

RECLAMATION

Managing Water in the West

Managing for Excellence - Teams 32 & 33

Use of Federal and Non-Federal Laboratory Services

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Managing for Excellence – Action Items 32 and 33

Evaluation of Opportunities for Best Providing Laboratory Services to the Bureau of Reclamation

Action Item 32

Determine Where Opportunities Exist for Use of Federal and Non-Federal Lab Services

Action Item 33

Determine Where Opportunities Exist for Retaining, Consolidating and/or Eliminating Lab Services Within the TSC and Regions

Introduction

Action items 32 and 33 of Reclamation’s Managing for Excellence Action Plan together call for this study to identify opportunities for improving Reclamation’s use of external and internal providers of laboratory services. This study outlines information and methods to evaluate options to ensure that the laboratory services provided or procured by Reclamation are the best value product for fulfilling Reclamation’s mission responsibilities related to the water and power resources infrastructure of the western United States.

The scope of this study is Reclamation-wide, considering construction labs, regional labs, contract labs, and the laboratory functions contained in the Technical Service Center (TSC). The study necessarily includes consideration of functions that overlap with laboratory services, since many of the groups in Reclamation that provide laboratory services also provide other related services.

Definition of Laboratory Services

The term laboratory can have several meanings, but for the purposes of this study, a laboratory is *a facility specially equipped for conducting scientific tests, observations and measurements, or for performing scientific experimentation or research, in a controlled environment*. Two key elements of this definition are *facilities* and *specialized equipment*, which go beyond those normally associated with an office environment. Laboratory facilities and equipment have operation and maintenance requirements to assure that they fulfill their intended purposes. Another key element is that laboratory facilities establish a *controlled environment*. In this environment, careful test measurements and experimentation can take place without being unduly affected by factors that are difficult to control in the field. Finally, even more important than facilities and

equipment, laboratories are staffed by *specialized personnel* having qualifications for solution of unique problems.

Key Tasks Undertaken in the Study

This study provides a framework for evaluating Reclamation's laboratories today and into the future. Key tasks undertaken were to:

- Identify and evaluate lab services and related technical services provided by Reclamation's internal laboratories. For each laboratory identified, characterize the workload of that laboratory from 2004 to 2006. This serves to describe the role of each laboratory within Reclamation and provides an indication of potential future workload.
- Identify external laboratories that could potentially be utilized by Reclamation and could be considered in an evaluation of a specific laboratory.
- Develop decision evaluation tools that can be used to assess opportunities for retaining, consolidating or eliminating lab services provided by specific internal Reclamation labs.

Findings

- Reclamation-operated laboratories are integral to the work of groups performing engineering and scientific analyses, field investigations, and construction management support to help Reclamation fulfill its mission responsibilities. Reclamation uses both specialized and standardized laboratory testing services. Specialized testing supports the need to solve unique design, construction, operation and maintenance problems. Standardized testing supports on-the-ground construction activities and daily operational needs with the labs near the construction and operation sites to provide quick turnaround and quality assurance.
- A listing of Reclamation Laboratories, their location and size is summarized in Table 1.
- Reclamation currently satisfies a portion of its standardized testing needs through contracts with accredited private laboratories. When private laboratories are uneconomical or logistically unable to meet Reclamation needs, Regional testing or construction laboratories near the projects perform standardized laboratory testing. Regional laboratory staffs also support construction management, operations of Reclamation projects, and compliance with environmental regulations. Construction laboratories are typically closed as the construction activity subsides in an area. Some of

the construction labs are small and not sustainable. Some of the standardized testing that was once performed at the TSC has been picked up by the Regional labs and contract labs.

- Construction laboratory expertise is distributed throughout Reclamation; however, most of the expertise is concentrated in two areas close to the current active construction projects (Mid-Pacific Construction Office and Upper Colorado Region).
- The Upper Colorado Region has developed a regional approach to organizing construction management and design functions to efficiently respond to future workload.
- The Technical Services Center (TSC) in Denver provides most of the specialized laboratory services used by the agency; with the groups that maintain the TSC laboratory expending about one third of their efforts on laboratory work on the average. They devote the other two-thirds of their efforts to conducting field work, and providing engineering, and analytical services. The TSC laboratory contracts work out during periods of heavy workload to supplement the capabilities of Reclamation lab facilities and staff. The TSC Leadership Team has examined the efficiency of the laboratory operations. They have recommended several laboratory consolidations that have been implemented and continue to monitor the operation of the laboratory for further opportunities for improvements in efficiency. A space consolidation committee has been formed to evaluate space options and recommend the best options for reducing laboratory space usage.
- Additional opportunities for the use of other Federal and non-Federal providers of laboratory services exist. This team recommends that Reclamation labs use the evaluation criteria provided in this report to evaluate opportunities for using outside laboratories. Some Reclamation offices already use contract labs or use contractors to staff Reclamation labs for standardized or routine testing. Alternative labs in each region and discipline were identified as part of this study and are listed in Table 2.
- The development of standard specifications and guidelines would help augment Reclamation's process to contract out construction QA/QC testing. There is no question that there will be a need to ramp-up hiring of contract labs to perform construction QA/QC testing, since Reclamation does not have more than a dozen qualified field materials testing technicians left.

Recommendations

- The Director, Technical Resources will consolidate selected laboratory groups in the Technical Service Center (TSC) in Denver. The Geotechnical Laboratory and Concrete Laboratory groups have been consolidated to form one combined Materials Engineering and Research Laboratory. With this consolidation, the Technical Services Center will maintain all concrete, soils and rock testing capabilities, but at a reduced capacity and with a reduced space requirement. The Director will consolidate laboratory space and negotiate consolidation cost savings with the General Services Administration.

Laboratory Services in the Bureau of Reclamation

Successful planning, design, construction, operation and maintenance of water resources projects require the use of a number of laboratory services. Today, laboratory services are needed to support three principal functions: construction support, planning and operational decision-making, and design. Similarly, Reclamation laboratories exist on three principal levels in Reclamation. Current Reclamation laboratories in each category are listed in Table 1.

- **Construction laboratories** are located in the field, close to construction sites, where they usually provide high-volume, rapid turn-around measurement and testing services to support inspection and quality assurance programs on specific construction projects. Construction laboratories generally exist only during the construction phase of a project, and are managed through the Design and Construction Offices in Reclamation Regional offices. Most of the construction laboratory expertise is concentrated in two areas close to the current active construction projects.
- **Regional laboratories** are distributed widely in Reclamation, usually located at regional or area offices. These laboratories provide measurement and testing services that support operational decision-making and planning functions. Regional laboratories have permanent facilities; some regional laboratories were originally established as construction laboratories and have evolved as projects transitioned from the construction phase to an operational state. In some cases area office laboratory functions are handled almost entirely by contract.
- **The Technical Service Center (TSC) Laboratory** is located in Denver, Colorado. This laboratory provides services to all of Reclamation. Much of the work performed by the groups that operate this laboratory is specialized in nature, addressing unique design, construction, operation and maintenance issues. Work in the TSC laboratory is most often funded

by specific projects when studies are addressing an issue unique to one or a few sites. Issues having broad application across Reclamation are partially funded provided by Reclamation’s Science & Technology program. The laboratory in Denver, like all of the TSC, operates on a fully reimbursable basis, obtaining revenue entirely from their clients on a fee for service basis. The TSC Leadership Team has recently commissioned a space consolidation committee to develop options for reducing laboratory and office space, while considering future trends and requirements for space. This committee provides TSC management with recommendations that will ensure the greatest value from the unified management of the TSC laboratory facility.

- **National Research Center for Groundwater Desalination, Alamogordo, New Mexico.** There is a new research laboratory under construction in the Tularosa Basin. This facility is slated for completion in 2007. The Center is designed to provide state-of-the-art research facilities for Reclamation and visiting researchers involved in desalination research studies, pilot-scale projects and small demonstration projects. The Center will also offer public tours and feature an information display area as part of its public awareness program. The Center is unique in that it is the only major research facility in the United States dedicated solely to the desalination of brackish and impaired groundwater. The Center is intended to be the national focal point for cooperative research in brackish groundwater desalination when it officially opens in 2007.

Types of Services Provided by Reclamation Laboratories

The services provided by Reclamation’s laboratories span a variety of disciplines and functions. Most laboratories are staffed and operated as one function of a work group that provides a collection of related services. The services provided by the groups operating Reclamation laboratories can be broadly categorized as follows:

- Laboratory Services
- Field Services
- Engineering and Analytical Services
- Construction Management Services

Figure 1 shows a breakdown of the services provided by Technical Service Center laboratory work groups in FY 2005. This breakdown was obtained by asking group managers to categorize each specific job undertaken by their groups in that year. Construction management services are generally not provided by TSC laboratories, so they do not appear in the figure. Engineering and Analytical services make up almost half of the workload, with laboratory services nearly one third and field services a little less than one quarter of the workload. This represents a healthy diversity of services provided by laboratory work groups, which should help them adjust to short-term variations in any one workload component.

While each of these service categories is individually unique, they are also interconnected. The laboratory work groups have developed in this way to support the specialized needs of Reclamation. Integrating laboratory, field, engineering, analytical, and construction management work allows a synergistic enhancement of the capability to meet the needs for each individual service. There are many examples of the benefits of this synergy; multiple site-specific studies that are integrated with more generalized applied research studies to develop design or operational guidance; capability to perform field work that derives from experience making similar measurements in the laboratory; and design and analysis work that is performed efficiently by work groups intimately familiar with the laboratory studies and applied research work used to develop the analytical procedures. Any consideration of changes in the way laboratory services are provided within or procured from outside Reclamation should consider the effect those changes will have on this synergy. A more detailed discussion of the types of services provided by Reclamation laboratories follows.

Work Performed by Specialized Laboratory Groups (FY 2005)

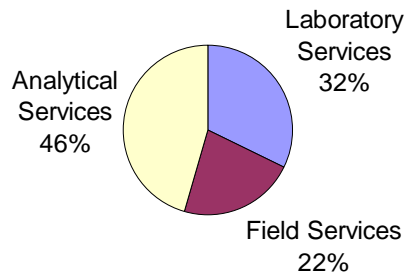


Figure 1. — Services provided by laboratory work groups in the Technical Service Center.

Laboratory Services

Laboratory services are those services that make direct use of laboratory facilities and equipment. Laboratory services may be either standardized or specialized. Standardized tests include such things as water quality analysis, concrete cylinder strength testing, and soil properties analysis, for which there are established industry-standard methods and procedures, and equipment needed to perform the work is available commercially off-the-shelf. In contrast, specialized laboratory services are those services for which standard methods and procedures are not defined or for which the necessary equipment to perform the work is unique or must be designed specifically for the application. Guidelines and general practices may be defined by industry, but there is considerable latitude for variation in specific methods and procedures. The lab located at the TSC in Denver provides specialized testing. Specialized testing includes, for example: strength testing of large structural members, high voltage equipment insulation testing, and model testing of the performance of hydraulic structures for passage and screening of fish at Reclamation water diversions. Specialized services also include the development of new and innovative methods, equipment and technologies that improve design and construction effectiveness and promote improved operation and maintenance of Reclamation projects.

