outside of Reclamation. The greatest benefit to this approach is that it would provide real experience in this area. However, the cons and risks far outweigh any benefits derived. It is felt that the expertise can be adequately maintained without actually performing

specific grouting design work. Given the current environment and workload at the TSC, if grouting design work was obtained, it would require hiring additional staff to accomplish this work, which could be viewed as mission creep and unnecessary. Grouting design is not currently in high demand, and adding additional staff to accomplish it would create an unnecessary risk to ensuring that sufficient workload is available to occupy current staff.

b. Document the design and analysis process in a design standard that would be utilized in the future when Grouting Design work is required. Because the expertise currently exists, it is important to ensure that the design standards and considerations are properly documented so that personnel can use their expertise to accomplish the grouting designs in the future. There are several engineers within the TSC that currently have this expertise, and their knowledge should be memorialized for future use in a new chapter of the design standards. Collaboration between chapter authors would be necessary to make sure conflicting or duplicate guidance is avoided. As a result of recommendations from the Managing For Excellence Team 16, funding has been, and continues to be made available from Policy & Administration and Dam Safety sources to update Reclamation Design Standards. A conservative estimate to produce this design standard is $100,000.

Although the documentation of the design and analysis process is a critical component to ensuring that the technical expertise is maintained, it is also recognized that having experienced senior level technical experts available is essential to a successful project. Therefore, in future grouting design, if experienced personnel are not available within Reclamation, it would be advisable to procure this service either in a peer review capacity or as a consultant during the process. Depending on the project, it is likely that the contracted person would serve in both capacities and would be able to directly pass on the nuances and intricacies required in the process. It is anticipated that the contracted person would be either a retired Reclamation employee or other qualified individual who has had intimate involvement with grouting designs on Reclamation facilities.

c. Develop a Reclamation-Wide Grouting Team. The 2011 endangered capabilities report shows that “Grouting Inspection” is not an endangered capability. However, this item should be monitored closely in the approaching years. Although most of the Reclamation Grouting Design can be captured in a Design Standard, grouting is unique in that it requires experienced field personnel to make design decisions regarding the grout mix, when to change the grout mix, proper grout hole orientation, additional holes to obtain closure, etc. Grouting occurs subsurface, where none of the work can be seen. Without experienced staff, Reclamation will be unable to properly carry out a successful grouting operation. Reclamation has always directed the grouting contractor’s work and should continue to do so in the future. Due to the scarcity of grouting programs, Reclamation should work towards developing a Reclamation-wide Grouting Team to be involved with all Reclamation grouting programs. This team would

be able to provide the expertise for both design and oversight work and be available to assist on grouting projects Reclamation-wide. This team could include a combination of collateral duty experienced staff and apprentice staff (mentees) to guarantee the required expertise continues.

Proposed Recommendation

Considerations

A preferred alternative should be recommended with time frames for implementation.

Action Plan Team Response

The proposed recommendation is to develop a design standard that documents the design considerations and other factors required to be able to perform Grouting Designs. Currently, there are several personnel within the TSC who have experience in this area, and it is important to capture as much of their knowledge as possible prior to their leaving Reclamation. In order to take advantage of this expertise, the COG strongly recommends that grouting standards be completed as soon as possible, preferably within the next 12 months. The Grouting Design Action Plan team members will serve as a Reclamation-wide Grouting Team established for the purpose of training apprentice employees to accomplish Grouting Designs and Field Grouting Operations to guarantee that the required expertise continues. The sufficiency and sustainability of these capabilities will continue to be monitored annually by the COG.

Appendix C

COG Membership

Appendix C

COG Membership

The Coordination and Oversight Group (COG) consists of eight members, including a chairman. The COG membership is intended to represent the diversity of Reclamation interests, roles, and responsibilities, which can include, but is not limited to, Regional Directors, Area Managers, Program Leads, Project Management Leads, Assistant/Deputy Directors, and leads in technical fields such as design, construction, environmental compliance, planning, and geology. Each of the five Regional Directors; the Director, Technical Resources; and the Deputy Commissioner, Policy, Administration and Budget (DC-PAB) has one member and one alternate. The member appointed by the DCO is a permanent member of the COG, whereas the other members serve on a rotational basis and as a collateral duty. The commitment for serving as a COG member is generally expected to cover 2 years, and as much as 3 years, to allow for continuity and transfer of knowledge.

The current membership of the COG is as follows:

Region/Office	Primary	Alternate
DC-PAB	John Baals	Chris Perry
TSC	Mark Boyle	Richard (Dick) LaFond
GP	Roxanne Peterson	Jeff Nettleton
UC	Kent Kofford	Pat Page
PN	Jen Beardsley	Richard (Dick) Link
MP	Richard Welsh	David Gore
LC	Scott Tincher	Brent Esplin
DCO	Barbara Schuelke	

Appendix D

Cost-Effective and Quality Services

Appendix D

Cost-Effective and Quality Services

Tables D-1 and D-2 were developed to give a general overview of the magnitude of service agreements (SA) by Service Provider Organizations (SPO). Table D-1 provides data related to the number of SAs, whereas table D-2 provides data related to the dollar value of the SAs. Figure D-1 displays the percentage of SAs completed within the agreed upon schedule and budget. The Technical Service Center (TSC) is Reclamation's largest SPO, with the largest number and dollar value of SAs; therefore, their data heavily influences the overall results.

Table D-1. Measure Cost Effectiveness and Quality of Services (Numerical Data)

SPO	Total Number of Active SAs in FY 2011	% of Total SAs	Total Number of SAs Completed in FY 2011	Total # of SAs Completed Within Completion Date	Total # of SAs Completed Within Budget	Number of SAs With Completion Reports
MP Region	76	2.7%	44	42	41	9
PN-RTS	151	5.3%	34	12	15	20
GP Region	63	2.2%	27	27	24	10
TSC	2,318	81.2%	864	839	836	291
LC ESO	53	1.9%	41	37	38	37
UC Region	1	0.0%	1	1	1	1
FCCO	88	3.1%	0	0	0	0
PAO	27	0.9%	7	7	7	7
MPCO	76	2.7%	31	27	30	31
Total	2,853	100%	*1,049	992	992	406

* The TSC had 285 service agreements which were for less than $10,000 and do not require completion reports. Therefore, the percentage of service agreements with completion reports is calculated as: 406/(1049-285) = 406/764 = 53%.

Note: PN-RTS = Pacific Northwest Region Resource and Technical Services, GP = Great Plains, MP = Mid-Pacific, MPCO = Mid-Pacific Construction Office, PAO = Provo Area Office, FCCO = Four Corners Construction Office, UC = Upper Colorado, LC ESO = Lower Colorado Regional Office Engineering Services Office, TSC = Technical Service Center

Table D-2. Measure Cost Effectiveness and Quality of Services (Dollar Data)

SPO	Value of SAs Completed in FY 2011 ($)	Value of SAs Completed by Completion Date ($)	Value of SAs Completed Within Budget ($)	Total Dollar Value of Work Performed On SAs in FY 2011 ($)
MP Region	2,979,260	2,485,812	2,375,812	5,043,310
PN-RTS	2,529,372	829,183	1,170,589	7,130,432
GP Region	1,546,481	1,546,481	1,464,581	3,864,760
TSC	27,676,189	26,613,677	26,713,216	98,829,185
LC ESO	5,282,021	4,922,106	5,052,563	9,997,733
UC Region	75,000	75,000	75,000	75,000
FCCO	-	-	-	7,608,761
PAO	764,037	764,037	764,037	7,272,000
MPCO	2,135,263	1,702,680	1,915,831	13,070,879
Total	$42,987,623	$38,938,976	$39,531,629	$152,892,060

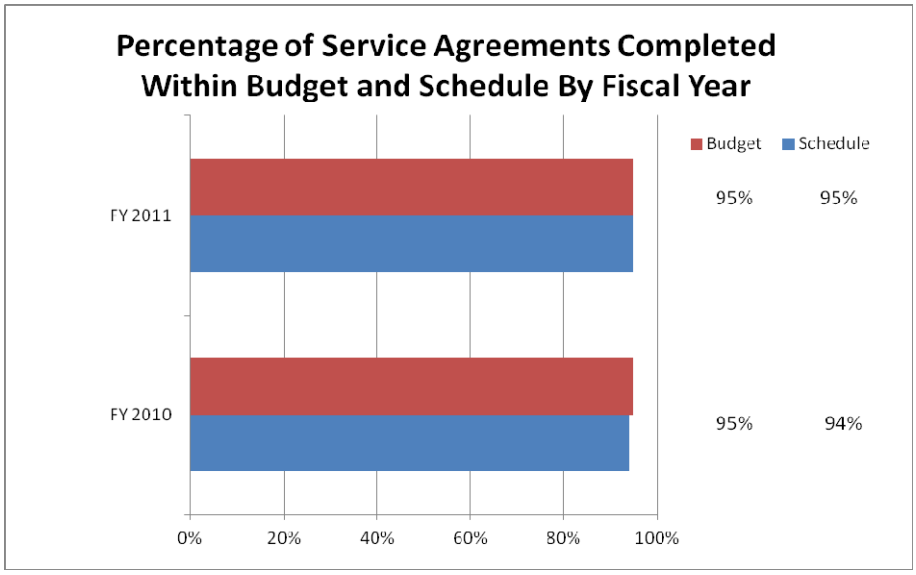

Figure D-1. Percentage of SAs completed within budget and schedule by FY.