Field Services

Field services describes the making of measurements and collection of data from real facilities, often while they are in operation. These measurements often support construction activities, operational decision-making, or maintenance needs, although field work may also support project planning and design. In contrast to laboratory work, there is a limited ability to control the measurement environment, and this must be accounted for in data collection and analysis. Examples of these services include collection of data related to hydrologic and environmental parameters, inspection and troubleshooting of field equipment, and commissioning newly installed equipment. Field services typically require the use of scientific equipment and/or specialized knowledge and training. The capability to provide field services is often derived from and enhanced by doing similar work in the laboratory. Field services often are provided when troubleshooting operational problems. In this context, Reclamation personnel are able to provide unbiased recommendations.

Engineering and Analytical Services

Analytical services that are not directly related to laboratory or field work are provided by many of the work groups that operate Reclamation laboratories. This work takes place in the office environment and is not simply the analysis of data collected from laboratory experiments or from the field (which are essential parts of laboratory and field services). Rather, this work is performed without the need for new laboratory or field work, but usually draws upon staff expertise gained through long-term experience performing laboratory studies. Analytical services support planning, design, construction, and operation and maintenance functions. Examples of analytical services include value engineering analyses, design work, cost analyses, preparation of design guidance and manuals, and more. Through this work, Reclamation's laboratory employees assist the broader organization and maintain familiarity with the agency as a whole, which allows them to continue to perform laboratory work and pursue applied research that best meets the agency's needs.

Construction Management Services

The Regional testing laboratories are often established in support of construction management or design activities and are managed as a part of the construction management process. Laboratory testing often identifies construction management issues. The staff of these laboratories provides significant support in the form of construction management services that include, but are not be limited to, safety oversight, contract administration, quality assurance, and development of construction alternatives. Employees who conduct the testing are often heavily involved with construction management inspections, reporting, etc. The laboratory services provided by the field labs are primarily standardized testing and have a different focus than services performed by the TSC labs, but the concept of synergistic improvement of construction management through the involvement of personnel familiar with laboratory testing is the same.

Laboratory Services in Relationship to Reclamation's Mission

Laboratory services support all aspects of the management, development, and protection of water and related resources. Laboratory services contribute directly to the solution of technical problems relating to the design and construction of water resources projects and their operation and maintenance after construction is completed. Figure 2 shows this graphically. In addition to directly addressing project-specific issues, laboratory services also provide long-term support to both the design and construction functions and the operation and maintenance functions through applied research and technology development. Although the specialized laboratory work groups are a primary provider of services to the research program, the laboratory work groups also provide support to other programs in Reclamation and are managed by the TSC.

One example of the role of laboratory services is the solution to the problem of Reclamation stilling basins being damaged by rocks drawn into the basin by backflow during normal operations. Problems at specific facilities led first to site-specific hydraulic model studies and field demonstrations of a flow deflector that solves the problem, followed by a three-year applied research program in the laboratory, co-funded by the Science and Technology program and other projects affected. The final result of this work will be the development of generalized design criteria and design guidance for future use on other Reclamation projects. This work will also have broader application in the future as it is adopted outside of Reclamation both domestically and internationally. Water resources engineers around the world rely on design criteria developed by Reclamation.

The integration of site-specific problem solving and longer-term generalized applied research is one benefit of a robust laboratory program in Reclamation. Another benefit is the synergy obtained by integration of various disciplines operating the laboratory managed by the TSC. An example of this is work performed several years ago to address the explosive growth of the mitten crab population in the Bay Delta area of California. The mitten crab is a non-native invasive species that threatened the fish salvage operation at the Tracy Fish Facility. Coordinated efforts of invasive species experts, fisheries biologists, and hydraulic and mechanical engineers led to the development of unique screening devices to help remove crabs and aquatic weeds while still safely screening fish. Prototype devices were tested in the hydraulic laboratory and then implemented in the field. This integration of disciplines was easily and quickly achieved since all participants worked for Reclamation in close vicinity to one another.

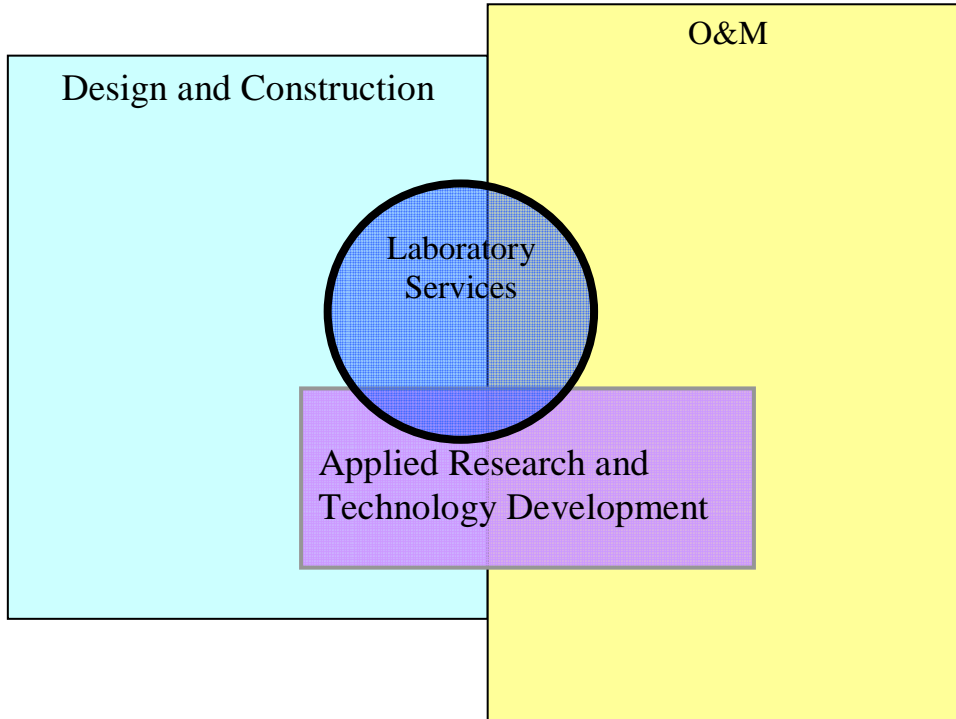


Figure 2. — The role of laboratory services in fulfilling Reclamation's mission.

Why and When Lab Services Should Be Contracted

Contracting with outside laboratories for parts of Reclamation’s laboratory services needs is practical and helps to hold down costs in situations like those listed below:

- Short term workload exceeds Reclamation staffing capability,
- Facilities needed for the testing are more readily available elsewhere,
- Standardized testing for routine parameters more cost effective through contracts,
- Contractors offer specialized services not readily available in Reclamation, or
- There is a need for independence in the work performed.

One example of specialized laboratory service provided by a non-Reclamation lab is the dam-overtopping protection research testing conducted at the outdoor hydraulics laboratory at Colorado State University (CSU) over the last 5 years. CSU has a high-head test facility with a large flow capacity available from Horsetooth Reservoir (facilities not available within Reclamation). Reclamation’s Hydraulics Laboratory directed CSU Laboratory staff to design, construct, and

test protection schemes for embankment dams or earthen spillways at a near prototype scale. Reclamation performed additional lab testing and analysis and patented the devices developed from this work.

Partnerships between Federal, university and private laboratories have worked well to meet Reclamation's needs by leveraging the facilities and expertise in each of the organizations. Although such arrangements can often be beneficial, decisions to contract out laboratory, analytical, and/or construction management services do need to address the following questions:

- Would it harm the agency's ability to preserve critical institutional knowledge required to maintain essential structures or operate major river systems (i.e., is it mission-critical)?
- Are the services inherently governmental, i.e., do they support work that involves the exercise of Reclamation's role as water master for example, where a decision could negatively impact a stakeholder – generally by reallocation of resources such as water, power, or money?
- Is the service commercially available within the necessary timeframes and at the necessary capability level? When lab services are needed in remote areas or tests must be performed rapidly, the logistics of shipping samples may prevent the use of an outside laboratory.
- Is the service cheaper when performed by the Government than by private industry?
- Does performance of lab/analytical/construction management services by Reclamation add more value to the work it supports? In some cases, Reclamation staffs are the experts in a specific field. Their assistance on a project enhances the product because of their level of knowledge and expertise developed over a period of time.

Reclamation Laboratories

The study team identified 11 Regional testing and construction laboratories, and 7 disciplines sharing laboratory facilities in the Technical Service Center. In addition, the Laboratory Shops in Denver (organizationally part of the Water Resources Services Division) provide laboratory construction support services to all disciplines using the TSC laboratory. The specific laboratories are shown in Figure 3, and listed below.

Construction Labs

- **UC Region**
 - Durango, CO (concrete and soil testing)
 - Farmington, NM (concrete and soil testing)
- **GP Region**
 - Loveland, CO (concrete and soil testing)
- **MP Region**
 - Willows, CA (concrete and soil testing,)
- **LC Region**
 - Yuma, AZ (concrete and soil testing)

Regional Testing Labs

- **LC Region**
 - Boulder City, NV (water quality, soil testing)
 - Yuma Desalting Plant (water quality)
- **UC Region**
 - Provo, UT (concrete and soil testing)
 - Alamosa, CO (water quality, lead paint analysis)
- **GP Region**
 - Conducted primarily by contract
- **MP Region**
 - Shasta Lake, CA (water quality, temperature stratification measurements)
- **PN Region**
 - Boise, ID (water quality)

Specialized Labs – Technical Resources

- **Technical Service Center Laboratory – Denver, CO**
 - Disciplines represented in the TSC Laboratory**
 - Materials Engineering and Research (86-68180)
 - Soil and Sediment (86-68520)
 - Environmental Applications and Research (86-68220)
 - Water Treatment Engineering and Research (86-68230)
 - Fisheries and Wildlife Resources (86-68290)
 - Earth Sciences and Research (86-68340)
 - Hydroelectric Research and Technical Services (86-68450)
 - Hydraulics (86-68560)
 - Laboratory Shops (86-68561; support for all disciplines)
- **National Research Center for Groundwater Desalination – Alamogordo, New Mexico**

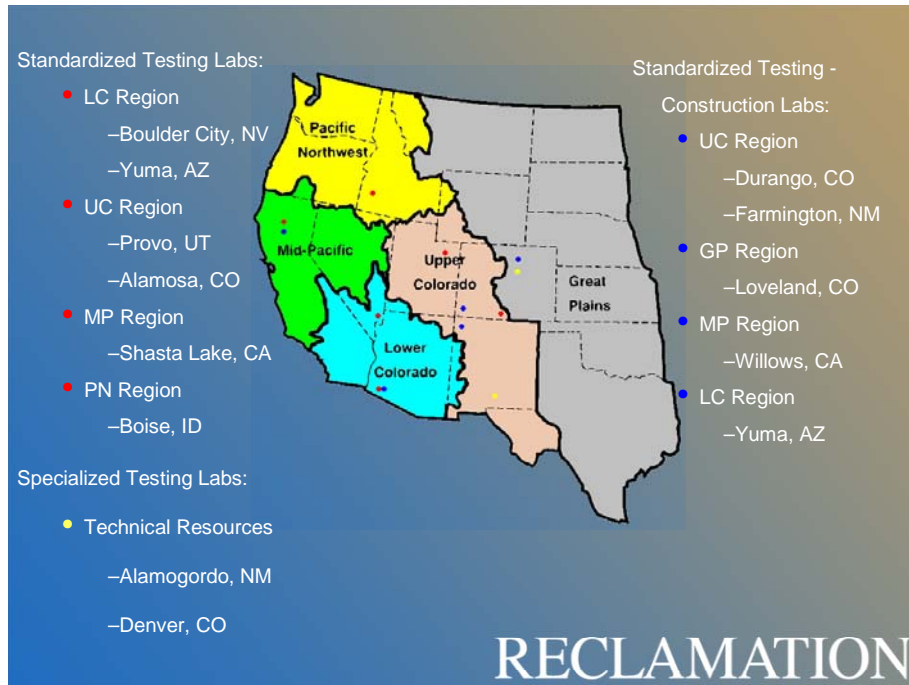


Figure 3. — Location of Reclamation laboratories.