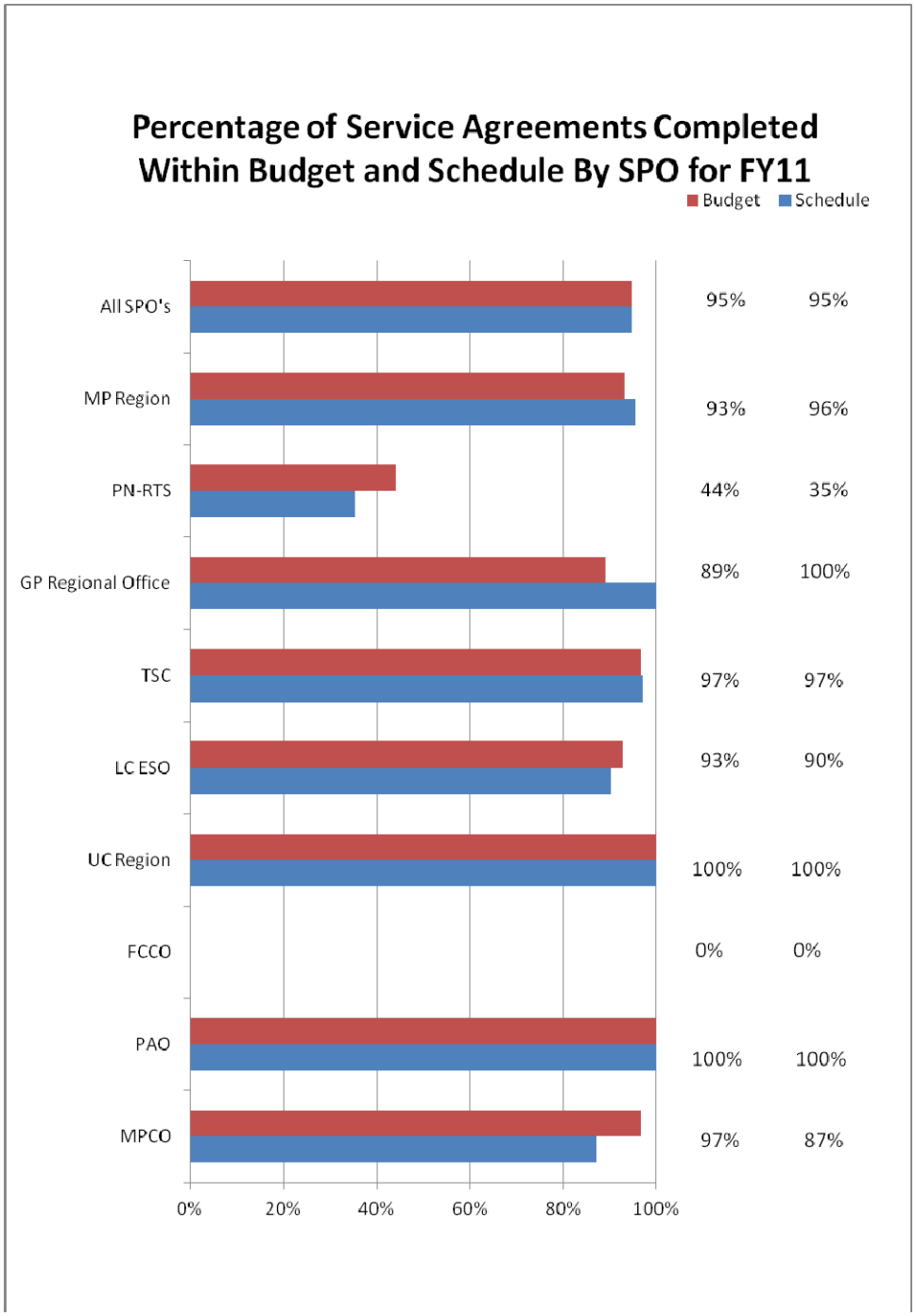

Figure D-2. Percentage of SAs completed within budget and schedule by SPO for FY 2011.

The following figures display the data collected from the SPOs for percentage utilization. Since the Electronic Service Agreement Module (ESAM) was not yet available, the SPOs were asked to manually provide the percentage of time billed to service agreements, program accounts, and overhead, with the total of these three categories equal to 100%. The COG believes much of the variance can be

attributed to different business practices and measurement methods among the SPOs. The TSC does not receive any program funding, and therefore does no program work. All work in the TSC is either a Service Agreement or Overhead.

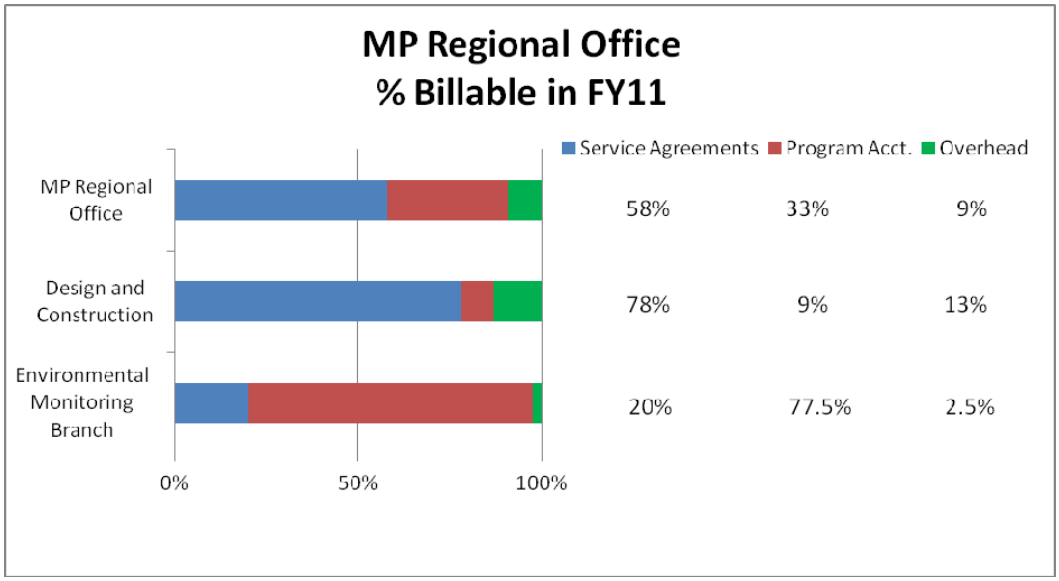

Figure D-3. Time billable in FY 2011 for MP Regional Office.

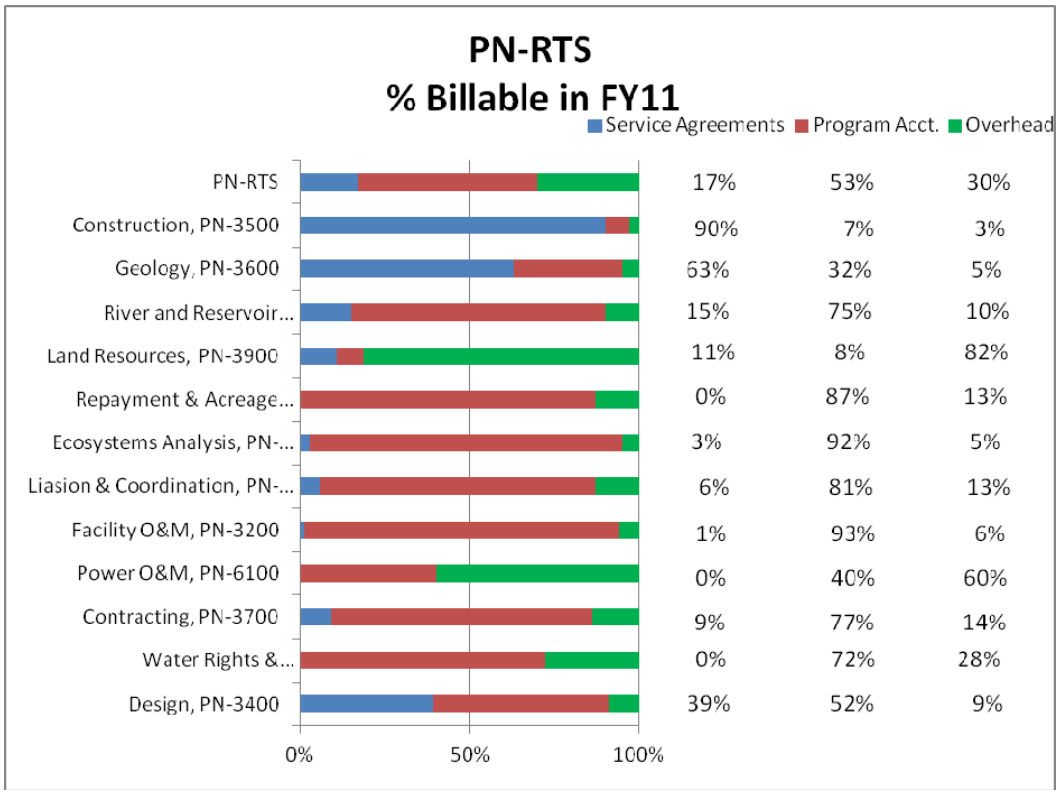

Figure D-4. Time billable in FY 2011 for PN-RTS.

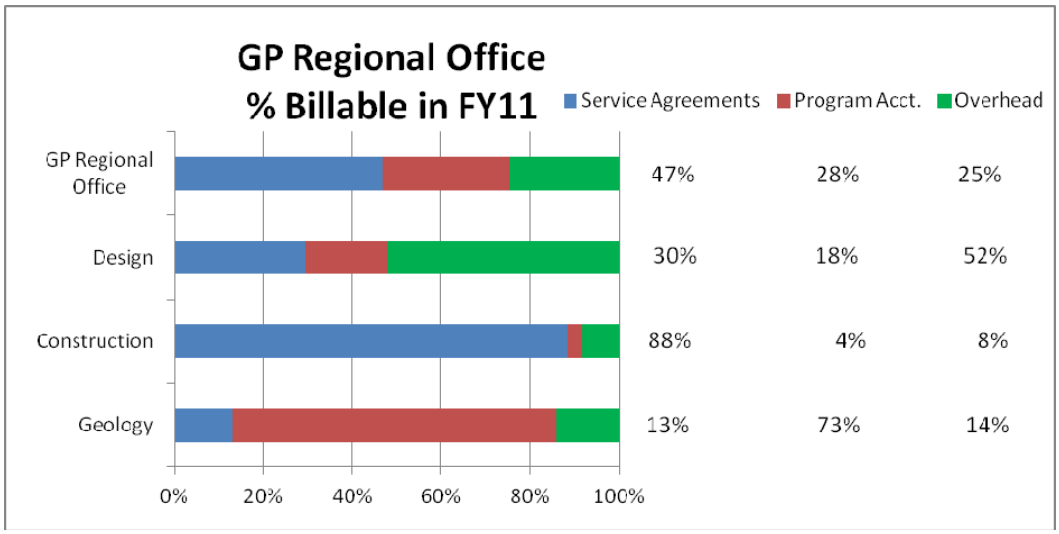

Figure D-5. Time billable in FY 2011 for GP Regional Office.