Appendix A provides detailed information about each of the Reclamation laboratories identified in this study. For each laboratory the following information is presented:

- Description of the nature of their work
- Present workload and future workload outlook
- Use of contracting
- Alternative Federal Government laboratories and alternative university or private laboratories that could potentially do some or all of this laboratory's work.
- Recent, ongoing, and planned future efforts to improve operational efficiency through cost reduction measures (reduction of space, consolidation with other laboratories, reduction of staff) or workload enhancement.

Appendix B provides data in spreadsheet form on TSC and Regional labs and the use of contracting. One spreadsheet summarizes standardized lab services provided by internal labs (TSC and Regional), in terms of total staff days of effort. A second spreadsheet provides a breakdown of billable staff days associated with the various specialized lab services provided through the TSC. This sheet also gives information on related engineering and scientific services provided by groups in the TSC that also provide laboratory services. A third

spreadsheet summarizes work performed in each major laboratory service area by TSC lab, Regional labs, and contracted outside laboratories. The first decision to contract work to a laboratory or assign it to an internal laboratory is generally made at the Regional or Area office level. However, once assigned to the TSC laboratory, a second decision to contract is often made in the TSC, with contracting at this level used to equalize workload or obtain unique laboratory services not available in Reclamation.

External Providers of Laboratory Services

Information about external providers of lab services was obtained in two ways. First, each Regional office was asked to identify the external and internal laboratories that they presently utilize for standardized testing. Second, each Reclamation laboratory was asked to identify external laboratories that they utilize to supplement their capabilities and that could potentially take on additional workload if a Reclamation laboratory were to be reduced in size or eliminated. Table 2 provides a summary list of all of these external laboratories and the related comments received from the Regional offices and Reclamation labs. Additional detail is provided in Appendix A.

Opportunities for Laboratory Services

Table 1. Reclamation laboratories and staffing (continued on next page)

USBR Office/Lab	Location	Org Code	Number of Staff	% lab work
PN Region				
PN Regional Lab	Boise, ID		3 full-time chemists (1 supervisory) 4 part-time students	85%
MP Region				
Northern California Area Office Water Quality Lab and Hydro Shop	Redding, CA		1 chemist (team leader) 2 full-time technicians 1 part-time technician 1 part-time student	27%
Mid-Pacific Construction Office	Willows, CA		4 materials engineering technicians	100%
LC Region				
Lower Colorado Region Materials Testing Laboratory	Boulder City, NV		1 supervisory chemist 2 part-time students (physical science techs)	100%
Yuma Desalting Plant Analytical Laboratory	Yuma, AZ		1 supervisory chemist 2 laboratory technicians 1 laboratory assistant All of these positions are contracted out. Reclamation owns the lab space and equipment.	100% (Contract)
Yuma Area Office Materials Laboratory	Yuma, AZ		1 engineering technician (part-time staffing lab, part time working as construction inspector)	50%
UC Region				
Alamosa Field Office Water Laboratory	Alamosa, CO		1 chemist 2 physical science technicians	100%
Four Corners Construction Office Laboratory	Farmington, NM and Durango, CO		2 supervisory materials engineering technicians (Durango) 5 materials engineering technicians (Durango) 3 materials engineering technicians (Farmington)	100%
Provo Soils Laboratory	Provo, UT		1 supervisory engineering technician 5 materials engineering technicians	70%
GP Region				
Construction Services Lab	Loveland, CO		3 materials engineering technicians 1 office automation clerk assists as needed with compilation and checking of data and reports	50%

Table 1. Reclamation laboratories and staffing (continued)

USBR Office/Lab	Location	Org Code	Number of Staff	% lab work
Specialized Laboratories				
National Research Center for Groundwater Desalination	Alamogordo, NM		Not yet operational	N/A
Hydroelectric Research	Denver, CO	86-68450	23 engineers (1 supervisory) 1 engineering technician 1 IT specialist 1 secretary (currently vacant) 1 student engineering aide	38%
Hydraulics	Denver, CO	86-68560	12 engineers (1 supervisory) 2 engineering positions vacant at this time 2 technicians; 1 vacancy at this time 1 secretary 1 student intern	33%
Laboratory Shops	Denver, CO	86-68561	1 foreman 2 model makers 1 machinist 1 electrician 1 general equipment mechanic	80%
Environmental Laboratories and Greenhouses	Denver, CO	86-68220	2 aquatic biologists (1 research grade) 3 aquatic scientists (2 research grade) 1 biologist 7 botanists (3 research grade) 2 chemists (1 research grade) 1 ecologist 1 fishery biologist 1 physical scientist 1 secretary (shared with 86-68290) 1 supervisory biological scientist 1 student intern (currently vacant)	15%
Fisheries and Aquaculture Facilities	Denver, CO	86-68290	8 fisheries biologists (1 supervisory) 2 wildlife biologists 7 natural resource specialists 1 environmental chemist 1 technician; 1 vacancy at this time 1 shared services secretary 1 student intern	35%
Materials Engineering and Research	Denver, CO	86-68180	13 engineers (1 supervisory) 9 technicians 1 petrographer 1 secretary	22%
Water Treatment	Denver, CO	86-68230	15 engineers (1 supervisory) 1 physical scientist 1 research chemist 1 chemist 3 technicians 1 program analyst 1 secretary	50%
Soil and Sediment	Denver, CO	86-68520	1 physical scientist	100%

Opportunities for Laboratory Services

Table 2. — External laboratories identified by Regional offices and by Reclamation laboratory groups.

USBR Office/Lab	Location	Alternative Lab	Location	Services Provided, Notes
PN Region				
PN Regional Lab	Boise, ID	Alchem Labs	Boise, ID	100% of similar services
		Analytical Labs	Boise, ID	100% of similar services
		State of Idaho Health Lab		100% of similar services
		USGS National Water Quality Laboratory	Denver, CO	50% of similar services
MP Region				
Contract labs already utilized by MP Region. Details in Appendix A.		Basic Laboratory	Redding, CA	Inorganic parameters (metals, general chemistry)
		BioVir Analytical Laboratories	Benecia, CA	All biological and pathogenic parameters
		Block Environmental Services		Toxicity testing
		California Laboratory Services	Pleasant Hill, CA	Chromium VI
		Caltest Analytical Laboratory	Napa, CA	All inorganic parameters and biological parameters
		Columbia Environmental Resource Center	Columbia, MO	Mercury in biological tissue
		Data Chem Laboratories	Salt Lake City, UT	Asbestos, metals, organochlorine pesticides and PCBs in solids
		Calif. Dept. of Fish & Game - WPCL	Cordova, CA	Metals analysis in tissue.
		Frontier Geosciences	North Seattle, WA	All metals analysis in tissue. Specialize in low level metals analysis.
		Fruit Growers Laboratory	Santa Paula, CA	All inorganic and organic parameters in drinking water.
		Montgomery Watson/Harza Laboratories	Monrovia, CA	All inorganic and organic parameters in drinking water
		Olson Biochemistry Laboratories	Brookings, SD	Low level selenium analysis.
		Severn Trent Laboratories	Sacramento, CA	All inorganic parameters and hazardous waste organics except for Ammonia as Nitrogen. Ag analysis in sediment, when known quantity is present, request 6010B
		Sierra Foothill Laboratory, Inc.	Jackson, CA	All inorganic parameters, microbiological parameters, acute and chronic toxicity.
		Twining Laboratories, Inc.	Fresno, CA	General chemistry and boron analysis.
		U.S. Geological Survey	Denver, CO	Inorganic parameters in soil .
		USBR Soils Lab, TSC	Denver, CO	General physical analysis in soils.
		Western Environmental Testing Laboratories	Sparks, NV	Inorganic parameters (metals, general chemistry).
Northern California Area Office Water Quality Lab and Hydro Shop	Redding, CA	No alternative labs listed		
Mid-Pacific Construction Office	Willows, CA	External materials testing labs can be used for QC testing on construction contractors but on critical and complex construction projects, QA must be performed by Reclamation in accordance with Reclamation FAC 03-02.		

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Table 2 (continued). — External laboratories identified by Regional offices and by Reclamation laboratory groups.

USBR Office/Lab	Location	Alternative Lab	Location	Services Provided, Notes
LC Region				
External laboratories used in the past by LC Regional Office		Beckmar Environmental Laboratories	Jeffersontown, KY	Metals, water, fish samples (\$12.5k in FY06)
		Alpha Analytical Laboratories		Overton site cleanup (\$7.4k), 5-yr BPA (\$10k)
		Beta Analytical		Carbon dating (\$7.1k)
		Janda, DBA Mohave Environmental Laboratories	Bullhead City, AZ	Water & wastewater analysis at Hoover Dam (\$19k in FY06)
Lower Colorado Region Materials Testing Laboratory	Boulder City, NV	Water quality test services may be readily available in the nearby metropolitan center of Las Vegas, however process time and ability to perform tests using Reclamation-specific methods may be an issue		
Yuma Desalting Plant Analytical Laboratory	Yuma, AZ	Water quality test services are readily available in the nearby metropolitan centers of Phoenix, AZ and San Diego, CA, however water samples are taken daily (and in some cases three times a day), and these samples would all have to be express-shipped out of town		
Yuma Area Office Materials Laboratory	Yuma, AZ	Soil and concrete testing services are readily available from providers in the surrounding metropolitan areas (Phoenix, AZ and San Diego, CA) within 200 miles. A significant issue could be timely processing of samples, as they would need to be shipped to the test		
UC Region				
Alamosa Field Office Water Laboratory	Alamosa, CO	The lab is approximately 200 miles from the nearest metropolitan area. Some analyses, i.e. ph, dissolved oxygen, nitrate, microbiology, need to be performed on-site or within 24 hours of sampling. This precludes sending these samples to outside labs. Cost of analyses is		
Four Corners Construction Office Laboratory	Farmington, NM and Durango, CO	These worksites and communities are rural. Testing providers may be available in the communities of Albuquerque, NM and Pueblo or Colorado Springs, CO. However, samples would need to be transported to these labs via some kind of express shipping, and		
Provo Soils Laboratory	Provo, UT	Water quality test services may be readily available in the nearby metropolitan center of Salt Lake City, however process time and		
Western Colorado Area Office Materials and Water Laboratories	Grand Junction, CO	Energy Laboratories, Incorporated	Casper, WY	Provides radiochemistry services to A-LP Project
		Sangre De Cristo Laboratory, Incorporated	Alamosa, CO	Provides water quality analyses for A-LP Project
		Green Analytical Laboratories, Incorporated	Durango, CO	Provides water quality analyses for A-LP Project and other projects in vicinity
		USBR Soil Properties Laboratory (TSC)	Denver, CO	Analyzing suspended sediment in water quality samples associated with features of A-LP Project
GP Region				
GP Regional Office	Billings, MT	The GP Region utilizes several unnamed independent, non-governmental labs for water quality and safety/health related lab testing. For construction-related testing, non-government labs (e.g., HKM Laboratories in Billings MT) do about 40% of the testing, and the Loveland Construction Office Laboratory does the remainder, when it is cost effective. See detailed writeups in Appendix A for details.		
Construction Services Lab	Loveland, CO	HKM Laboratories is used in some cases by the regional office as described above		
Dakotas Area Office	Bismarck, ND	Utilizes USGS labs for most testing		

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Opportunities for Laboratory Services

Table 2 (continued). External laboratories identified by Regional offices and by Reclamation laboratory groups.