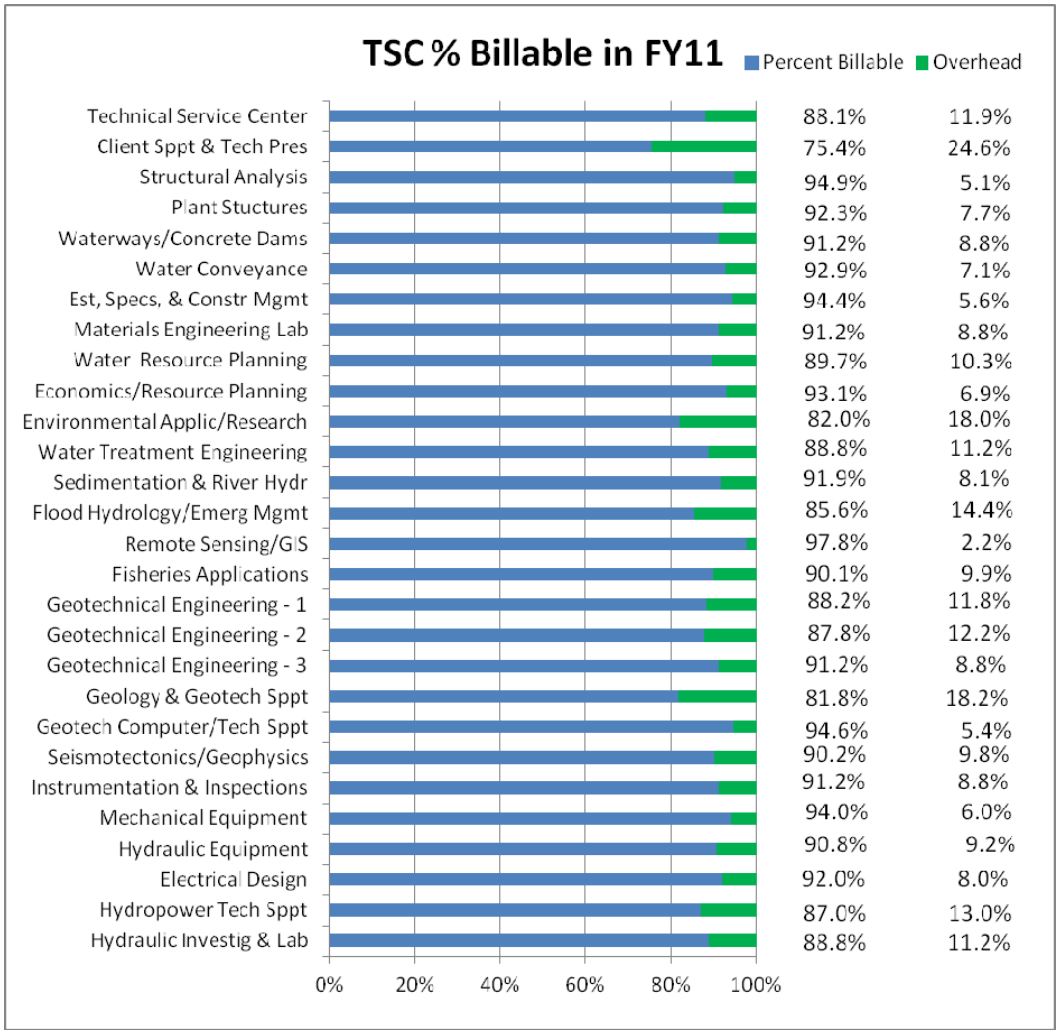

Figure D-6. Time billable in FY 2011 for the TSC.

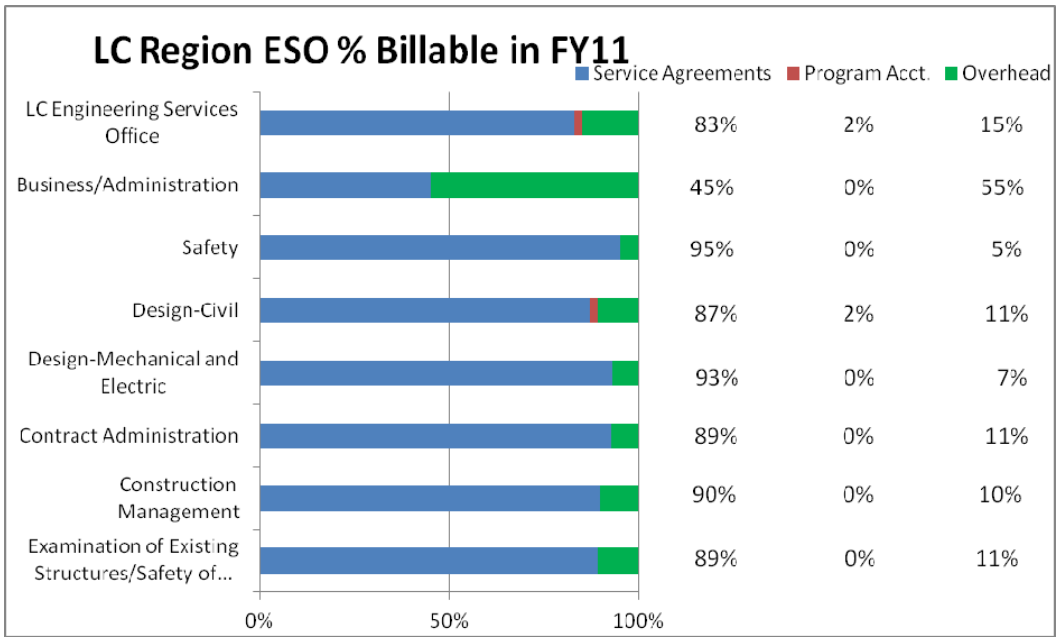

Figure D-7. Time billable in FY 2011 for LC Region ESO.