USBR Office/Lab	Location	Alternative Lab	Location	Services Provided, Notes
Specialized Laboratories				
National Research Center for Groundwater Desalination	Alamogordo, NM	No alternative laboratories listed		
Hydroelectric Research	Denver, CO	No other laboratories in the world offer similar range of services. Closest matches are the Canadian hydroelectric utilities, Hydro Quebec and BC Hydro.		
Hydraulics and Lab Shops	Denver, CO	U.S. Army Corps of Engineers Coastal & Hydraulics Laboratory	Vicksburg, Mississippi	This is a government lab under pressure to downsize and contract work out. May have limited ability to take on new work from Reclamation.
			Stillwater, OK	Focused research facilities having limited ability to do work for others outside of their own agency's mission definition
		USDA-Agricultural Research Service (several locations)	Phoenix, AZ	
		USGS Hydrologic Instrumentation Facility	Oxford, MS	
		USGS Conte Anadromous Fisheries Laboratory	Bay St. Louis, MI	Focused on water measurement issues only
			Turners Falls, MA	Focused on anadromous fish issues only
		Turner-Fairbank Highway Research Center	McLean, VA	Hydraulic structures associated with transportation infrastructure
		ENSR Hydraulic Laboratory	Redmond, WA	
		Alden Hydraulic Laboratory	Holden, MA	
		Colorado Engineering Experiment Station, Inc.	Nunn, CO	Continuity of capability is an issue
		Several unspecified university laboratories		
Environmental and Greenhouses	Denver, CO	Ongoing cooperation with many federal agency labs and university labs having associated interests, but different focus		
Fisheries and Aquaculture Facilities	Denver, CO	Ongoing cooperation with many federal agency labs and university labs having associated interests, but different focus		
Materials Engineering and Research	Denver, CO	LeHigh University	Pennsylvania	Similar 5M-lb testing capability; facilities are kept very busy and have little availability.
		U.S. Army Corps of Engineers Engineering Research and Design Center	Vicksburg, MI	
		Naval Laboratory	Blossom Point, MD	Blast testing and mitigation studies
		Sandia National Laboratories	New Mexico	Blast testing and mitigation studies
		New Mexico School of Technology	New Mexico	Blast testing and mitigation studies
				Cooperating now on some projects of mutual interest
		Turner-Fairbank Highway Research Center	Turners Falls, MA	
		Several unspecified university laboratories		
Water Treatment	Denver, CO	Ongoing cooperation with many federal agency labs having mutual interests		
Soil and Sediment	Denver, CO	No specific alternative laboratories listed. This lab is one of the alternative providers mentioned by several regions.		

Strategies for Retaining Capabilities and Consolidating Reclamation Laboratory Facilities

Some laboratory services are by nature difficult or expensive to maintain. Strategies for retaining these capabilities include:

- Make laboratories as efficient as possible, within reason, through space and equipment consolidation, optimization of staff capabilities, and the use of best management practices.
- Continue with planned implementation of space consolidation in the TSC and Regional labs as well as other appropriate measures that make lab services more economical such as hiring short term contractors to accomplish spikes in workload.
- Consider management alternatives described in this report to help maintain critical capabilities in an effective and efficient manner. The most efficient method for obtaining lab services should be evaluated periodically.

Identifying Opportunities to Retain, Consolidate, or Eliminate Lab Services

The decision tree flow chart presented in Appendix C shows how the decision to retain, consolidate, or eliminate laboratory services within Reclamation can be considered. For services critical to fulfilling Reclamation's mission, the retention of some capability within Reclamation is necessary. Consolidation of multiple overlapping facilities or capabilities can take place, or large operations can be reduced in size or otherwise optimized to make them more efficient. For services that are not judged critical to fulfilling the mission, all three options (retention, consolidation, elimination) are possible. The decision is then based on a best value analysis, comparing the capabilities, continuity, and efficiency of both internal and external providers of the service. The essential questions to answer are as follows:

- Is the capability to perform the work critical to fulfilling Reclamation's mission?
- Is existing Reclamation capability well-matched to Reclamation's needs?
- What are the capabilities, continuity, and efficiency of outside laboratory service providers?
- How do the costs and value provided by Reclamation labs compare to those available from outside labs?

Opportunities for Laboratory Services

- Are there intangible benefits of retaining capability in Reclamation as opposed to making use of outside capabilities?

Capability, continuity and efficiency are the key evaluation factors that should be considered for any outside laboratory service provider. Capability indicates that the provider has the required facilities and technical staff to perform the work when needed. Continuity indicates that the provider is expected to be around for the long term, and that staff turnover is low enough that there is a reasonable expectation that the provider can give continued support of Reclamation's needs when follow-up work on a particular project is needed. Efficiency indicates that the provider can perform the work in a timely manner for a similar or better cost than Reclamation. If the provider lacks capability and must learn "on the job" their efficiency will be low and impact Reclamation's ability to accomplish the mission. Similarly, if a lab is economical, but slow, then efficiency is poor.

Continuity is a crucial element and is often difficult to ensure when services are obtained from an outside provider. The retention of laboratory capabilities necessary to meet mission-critical needs is essential for Reclamation. This report identifies those needs and attempts to identify opportunities for retaining those capabilities within Reclamation. This includes taking advantage of opportunities to do work for others so that Reclamation can retain mission-critical capability.

Other intangible factors must be considered in any analysis. One example is administrative limitations on work that can be done by some outside laboratories. We know from recent experiences that there are several hydraulics laboratories in the U.S. Dept. of Agriculture (USDA) Agricultural Research Service (ARS) that could potentially provide services to Reclamation. However, because ARS is entirely a research organization, their labs are often unable to take on jobs related to site-specific problem-solving or troubleshooting. The work can only be performed when it contributes significantly to their targeted research focus areas.

The team envisions that any analysis of a specific laboratory service provided by Reclamation would first entail an evaluation of the capabilities, costs, and efficiency of the internal provider, followed by an evaluation of potential external providers, considering the factors discussed above.

APPENDIX A

LABORATORY SUMMARIES

Construction Laboratories

Upper Colorado Region

Laboratory: Four Corners Construction Office Laboratory

Group: Four Corners Construction Office

Organizational Parent: Upper Colorado Regional Office

Location: – Durango, CO
– Farmington, NM

Contact Information: Mike Deming, Farmington Office Manager
970-799-3225

Rick Ehat, Four Corners Office Manager
970-259-1100

Description: Four Corners Construction Office performs work primarily in two major categories; investigations to support (1) design and (2) construction quality control. The lab provides support to several program areas: Safety of Dams (SOD) for the BIA, Navajo Indian Irrigation Project (NIIP), and the Animas-La Plata Project (A-LP).

The primary capability of the lab is materials engineering testing of soil and various batched or concrete products. The information is used for design of all types of Reclamation features and for construction quality control of same features. Testing of rock is accomplished on an irregular basis as is some specialized soils testing for research purposes associated with design.

There are two labs under the FCO with one supervisor. The labs provide service to the Farmington Construction Office, Farmington New Mexico and the Animas-La Plata Project, Durango, Colorado. (UC Region.) Lab personnel are assigned to each lab but are used at both labs as needed to balance the workload and reduce the need for hiring additional staff. Mobile lab trailers are used for BIA Safety of Dams work because of distance from the office and isolation factors on the reservation.

The FCO/A-LP labs' primary client is Reclamation, with no work contracted to external labs and 10-12% contracted to the Denver Technical Services Center. The lab uses software that was developed by Reclamation in the 1970s. Utilities and supplies and other expenses are covered in the total cost to run each lab as described below. Current facilities are housed in leased buildings. All equipment is owned by Reclamation. Annual lab funding fluctuates with construction budgets.

Opportunities for Laboratory Services

Staff: FCO Lab staff consists of 2 Supervisory Materials Engineering Technicians and 8 Materials Engineering Technicians. The two supervisors and five technicians are duty-stationed in Durango (A-LP), and three technicians are duty-stationed in Farmington (FCO).

Workload: The A-LP customers are as follows: the Navajo Nation, the Ute Mountain Ute Tribe, the Southern Ute Indian Tribe, the Animas-La Plata Water Conservancy District, the State of Colorado, the San Juan Water Commission of New Mexico and the La Plata Water Conservancy District of New Mexico.

The Farmington Construction Office customers are the Bureau of Indian Affairs (SOD and NIIP), Navajo Nation (SOD and Technical Assistance), and many of the Tribes/pueblos (BIA SOD) within New Mexico.

The Farmington branch of the FCO lab performs 100% of their work to serve Reclamation. The BIA pays for the work on the Navajo Indian Irrigation Project and on BIA Safety of Dams. The Durango branch of the FCO lab provides its services to Reclamation for the Animas-La Plata Project, and receives funding from that project to perform the work. Lab staff spends the lion's share of their time providing design and construction lab services, with concrete and soil testing constituting the largest portion of analyses performed. Other tests form a smaller portion of the work: seepage prevention, concrete and soil cement mix design, rock mechanics.

Contracting Activities: While the lab doesn't outsource any work to private sector labs, it does send 1-2% of its work to the Denver Technical Services Center (estimated at less than 20k/yr).

Location of the labs is a primary reason they perform their work in-house. The labs in local communities generally do not have the equipment to run many of Reclamations tests. Additionally, much of the work is done in isolated area of the Navajo Reservation where there are no labs at all.

Technical capability of nearby labs is a challenge to outsourcing the work, as is availability 24-hour-per-day service for construction analyses and prompt reporting to keep contractors on schedule. The cost of the equipment required for Reclamation tests, especially when not used frequently is a challenge for most companies in the Farmington-Durango area.

Potential Alternate Providers of Similar Services: These worksites and communities are rural. Testing providers may be available in the communities of Albuquerque, NM and Pueblo or Colorado Springs, CO. However, samples would need to be transported to these labs via some kind of express shipping, and processing deadlines would have to be met, as the work is performed for QA/QC of construction projects, and progress depends on timely receipt of lab results. A

cost-benefit analysis would need to be performed to determine what cost savings could be obtained by outsourcing this work.

Great Plains Region

Laboratory: Construction Services, Loveland

Group:

Organization Parent: Great Plains Regional Office (GPRO)

Location: Loveland, Colorado

Contact Information: Larry Schoessler (Construction)
406-247-7784
lschoessler@gp.usbr.gov

Cody Clark (Geology)
406-247-7874
cclark@gp.usbr.gov

Description: For construction related testing and/or lab work, GPRO either does own construction materials testing (thru Construction Services, Loveland) or, more commonly, the specs are written so that the contractor must hire an independent testing lab to do the work. As the GPRO materials technicians retire (all three are eligible), GPRO will be forced to re-evaluate the extent to which in-house testing is done, and that may lead to more contracting out for lab services. Typical testing done by Construction Services, Loveland, and/or contractors include: Soil testing – laboratory compaction (Proctor), in place density, percent compaction, consistency limits (liquid limit, plastic limit, plasticity index), specific gravity (soil and rock), moisture content, mechanical analysis (gradation of gravel and sand, hydrometer analysis, relative density (maximum and minimum index unit weight testing), field logging of soils in test pits. Concrete testing – slump, unit weight, air content, concrete temperature, casting and testing samples for determination of compressive strength. Where construction contractors are required to employ independent testing labs, Reclamation personnel provide quality assurance oversight by visually observing the work of independent lab personnel and reviewing independent lab test results for compliance with specifications.

For geology related testing and/or lab work, in the last two years GPRO have sent soil samples to laboratory for testing 5 times. The largest of the projects, with the greatest number of samples were Pueblo and Olympus projects. Samples from these projects were tested in Reclamation’s Laboratory at Construction Services, Loveland. For the other 3, much smaller projects, soil samples were sent to HKM laboratories in Billings. In addition GPRO has two upcoming projects at Veterans

Opportunities for Laboratory Services

Dam, OK and Nelson Dikes, MT. Samples from Veterans will be sent to Reclamation's Laboratory at Construction Services, Loveland for testing. Samples from Nelson will be sent to HKM for testing.

Staff: Three materials engineering technicians, plus one Office Automation Clerk who assists as needed with compilation and checking of data and reports. **Workload:** For construction related work, over the last two years, 100% of the quality control testing was performed by independent testing laboratories required to be hired by construction contractors. 100% of quality assurance testing and provision of technical expertise on soils and concrete to field inspection forces was provided by Reclamation's Laboratory at Construction Services, Loveland accounting for about 25 staff days.

For Geology related work, over the last two years, taking into account the size of the projects and amount of samples sent in for testing about 40% of Reclamation laboratory testing was contracted out to HKM in Billings. About 60% of Reclamation samples were tested in-house, at Reclamation's Laboratory at Construction Services, Loveland. Not accounting for the size of project and number of samples, about 50% was contracted and 50% was done by Reclamation forces. Reclamation's Laboratory at Construction Services, Loveland spent about 90 staff days performing testing on samples provided by Geology.

Contracting Activities: For construction related work, aware of only two instances where GPRO have contracted for laboratory materials testing directly from the regional office (or, better stated, these are the two that come to mind): In 2004, GPRO contracted with Maxim Technologies in Helena for concrete quality assurance testing for the underwater repairs in the Canyon Ferry Stilling Basin. GPRO is just now in the process of contracting with HKM Engineers (through the regional IDIQ engineering services contract) for materials testing on the T&Y fish diversion structure near Miles City.

Recent and Ongoing Efforts to Consolidate, Reduce Cost and Retain Capabilities: Reclamation's Laboratory at Construction Services, Loveland has obtained surplus laboratory equipment from different offices in the GP Region and the TSC in order to maintain a full service laboratory at Loveland and a field quality control oriented mobile laboratory for use throughout the GP Region. Nearly all of the laboratory equipment currently on hand was obtained at no cost from surplus, and the cost to maintain and calibrate the equipment is minimal (estimated at about 5 staff days per year). Rather than perform annual calibrations on equipment that hasn't been used in the past year, the current practice is to calibrate equipment before use. The cost of consumables is small and is charged to the project receiving the services. This approach further reduces the cost to maintain the laboratory. The fixed lab in Loveland is located in space temporarily borrowed at no cost from the ECAO, and the mobile lab is stored at the same facility at no cost. The materials technicians also serve as construction inspectors with their time fully utilized, so there is no added cost to maintain the staff

capability. It is GP-2600's position that the laboratory at Loveland provides in-house lab capability at the lowest possible cost because the viability of the lab is not dependent on a certain level of workload. The lab is used when it is cost-effective to do so, and this is evaluated on a case-by-case basis. If the need for financial investment would be required to maintain the lab in the future, it is likely the lab would no longer be supported unless there was an accompanying change in forecasted workload that required lab services.

Potential Alternative Providers of Similar Services: The potential alternative providers are independent labs under contract to Reclamation and independent labs under contract to construction contractors. Both of these sources have been used and continue to be used routinely by GP-2600. It has been our experience that the level of materials testing expertise possessed by GP-2600 is superior to that which is available through independent labs, so we intend to continue to use the Loveland lab when it is cost effective to do so.

Mid-Pacific Region

Laboratory: Mid-Pacific Construction Office (MPCO)

Group: Division of Field Engineering – Concrete and Soils Lab

Organizational Parent: Mid-Pacific Construction Office (MPCO)

Location: Willows, California and various jobsite locations

Contact Information: Richard A. Welsh, Construction Engineer 530-934-7066

Description: The MP Construction Office contains the only materials testing and analysis facility for materials investigation and construction quality control (QC) and quality assurance (QA) within the Mid Pacific Region. In addition, the office provides support to the Pacific Northwest Region for materials investigation and quality assurance since the abolishment of their laboratory organization.

The materials laboratory support construction activities at all construction projects throughout the region. MPCO has a permanent laboratory located in Willows, CA with two fully operating mobile materials laboratories and temporary facilities as required by the various construction projects.

Staff: 4 Material engineering technicians

Workload: MPCO provides all testing for investigation and designs within the Region, as well as, all the materials testing (QC/QA) for the construction contracts administered for Reclamation. At times, material testing is provided to other agencies such as COE, Fish and Wildlife, and Bureau of Indian Affairs.

Opportunities for Laboratory Services

In FY 2006, the lab provided materials testing for the following contracts: Lauro Dam SOD, Placer County Water Agency Pumping Plant, East Bear Creek Pumping Plant, Prosser Creek SOD, Buckhorn Dam Slope Stabilization, San Justo Dam Access Road, Tracy Northside Utilities, and New Melones Waterline Improvements.

In FY 2007, it is expected the testing will support the following construction contracts: Placer County Water Agency Pumping Plant Phase II, East Bear Creek Pumping Plant, Chiloquin Dam Pumping Plant, Battle Creek Fish Facilities, Stony Gorge SOD, Folsom Dam SOD, East Park Dam Road Repair, Savage Rapids Pumping Plant (PN Region), Coleman Barrier Weir, and other smaller construction contracts.

The investigation and construction quality control workload is increasing and expected to continue for several years. It is expected that the current staff will not be able to cover the workload in FY2008. The current plan to cover the increased workload will be via additional hires, detail staff from other Reclamation offices and use outside material consultants. It is expected that all three methods will be implemented.

Contracting Activities: The only contracting being performed now is by having some of the construction contractors perform the QC testing while Reclamation performs the QA function.

Recent and Ongoing Efforts to Consolidate, Reduce Costs, and Retain

Capabilities: The PN Region is using MPCO labs services when they have work requirements that can not be accomplished via other means. Tieton Spillway investigation was the first time services were used by the PN Region. Currently, MPCO will perform QA services on Savage Rapids Pumping Plant for the PN Region.

Potential Alternative Providers of Similar Services: Consultant material testing labs can be used for QC testing on construction contractors but on critical and complex construction projects QA must be performed by Reclamation in accordance with Reclamation FAC 03-02.

Lower Colorado Region

Laboratory: Yuma Area Office Materials Laboratory

Group: Technical Services Group (YAO-2300)

Organizational Parent: Yuma Area Office, Technical Support Office

Location: Yuma, Arizona

Contact Information: Robert Adams, Group Manager, (928) 343-8117

Description: The YAO Materials Laboratory provides testing services for soils and concrete. Testing is performed in association with various civil engineering activities within the LC Region. Investigative and Quality Assurance testing is performed on current and future construction projects, and maintenance work performed by contractor and Reclamation employees. The Materials Laboratory provides investigative testing in support of project designs. The lab also supports inspection (quality assurance) of soil and concrete construction.

Staff expertise is focused in the areas of concrete testing, soil testing and analysis; they also evaluate canal lining materials and concrete mix designs. Information gained through their work is used to enable completion of water delivery projects. 100% of staff time is invested in standardized testing, with the single staffer doing double duty as lab staffer and construction inspector.

Typical tests include:

- Unified soil classification.
- Gradation of soils and aggregates.
- Moisture content of soils and aggregates.
- Specific Gravity of soils and aggregates.
- Atterberg limits tests for soil.
- Maximum density determination of soil and aggregates.
- In-place density determination for soil and aggregates.
- Proctor compaction tests for soils.
- Relative Density Tests for soils.
- Undisturbed soil sampling in test pits, trenches, accessible borings and tunnels.
- Disturbed soil sampling in test pits, trenches, accessible borings and tunnels.
- Percent absorption for aggregates.
- Silt content of aggregates.
- Fresh concrete slump test.
- Fresh concrete entrained air test.
- Unit weight of fresh concrete.
- Cast, cap and break concrete compressive strength cylinders.
- Design concrete mix designs.

Laboratory facilities are located at the Yuma Area Office, consisting of a 45'x35' lab area with all the equipment required to perform the testing listed above.

Staff: 1 Engineering Technician (part-time lab staffer, part time inspector)

Workload: The YAO Materials Lab has been processing investigation samples for the All American Canal Drop 2 Reservoir over the last several years. Future work for the lab will be the QA testing for the All American Canal Drop 2

Opportunities for Laboratory Services

Reservoir and canal lining. There will also be additional work for other YAO maintenance and construction projects; Coachella Lining, SCADA, Cibola Valley and other MSCP projects.

The lab has only been operated 25% of the time for the past three years, but during the next three (through FY09) will be operated full-time to accommodate work from two major construction projects. Work will consist of standardized soil and concrete testing. The work will be funded by appropriations for the construction of the projects.

An estimate of the customer workload breakdown would be 40% YAO, 40% LC Region, 20% Denver office.

Contracting Activities: The lab performs work solely for YAO, outsourcing approximately 10% of its work to the Technical Services Center. For staff to consider outsourcing work to external labs, the external lab staff would need to demonstrate compatible experience and would need to be able to process samples and return test results in a timely manner.

Potential Alternate Providers of Similar Services: Soil and concrete testing services are readily available from providers in the surrounding metropolitan areas (Phoenix, AZ and San Diego, CA) within 200 miles. A significant issue could be timely processing of samples, as they would need to be shipped to the test labs.

Regional Testing Laboratories

Regional and area office laboratories (collectively referred to in this report as Regional laboratories) generally provide standardized laboratory testing that support construction activities or routine project operations. The majority of this work is water quality testing, concrete testing, and soil testing and analysis. Spreadsheets in Appendix B show that these laboratory operations vary widely in size, from just a few staff days per year to more than 1000. Staffs of some of these labs (e.g., Yuma Desalting Plant lab) also provide other engineering and scientific services not characterized as laboratory work.