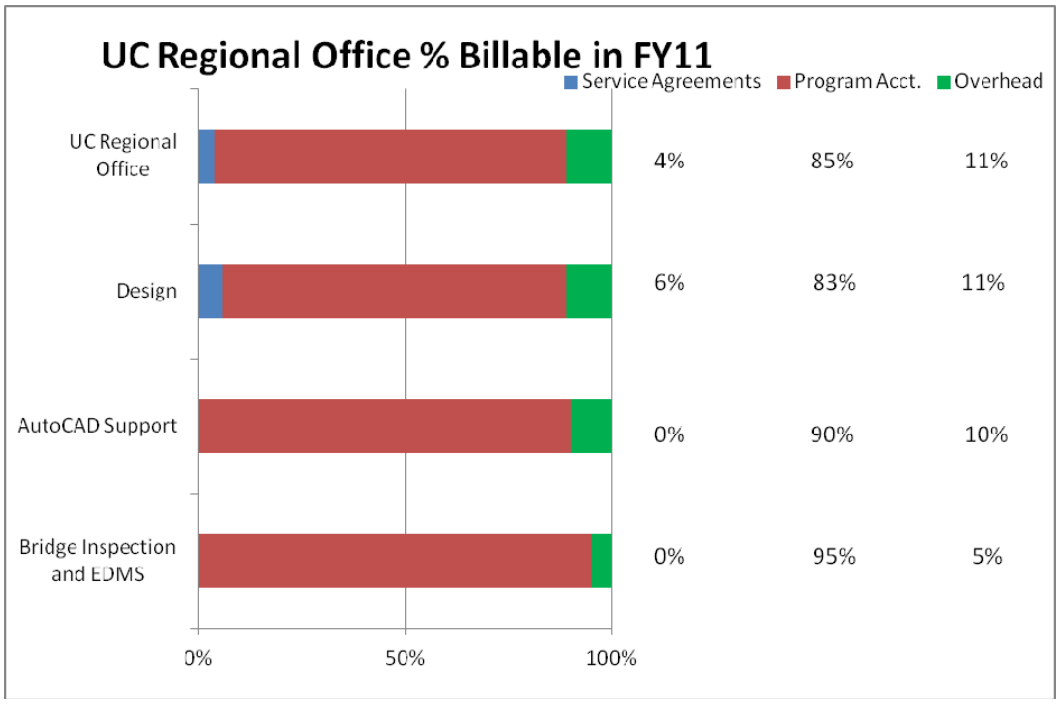

Figure D-8. Time billable in FY 2011 for UC Regional Office.

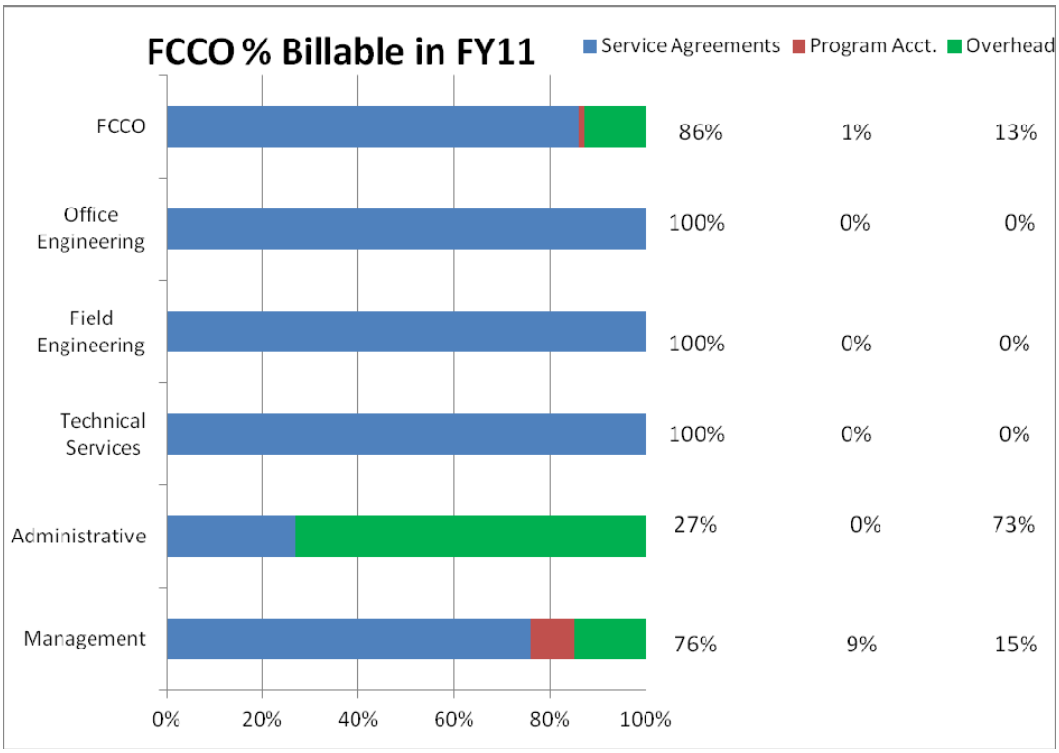

Figure D-9. Time billable in FY 2011 for FCCO.

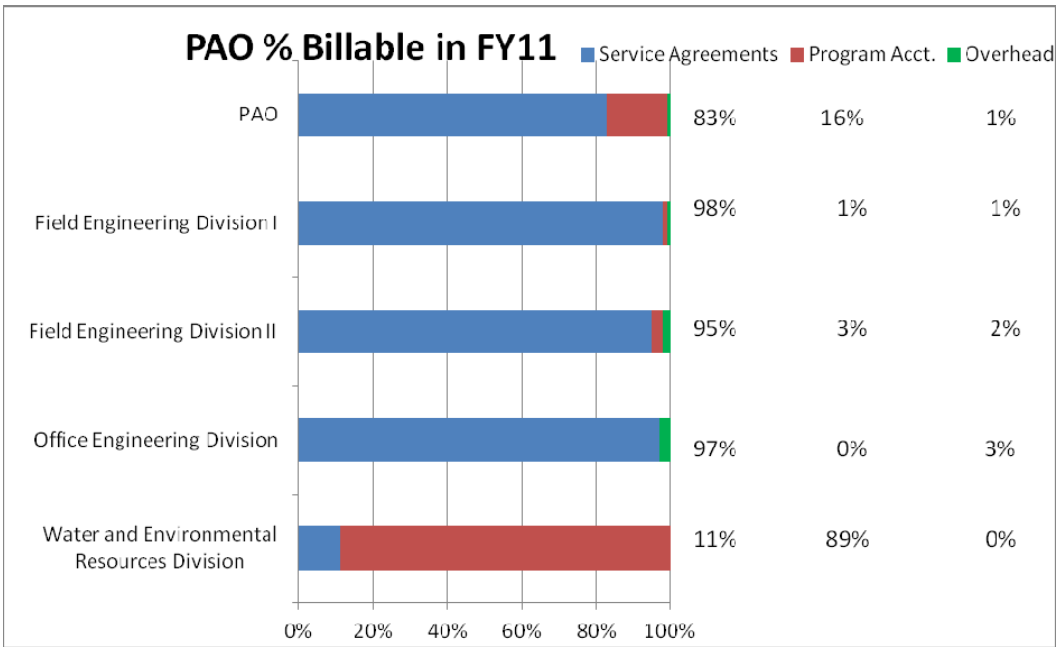

Figure D-10. Time billable in FY 2011 for PAO.