The map in Figure 3 shows that most of the Regional labs are geographically separate, except for construction labs, which are sometimes close to one another or to other Regional labs. This is due to the need for fast turn-around or construction-related testing, or the need to avoid logistical problems associated with transporting material samples to distant locations.

Contracting for Lab Services in Regional and Area Offices

Detailed descriptions of Regional labs show that most Regional labs do little or no contracting for lab services. Instead, contracting takes place at the Regional and Area office level; decisions to contract or use internal providers are made before work is transferred to the labs themselves. These numbers are estimates since identification of the laboratory related expenses at all levels of Reclamation is very difficult to separate in the financial reports.

Region	Contracting for Standardized Testing (Estimated Annual Value)
PN	\$ 100,000
MP	\$ 500,000
LC	\$ 100,000
UC	\$ 275,000
GP	\$ 100,000
TOTAL	\$1,075,000

Lower Colorado Region

Laboratory: Lower Colorado Region Materials Testing Laboratory

Group: Resource Management Office (LC-2550)

Organizational Parent: LC Regional Office, Resource Management Office

Location: Boulder City, Nevada

Contact Information: Jeannie Rutherford, Lands Manager
702-293-8425

Amy Stephenson, Supervisory Chemist
702-293-8598

Description: The Lower Colorado Regional Laboratory provides analytical support for Reclamation projects in the areas of surface and ground water monitoring programs as well as agricultural and engineering soil studies. Results are used to verify modeling programs, track long-term environmental trends, and to support operational decisions by project managers. In addition to offering extensive physical and chemical analytical services, lab staff also work collaboratively with clients to develop appropriate data quality objectives and sampling plans, to select optimal laboratory methodology, and to ensure that reports of analysis are formatted properly.

The Laboratory performs various standardized tests in the areas of water quality, soils, and metals. Lab staff perform 100% of tests in-house, only once over the past eight years outsourcing analyses. In that case, lab staff chose an external lab that had specific instrumentation and could meet processing deadlines.

The lab can perform the following tests:

Water Analyses

Water and soil extracts

EC – Electrical Conductivity

pH – Relative Acidity/Alkalinity

TDS – Total Dissolved Solids (evaporative method)

Anions – Sulfate, Chloride, Carbonate, Bicarbonate

Cations – Sodium, Potassium, Calcium, and Magnesium

Minors – Fluoride and Silica,

Nutrients – Nitrate-Nitrite, Ammonia, Boron, total Phosphate, and ortho-Phosphate

Trace Elements – Al, Ag, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sn, Sr, Tl, and Zn

Special – Chlorophyll, Pheophytin, Total Suspended Matter, and Residue on Ignition

Soils Analyses

Screening tests:

1:5 tests - EC, pH, settling volume
Textural Classification
Percent Salt

Complete soil analyses:

Saturated paste extraction
Anions
Cations
Minors
Trace elements
pH
ESP (Exchangeable Sodium Percentage)
Gypsum

Construction/Engineering-Unified Soil Classification

Atterberg Limits
Gradation

Special Tests

Specific gravity

The lab houses the following equipment:

- Perkin-Elmer AAnalyst 100 Spectrophotometer – flame
- Perkin-Elmer SIMA 6100 graphite furnace
- Varian Cary 100 Ultra Violet Visible Spectrophotometer
- Dionex ICS Ion Chromatograph
- OI analytical Flow Solution IV segmented flow analyzer
- Milestone DMA 80 Direct Mercury Analyzer

Staff: 1 Supervisory Chemist, 2 part-time students (physical science technicians)

Workload: Over the past three years the LC Regional lab has received between 2,500 and 3,500 samples annually. In 2003 and 2004, 41% of samples received were from the Yuma Area Office, 8% were from outside agencies, and 51% were from the Lower Colorado Regional Office. In 2005 we received a variety of laboratory equipment as a result of the closing of the Denver Lab; thus we experienced an increase both of our analytical capabilities and our client base. In 2005, 14% of samples received were from the Denver Office, 27% from the Yuma Area Office, 12% from outside agencies, and 47% from the Lower Colorado Regional Office.

Opportunities for Laboratory Services

In 2003 and 2004, 90% of the samples received were water and 10% were soils or other solids. In 2005, 97% of the samples were water.

The majority of their work is for Reclamation, with about 12% of their work coming from the U.S. Geological Survey.

Contracting Activities: The lab doesn't typically contract out work. They work directly with Reclamation clients on analyses – providing flexibility, responsive service, and fast turn around. They also use Reclamation-specific methods in processing samples. As an in-house lab, they are able to meet processing deadlines that might be difficult for external labs to meet.

Potential Alternate Providers of Similar Services: Water quality test services may be readily available in the nearby metropolitan center of Las Vegas, however process time and ability to perform tests using Reclamation-specific methods may be an issue.

Laboratory: Yuma Area Office Yuma Desalting Plant Analytical Laboratory

Group: Desalting Group (YAO-1100)

Organizational Parent: Yuma Area Office, Area Manager's Office

Location: Yuma, Arizona

Contact Information: Michael Norris, Group Manager
928-343-8214

Wayne Johnson, Supervisory Chemist
Burns & Roe Services Corporation, Oradell, NJ
928-343-8171

Description: The YAO Yuma Desalting Plant Analytical Laboratory performs water quality analyses to comply with the legislated requirements of the Colorado River Basin Salinity Control Act, dated 1973. Essentially, Colorado River waters delivered to Mexico must meet defined standards pertaining to salinity. The flows delivered to Mexico must be tested to ensure annual cumulative salinities do not exceed agreed-upon levels.

Information generated is used to help Reclamation and others make decisions on how to operate various water processing and delivery facilities, such as the Colorado River, the Water Quality Improvement Center, and multiple groundwater wells and drains in the Yuma, AZ area. Specifically, the information is provided to the U.S. Geological Survey and used as the basis for official

salinity levels reported to Mexico, as required by international treaty, which affects Reclamation decisions on how to operate the Colorado River to ensure compliance with international agreements.

Staff expertise is concentrated in the area of water quality analysis and has developed over many years of experience in the water purification industry. Equipment availability limits evaluations to inorganic constituents, with samples needing analyses of organics being sent to external labs. 100% of staff time is invested in standardized testing. The lab processes as many as 10,000 samples a year.

The laboratory is licensed by the Arizona Department of Health Services for drinking water and wastewater inorganic analyses. The laboratory participates in the U.S. Geological Survey, the U.S. Environmental Protection Agency and Environmental Resource Associates quality control programs.

The Lab houses the following equipment:

- Lachat-Quik Chem 8000 2 channel flow injection analyzer used for chloride, nitrate, ammonium and orthophosphate analyses.
- Dionex Ion Chromatograph 2120i with AI-450 data system used to analyze F, Br, Cl, PO₄, NO₂, NO₃, and SO₄. This instrument has the capability of simultaneously determining all of the anions mentioned utilizing less than a milliliter of sample.
- Radiometer titration equipment including ABU 80 Autoburette, TTT85 titrator and SAC80 sample changer used for pH, alkalinity, specific conductance and fluoride
- Tecan RSP8051 4 channel diluter for diluting water samples.
- Baird ICP 2000 simultaneous inductively coupled plasma emission spectrophotometer used for the following analyses: Silver, aluminum, barium, beryllium, boron, cadmium, calcium, cobalt, chromium, copper, iron, lithium, manganese, magnesium, molybdenum, nickel, potassium, lead, silica as SiO₂, strontium, sulfur as SO₄, antimony, tin, thallium, vanadium, and zinc.
- Other general laboratory equipment includes equipment required to perform the following tests: chlorine residual, corrosivity, heterotrophic plate count, percent solids or moisture, total dissolved solids and turbidity. This equipment includes a Mettler AE163 analytical balance, Hach Ratio/XR turbidimeter, CEM AVC80 percent solids analyzer and other general laboratory equipment.

Staff: 1 Supervisory Chemist, 2 laboratory technicians, 1 laboratory assistant. **All of these positions are contracted.**

Workload: The lab is operated full-time all year. Primary clients include the Yuma Area Office's Water Quality Improvement Center, the Yuma Area Office's Operations & Maintenance Group, and the Yuma Desalting Plant. Funding for work is provided by the appropriations for the operation and maintenance of the Yuma Desalting Plant, Colorado River Basin Salinity Control Project – Title I.

Contracting Activities: The lab performs work solely for the Yuma Area Office. All lab work is contracted out via the Yuma Desalting Plant operations and maintenance contract. Reclamation owns the laboratory equipment and space. Lab staff typically send samples requiring organic analyses to external labs, as the YDP lab lacks the equipment to perform those analyses.

Potential Alternate Providers of Similar Services: Water quality test services are readily available in the nearby metropolitan centers of Phoenix, AZ and San Diego, CA, however water samples are taken daily (and in some cases three times a day), and these samples would all have to be express-shipped out of town for analyses. Because of the quantity of analyses required, out-of-town processing would need to be evaluated for any cost savings, as that option might prove prohibitively expensive.

Upper Colorado Region

Laboratory: Provo Soils Laboratory

Group: Provo Field Office (PR-300)

Organizational Parent: UC Regional Office, Provo Field Office

Location: Provo, Utah

Contact Information: Curt Pledger, Lab Manager
801-379-1208

Description: The Provo Materials Lab is a full service materials engineering lab that provides quality assurance/quality control on soils and concrete during construction, and design data collection. Lab staff can run the full battery of soils and concrete testing including:

- Atterbergs
- Total mechanical analyses including hydrometers
- Density tests (nuclear, sand cones, sleeve methods, 6-foot diameter ring)
- Proctor & relative densities
- Testing standards include Reclamation, ASTM & ACI

- Soils classification
- Slump, air, and unit weight on concrete
- Concrete compressive tests
- Equipment calibration
- Percolation and settlement testing
- Plus No. 4, minus No. 4 specific gravities

Lab staff perform lab and field tests. They operate Interior vehicles and their customers are billed on a per-mile basis. They own their equipment to run the tests mentioned above. In addition, they own:

- Trackhoes for exploration
- Portable water tanks
- Mobile laboratories
- gINT programs, PCQAS, PCEARTH
- License with the NRC to run nuclear tests

Staff: Lab staff consists of 1 Supervisory Engineering Technician, 5 Materials Engineering Technicians.

Workload: The lab workload is 100% standardized testing. The Lab's customer base includes:

- Dam Safety – SEED & SOD programs
- The DOI and the Central Utah Water Conservancy District for the completion of the Central Utah Project – reimbursable.
- Recreation
- RIP program
- BIA and Fish & Wildlife Service – reimbursable
- Forest Service – reimbursable
- Various water districts – reimbursable

Funding for the lab is provided by several of the programs listed above, including the Central Utah Water Conservancy District, the BIA, the Fish & Wildlife Service, the Forest Service, and the various water districts for whom testing is performed.

The workload breakdown varies from year to year. During the previous two years, lab workload breakout was 70% soil testing, 30% concrete. During the previous 10 years, the workload is closer to 50% in each area. The future two years look like we are swinging back to concrete with a 70% concrete and 30% soils.

Contracting Activities: The lab doesn't contract out any work.

Potential Alternate Providers of Similar Services: Water quality test services may be readily available in the nearby metropolitan center of Salt Lake City, however process time and ability to perform tests using Reclamation-specific methods may be an issue.

Laboratory: Alamosa Field Office Water Laboratory

Group: Alamosa Field Division (AFD-400)

Organizational Parent: Upper Colorado Region, Albuquerque Area Office

Location: Alamosa, Colorado

Contact Information: Ella Mae Herrera, Manager, AFD
719-589-5856 x400

Description: The Alamosa Field Office Water Laboratory performs water quality analyses to comply with the legislated requirements of the Rio Grande Compact, Article III, dated 1939. Essentially, waters produced by the Closed Basin Project must meet defined standards pertaining to total dissolved solids and percent sodium. Additionally, all water discharged must comply with the State of Colorado water quality standard. These commonly called “Table Value Standards” require that certain metals and inorganic constituents do not exceed calculated values for this segment of the Rio Grande.

The laboratory also analyzes Project water and “fouling materials” for metals and microbiological communities in support of infrastructure maintenance activities and operational decision processes.

The laboratory executes water quality analyses for inorganic, elemental and microbiological parameters. The laboratory also analyses algae, sediments, and “biofouling materials” to support biofouling mitigation/elimination endeavors. The lab also performs “lead in paint” analyses.

These analyses are accomplished by a Chemist and two Physical Science Technicians. The Lab participates twice annually in the USGS Standard Reference Sample Round-Robin. They compare exceedingly well with 150 State, local, national, international, academic, and commercial laboratories competing in this audit.

The AFD laboratory encloses approximately 1400 square feet with six separate “sub-labs.” Included are air handling systems, reagent/inert gas and vacuum lines, fumes hoods, casework, cabinets, safety showers and eyewash stations. Instrumentation includes: an Inductively-Coupled Mass Spectrometer (ICPMS), Inductively-Coupled Optical Emission Spectrometer (ICPOES), mercury analyzer, two ion chromatographs, automatic titrator, 1000X optical microscope

w/ computer controlled digital camera, stereomicroscope, pH meters and balances. A laboratory dishwasher, ovens, utilities and miscellaneous other equipment are also installed.

The lab also has a Class 2, Type B2 biological safety cabinet. This cabinet is installed in a Biological Safety Level 2 (BSL2) laboratory. The lab utilizes a Laboratory Information Management System (LIMS), numerous instrument/data control software programs and a chemical inventory software program. The lab uses nine PCs to operate instruments and connect to the LAN. The instrumentation is worth approximately \$500,000. The infrastructure is worth somewhat more than \$700,000.

Staff: Lab staffing consists of one chemist and two physical science technicians, all of whom hold chemistry degrees.

Workload: Approximately 97% of the laboratory sample load is submitted by the Closed Basin Project. Additional samples are occasionally submitted by engineers and program specialists from the AAO. Upon request, there is the possibility of accepting additional workload from the Area and Regional offices. Only samples from Reclamation sources are currently being accepted.

Contracting Activities: The lab doesn't currently outsource any work, but if they were, they would consider the following factors: accreditation, reputation, customer service, timeliness of service, location and cost.

Potential Alternate Providers of Similar Services:

Sangre De Cristo Laboratory, Incorporated
2329 Lava Lane P.O. Box 642
Alamosa, Colorado 81101
(719) 589-1024

Laboratory: Western Colorado Area Office Materials and Water Laboratories

Group: Western Colorado Area Office (WCAO)

Organizational Parent: Upper Colorado Regional Office, Western Colorado Area Office

Location: Grand Junction, Colorado

Contact Information: Mark Wernke, Lab Manager
970-248-0643

Description: The WCAO Materials Lab provides quality assurance/quality control on soils and concrete during construction and also for design data collection. In addition, the Water Lab provides testing for investigations and monitoring.

Materials Lab staff run the following tests:

- Atterbergs
- Total mechanical analyses including hydrometers
- Density tests by sand cones and sleeve methods.
- Proctor & relative densities
- Testing standards include Reclamation, ASTM & ACI
- Soils classification
- Slump, air, and unit weight on concrete
- Concrete compressive tests
- Equipment calibration
- Permeability and settlement testing
- Plus No. 4, minus No. 4 specific gravities
- Penetration resistance of fine grained soils
- Sampling and testing of concrete aggregates.

The Water Lab is capable of running the following tests:

- Electrical conductivity
- pH analysis
- analysis by titration
- total dissolved oxygen and nitrogen
- suspended solids, dissolved solids, and total matter in water
- turbidity

Staff: Laboratory staff consists of a Construction Inspector who also performs the lab testing.

Workload: Lab workload is 100% standardized testing, with the customer base including the following programs:

- Recovery Implementation Program (Endangered Species)
- Dam Safety (SOD)
- P.A.M. investigation and testing (Water Conservation)

The workload is broken down among the various types of tests as follows: water quality testing and analysis - .04 FTE; concrete testing - .25 FTE; soil testing - .25 FTE.

Contracting Activities: The Lab doesn't contract out any of its work.

Potential Alternate Providers of Similar Services:

Energy Laboratories, Incorporated
2393 Salt Creek Highway 82601
www.energylab.com
(888) 235-0515

Services provided by this lab are Radiochemistry for the Animas La- Plata Project which consists of analysis for Uranium, Gross Alpha/Beta, Radium 226/228, Strontium 89/90, Isotopic Thorium 228/230/232. Covered under A.-L.P. Durango Pumping Plant Structures and Improvements Environmental Compliance. BPI implementation Matrix 6C.

This A.-L.P. Radiochemistry sampling is done on a monthly basis for 3 sites on the Animas River near and at Durango, Colorado along with 1 duplicate sample and 1 blank sample and 1 time a year at the A.-L.P. Durango Pumping Plant area on 4 ground water monitoring wells along with 1 duplicate sample and 1 blank sample.

Upper Animas Studies analysis consists of Alkalinity, Hydroxide, Chloride, Acidity, pH, Fluoride, Bicarbonate, Conductivity, Sulfate, Carbonate, T.D.S. Total & Dissolved Metals – Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Cobalt, Copper, Chromium, Iron, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Thallium, Vanadium, Zinc. Total Metals – Calcium, Magnesium, Potassium, Silicon, Sodium. Covered under Geographically Defined Programs. BPI implementation Matrix 22.

The Upper Animas Study field sampling events are done on a bimonthly basis at 4 locations at Silverton, Colorado plus a series of 18 locations are done 1 or sometimes 2 times a year for ground water.

Dolores River and Split samples water quality analysis from this lab are major cations/anions, total and dissolved trace elements which consist of these parameters: Conductivity, TDS, Ph, Fluoride, Chloride, Ammonia, Nitrate, Orthophosphate, Sulfate, Carbonate, and Bicarbonate.

Total & Dissolved Metals – Silver, Arsenic, Cadmium, Chromium, Copper, Iron, Manganese, Lead, Selenium, Mercury, Zinc, Nickel, Aluminum.

Total Metals – Silicon, Calcium, Magnesium, Sodium, Potassium. Total recoverable on total selenium and dissolved selenium. Covered under C.R.W.Q.I.P. and Durango Pumping Plant Structures and Improvements, O&M, General Water Resource Planning under geographically defined programs. BPI implementation Matrix' 22, 4H, 6C and 8H.

Opportunities for Laboratory Services

This laboratory also provides sample bottles, preservative ampules, prepaid overnight U.P.S. labels, coolers with packaging material upon request. They also provide hard copy data and electronic data in Excel format.

The Dolores River is sampled 3 times a year at 1 site during high spring runoff prior to irrigation, during mid summer irrigation and once late fall low flow after irrigation season.

1 set of split samples and 1 set of spike samples are sent in 1 time a year for quality assurance/ quality control purposes.

Sangre De Cristo Laboratory, Incorporated
2329 Lava Lane P.O. Box 642
Alamosa, Colorado 81101
(719) 589-1024

Services provided by this lab for the Animas-La Plata and split samples water quality analysis for major cations/anions and total and dissolved trace elements which consist of these parameters:

Major constituents - Conductivity, TDS, pH, Fluoride, Chloride, Ammonia, Nitrate, Orthophosphate, Sulfate, Carbonate, and Bicarbonate.

Total and Dissolved Metals – Silver, Arsenic, Cadmium, Chromium, Copper, Iron, Manganese, Lead, Selenium, Mercury, Zinc, Nickel, Conductivity, TDS, Ph, Fluoride, Chloride, Ammonia, Nitrate, Orthophosphate, Sulfate, Aluminum.

Total Metals – Silicon, Calcium, Magnesium, Sodium, Potassium. Total recoverable on total selenium and dissolved selenium. Covered under Durango Pumping Plant Structures and Improvements, Ridges Basin Dam and Reservoir Environmental Compliance, O&M, General water Resource Planning under geographically defined programs. BPI implementation Matrix' 22, 4H, 6C, 8H.

This laboratory provides hard copy data along with electronic versions in MS Excel format.

The Animas River is sampled at 3 sites on a monthly basis along with 1 set of duplicate and 1 set of blank samples an added 2 sites are sampled on a quarterly basis in Colorado and New Mexico.

The Durango Pumping Plant wells are sampled at 4 locations 1 time a year at midsummer.

1 set of split samples and 1 set of matrix spike samples are sent in 1 time a year for quality assurance/ quality control.

Green Analytical Laboratories, Incorporated
75 Suttle Street
Durango, Colorado 81303 (970) 247 – 4220

Services provided by this lab are for the Animas – La Plata, Animas River Water Nutrient Study, San Juan Hammond water quality analysis for major cations/anions, total and dissolved trace elements which consist of these parameters:

Nutrients for ARNW study are nitrate/nitrite as N, total phosphorous, TKN. Major constituents - Conductivity, TDS, Ph, Fluoride, Chloride, Ammonia, Nitrate, Orthophosphate, Sulfate, Carbonate, and Bicarbonate. Total & Dissolved Metals – Silver, Arsenic, Cadmium, Chromium, Copper, Iron, Manganese, Lead, Selenium, Mercury, Zinc, Nickel, Conductivity, TDS, Ph, Fluoride, Chloride, Ammonia, Nitrate, Orthophosphate, Sulfate, Aluminum. Total Metals – Silicon, Calcium, Magnesium, Sodium, Potassium. Total recoverable on total selenium and dissolved selenium.

Covered under C.R.W.Q.I.P. and Durango Pumping Plant Structures and Improvements, Ridges Basin Dam and Reservoir, O&M, General water Resource Planning under geographically defined programs. BPI implementation Matrix' 22, 4H, 6C, 8H.

Green Analytical laboratory provides bottles and preservatives upon request. This laboratory also provides hard copy and electronic data in MS Excel format.

Water quality samples for nutrient analysis are sent to this lab on a monthly basis for 5 sites on the Animas River in Colorado and New Mexico.

Water quality samples will be sent to this lab 1 time a year for 9 sampling sites on the San Juan – Hammond Drains.

1 set of splits samples and 1 set of matrix spike samples are sent to this lab for quality assurance/ quality control purposes.