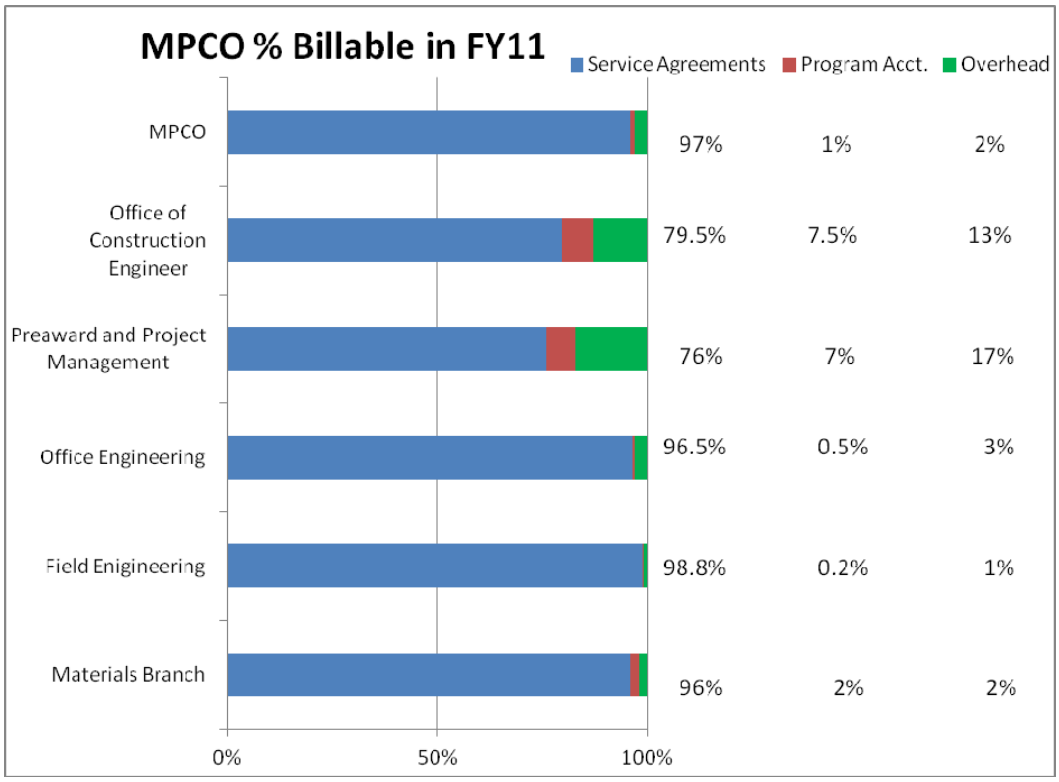

Figure D-11. Time billable in FY2011 for MPCO.

Appendix E

Customer Satisfaction

Appendix E

Customer Satisfaction

Figure E-1 shows a weighted average summary of the results from the 406 completion reports returned to the SPOs in FY 2011. The TSC used slightly different rating criteria than the other eight SPOs in FY 2011 as summarized in Figure E-2. Therefore, the TSC's overall average of 4.35 was used for the TSC in the weighted average calculation for all SPOs in Figure E-1.

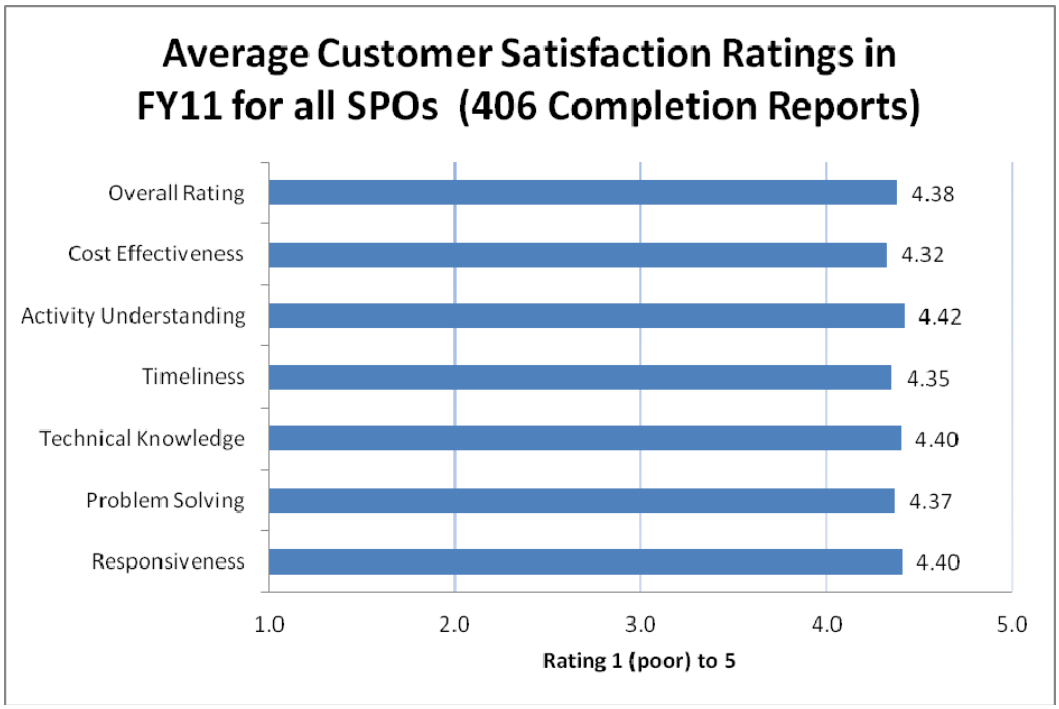

Figure E-1. Average customer satisfaction ratings in FY 2011 for all Reclamation service provider organizations.

Summary of the TSC FY 2011 Completion Report Surveys

Customer Group	Number of Surveys Sent	Number of Responses	Cost effectiveness of the service	Coordination with client and other SPOs	Timeliness of assistance	Knowledge of technical areas	Responsiveness of staff	Quality of product	Overall performance	Summary Value
GP Region	74	23	4.22	4.39	4.39	4.78	4.52	4.74	4.65	4.53
LC Region	35	26	4.42	4.69	4.58	4.73	4.69	4.62	4.58	4.62
MP Region	94	42	4.46	4.59	4.54	4.80	4.73	4.66	4.63	4.63
PN Region	61	29	4.00	4.31	4.11	4.48	4.34	4.34	4.38	4.28
UC Region	45	24	4.54	4.91	4.67	4.96	4.75	4.81	4.88	4.79
SSLE (Dam Safety and Security)	136	68	3.91	4.10	4.13	4.26	4.21	4.25	4.15	4.15
Research Office	55	14	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Program & Analysis Office	25	22	4.73	4.82	4.95	4.77	4.86	4.86	4.77	4.82
Reclamation – Other	13	10	3.80	4.20	4.6	4.50	4.40	4.50	4.30	4.33
Other Government Agencies	41	33	4.44	4.52	4.41	4.81	4.63	4.66	4.66	4.59
Totals/Averages	579	291	4.29	4.33	4.29	4.49	4.40	4.42	4.38	4.35

Figure E-2. Summary of the TSC FY 2011 Completion Report Surveys.

Appendix F

Reports Developed or Transmitted by the COG in FY 2011

Appendix F

Reports Developed or Transmitted by the COG in FY 2011

Table F-1 is a list of Annual Reports and One-Time Reports that the Coordination and Oversight Group (COG) developed and/or transmitted in fiscal year (FY) 2011. Those with shading in the far-right column indicate the report was delivered by the due date. In FY 2011, the due dates were self imposed, either in accordance with COG procedures or as a sound business practice.

Table F-1. FY 2011 COG Reports

Reports Assigned/Required	Report Due Date	Actual Date Report Provided
Annual Reports		
Transmit Advance Planning Worksheets for FY 2012 and FY 2013 to the Service Provider Organizations	March 2011	March 10, 2011
Transmit Draft COG FY 2010 Annual Report to the Deputy Commissioner – Operations (DCO), includes the Technical Capability Report	January 28, 2011	January 28, 2011
Submit Final COG FY 2010 Annual Report to the DCO	Final report due within 30 days of receipt of DCO's comments	March 28, 2011
One Time or "As Required" Reports		
Action Plans for "endangered" capabilities	See Table B-1	
Transmit Draft COG Analysis and Recommendations Regarding PN Region Drill Crew Issues Report to the DCO for review	July 14, 2011	August 25, 2011

Appendix G

Outsourcing of Technical Services

Appendix G

Outsourcing of Technical Services

The annual review of technical services work outsourced or contracted provides critical data which contributes to the goal of ensuring Reclamation's use of cost-effective and quality services, as well as the maintenance of core technical capability. The Coordination and Oversight Group (COG) collected data, maintained records, and provided reports on the total amount of technical services contracted or outsourced annually. A copy of the data can be found at http://www.usbr.gov/bp/tr.html.

The COG members reviewed over 120 contracts that were initiated during FY 2011 for technical related services. Review of these data was intended to verify that the Reclamation workload distribution practices were being followed. This analysis revealed that Reclamation was doing a very good job following the workload distribution practices. Very few instances were found where the practices were not being followed, and even in these cases, the intent was being met.

The primary issue identified in a few isolated cases was that the TSC was not always contacted to verify they did not have the capability or capacity to perform technical support efforts. The following are general examples:

- On two occasions the LC Region contracted out cultural resource efforts that required significant site specific knowledge of the location. The individuals who contracted the work had considerable background in related work, and knew that the TSC had not performed complex plans, agreements, or prehistoric site investigations in these locations. However, LC Region personnel did not contact the TSC before contracting with a firm that has done similar work at the sites. The COG member met with LC Region personnel to discuss the Reclamation workload distribution practices and agreed to make the necessary contacts in the future.

- In UC Region, survey work was contracted by an Area Office without considering other Reclamation resources. This type of surveying is not performed by the TSC or a designated specialized resource, and therefore the Workload Distribution Flowchart (D&S CMP 10-03) was not applicable. Because this is internal to the UC Region, it is not considered to be a COG issue, and it is at UC Region's discretion to address.

- In MP Region, there were a few occasions where technical services were outsourced by regional personnel when the TSC did not appear to have adequate capabilities or capacity to conduct the work. In one case, considerable knowledge of environmental issues along the San Joaquin River was required for a complex NEPA/CEQA related investigation and document development. In another, a complex river restoration effort needed an independent review, and therefore the TSC was not contacted. On another occasion, the TSC was not requested to support a climate change analysis since a contractor had developed complex models during earlier phases of the project. The COG member discussed each case with individuals familiar with the projects and emphasized the need to follow Reclamations workload distribution practices. In all cases, the COG determined there was legitimate rationale for contracting the work, although coordination was not performed completely.

New contracts and task orders under Product Service Codes that are typically used for technical service support were pulled and reviewed. The line item summary of these contracts and the evaluation of those that appeared to be for a core/critical technical service were not included in this report.