Denver Technical Center
Joe Lyons, Doug Hurcomb, Julie Fahy
Bureau of Reclamation
D-8520 5th Floor Building 67
Denver Federal Center
West 5th Avenue and Kipling Street
Denver, Colorado 80225
(303) 445 – 2187

Services provided by Reclamation Laboratory consist of analysis of suspended sediment water quality samples for sand, silt and clay which consist of: total

Opportunities for Laboratory Services

concentrations in mg/l granules >2mm % total, Sand in % total (2-1mm)% V. coarse, (1-0.5 mm) % coarse, (0.5-0.25 mm) % med., (0.25-0.125 mm) 5 fine, (125-0.062 mm) % V. fine. Silt in % total (0.062-0.032mm) % coarse, (0.32-0.016 mm) % med., (.016-0.008 mm) % fine, (.008-0.004mm) % V fine. Clay in % total (004-00004mm). Covered under Durango Pumping Plant Structures and Improvements, Ridges Basin Dam and Reservoir Environmental Compliance. BPI implementation matrix 6C.

Reclamation Laboratory provides hard copy data and electronic data. A set of suspended sediment samples are sent to this laboratory 2 and sometimes 3 times a year for analysis for 1 site on the Animas River at the Durango, Colorado Pumping Plant area.

Great Plains Region

Laboratory: Analytical Laboratory Services for Health and Safety (not a laboratory)

Group:

Organization Parent: Great Plains Regional Office (GPRO)

Location: Billings, Montana

Contact Information: Victor Feuerstein
406-247-7776
vfeuerstein@gp.usbr.gov

Description: The analysis of bulk samples, wipe samples, personal air samples and area air samples are accomplished by an independent non-governmental laboratory. Selection is based upon the best value to the Government. Cost per sample, shipping, media, turn-around time, lab capability, analytical error, availability of assistance, chain of custody and convenience are considerations. There is no governmental laboratory service support in GPRO capable of providing the analysis needed in accordance with the National Institute of Occupational Health and Safety (NIOSH), American Industrial Hygiene Association (AIHA), Occupational Safety and Health Association (OSHA), Environmental Protection Agency (EPA) requirements for specific types and materials. Sample media is purchased from the laboratory when doing so results in savings as the result of a reduction in the standard analytical error, fewer sample blanks (field, lab, media etc). There is no contract for the intermittent analysis', it is a fee for services. When a large scale project arises, where the number of samples, length of the project, special nature of the analysis or other confounding factors make it advantageous to orchestrate a contract arise, the contract is offered through the contract process.

Staff: NA

Workload: NA

Contracting Activities: As noted under the “Description” section, all laboratory work is done by an independent non-governmental laboratory.

Recent and Ongoing Efforts to Consolidate, Reduce Cost and Retain Capabilities: NA

Potential Alternative Providers of Similar Services: NA

Laboratory: Geology and Construction Services (not a lab)

Group:

Organization Parent: Great Plains Regional Office (GPRO)

Location: Billings, Montana

Contact Information: Larry Schoessler
406-247-7784
lschoessler@gp.usbr.gov

Cody Clark
406-247-7874
cclark@gp.usbr.gov

Description: For construction related testing and/or lab work, GPRO either does its own construction materials testing or, more commonly, the specs are written that the contractor must hire an independent testing lab to do the work. As the GPRO materials technicians retire (all three are eligible), GPRO will be forced to re-evaluate the extent to which in-house testing is done, and that may lead to more contracting out for lab services. Gerri Voto is the CO and Lyle Lallum is the COR for the IDIQ contract, and they may know of other instances where that contract has been used to obtain lab testing services in other work groups.

For geology related testing and/or lab work, in the last two years GPRO have sent soil samples to laboratory for testing 5 times. The largest of the projects, with the greatest number of samples was Pueblo and Olympus. Samples from these programs were tested at Reclamation’s Loveland Construction Office Laboratory. For the other 3, much smaller projects, soil samples were sent to HKM laboratories in Billings. In addition GPRO has two upcoming projects at Veterans

Opportunities for Laboratory Services

Dam, OK and Nelson Dikes, MT. Samples from Veterans will be sent to Reclamation's Loveland Construction Office Laboratory for testing. Samples from Nelson will be sent to HKM for testing.

Staff: NA

Workload: For Geology related work, over the last two years, taking into account the size of the projects and amount of samples sent in for testing about 40% of Reclamation laboratory testing was contracted out to HKM in Billings. About 60% of Reclamation samples were tested in-house, at Reclamation's Loveland Construction Office Laboratory.

Not accounting for the size of project and number of samples, about 50% was contracted and 50% was done by Reclamation forces.

Contracting Activities: Only aware of only two instances where GPRO have contracted for laboratory materials testing directly from the regional office (or, better stated, these are the two that come to mind): In 2004, GPRO contracted with Maxim Technologies in Helena for concrete quality assurance testing for the underwater repairs in the Canyon Ferry Stilling Basin. GPRO is just now in the process of contracting with HKM Engineers (through the regional IDIQ engineering services contract) for materials testing on the T&Y fish diversion structure near Miles City.

Laboratory: Dakotas Area Office (DKAO) (not a lab)

Group:

Organization Parent: Great Plains Regional Office (GPRO)

Location: Bismarck, North Dakota

Contact Information: Randy Ehlis
701-250-4242 ext. 3372
rehlis@gp.usbr.gov

Description: Lab work being conducted for DKAO projects is being done under agreements with USGS (and these agreements go through the GPRO) or is being done by another entity and DKAO is providing cost sharing, e.g. the TMDL study being developed for the Cheyenne River in SD. DKAO has on occasion needed to have a water or soil sample analyzed for various constituents. These are handled on a case by case basis. There is no set protocol for this process. There may be lab work done as part of a contract for specific projects. It is the responsibility of the contractor to have the work done as a provision of the contract.

Staff: NA

Workload:

Contracting Activities: As noted under the “Description” section, most laboratory work is done by the USGS or is being done by another entity.

Mid-Pacific Region

Contracting from the MP Regional Office

Environmental Monitoring Branch, Division of Environmental Affairs, Mid-Pacific Region: Uses contract laboratories from a list of laboratories approved for the Mid-Pacific Region. (See the following list.)

Each laboratory on the list has been audited and approved for use by the Quality Assurance Team within the Environmental Monitoring Branch. For laboratories to remain on the list, they must be audited every three years.

The audit process consists of a performance audit (the laboratory analyzes samples and the audit team compares laboratory results to certified values) and a system audit (the facility is visited by the audit team to ensure that samples are analyzed per the laboratory's quality assurance manual and the approved analytical methods).

Also attached is a list of the routine programs MP-157 currently manages. Both environmental matrices sampled and specific chemical parameters tested for each program are included. A short synopsis describing each program is also provided. In addition to the routine programs, several times each year MP-157 services are recruited to perform special investigations for Mid-Pacific program managers. These projects usually involve testing a site for a short period of time for chemical constituents of concern (i.e., testing soils on shooting ranges, paint chips off Reclamation structures for lead, and fish from Reclamation reservoirs for human health advisories).

Budget: Staff estimates our current analytical budget at approximately \$500,000 per year. Of this cost, approximately \$370,000 is for inorganic parameters, \$70,000 for organic parameters, \$55,000 for biological parameters, and \$5,000 for toxicity testing.

Opportunities for Laboratory Services

Basic Laboratory	Address	2218 Railroad Avenue Redding, CA 96001 USA
	Contact	Nathan Hawley, Kurtis Montegna, Ricky Jensen
	Phone	(530) 243-7234
	Fax	(530) 243-7494
	Cell	
	Email	nhawley@basiclab.com, kmontegna@basiclab.com, mhawley@basiclab.com, jcady@basiclab.com (quotes)
	Methods	<i>Approved only for inorganic parameters (metals, general chemistry)</i>
BioVir Analytical Laboratories	Address	685 Stone Road Unit 6 Benicia, CA 94510 USA
	Contact	Rick Danielson, Lab Director
	Phone	(707) 747-5906
	Fax	(707) 747-1751
	Email	red@biovir.com, csj@biovir.com, lb@biovir.com
	Methods	<i>Approved for all biological and pathogenic parameters</i>
Block Environmental Services	Address	2451 Estand Way Pleasant Hill, CA 94523 USA
	Contact	David Block
	Phone	(925) 682-7200
	Fax	(925) 686-0399
	Email	dblock@blockenviron.com
	Methods	<i>Approved for Toxicity Testing.</i>
California Laboratory Services	Address	3249 Fitzgerald Road Rancho Cordova, CA 95742
	Contact	Barry Nicholson
	Phone	(916) 638-7301
	Fax	(916) 638-4510
	Email	barryn@californialab.com
	Methods	<i>Approved for Chromium VI</i>
Caltest Analytical Laboratory	Address	1885 North Kelly Road Napa, CA 94558
	Contact	Bill Svoboda, Project Manager
	Phone	(707) 258-4000
	Fax	(707) 226-1001
	Email	bsvoboda@caltestlab.com
	Methods	<i>Approved for all inorganic parameters and biological parameters</i>

Columbia Environmental Resource Center	Address	4200 New Haven Road Columbia, MO 65201 USA
	Contact	Tom May, Research Chemist
	Phone	(573) 876-1858
	Fax	(573) 876-1896
	Email	thomas_may@usgs.gov
	Methods	<i>Approved for mercury in biological tissue</i>
Data Chem Laboratories	Address	960 West LeVoy Drive Salt Lake City, UT 84123-2547 USA
	Contact	Bob DiRienzo, Kevin Griffiths-Project Manager
	Phone	(801) 266-7700
	Fax	(801) 268-9992
	Email	griffiths@atachem.com
	Methods	<i>Approved for asbestos, metals, organochlorine pesticides and PCBs in solids</i>
Dept. of Fish & Game - WPCL	Address	2005 Nimbus Road Rancho Cordova, CA 95670 USA
	Contact	David B. Crane
	Phone	(916) 358-2858
	Fax	(916) 985-4301
	Email	dcrane@ospr.dfg.ca.gov
	Methods	<i>Approved only for metals analysis in tissue.</i>
Frontier Geosciences	Address	414 Pontius North Seattle, WA 98109 USA
	Contact	Michelle Gauthier, Laboratory Director
	Phone	(206) 622-6960
	Fax	(206) 622-6870
	Email	michelleg@frontier.wa.com
	Methods	<i>Approved for all metals analysis in tissue. Specialize in low level metals analysis.</i>
Fruit Growers Laboratory	Address	853 Corporation Street Santa Paula, CA 93060 USA
	Contact	David Terz, QA Director
	Phone	(805) 392-2024
	Fax	(805) 525-4172
	Email	davidt@fglinc.com
	Methods	<i>Approved for all inorganic and organic parameters in drinking water.</i>

Opportunities for Laboratory Services

Montgomery Watson/Harza Laboratories	Address	750 Royal Oaks Drive Ste. 100 Monrovia, CA 91016 USA
	Contact	Allen Glover (project manager), Mike Spillane (bottle orders), Bradley Cahoon (quotes)
	Phone	(916)652-4556, 916-996-5929 (AG-cell)
	Fax	(916) 652-9571
	Email	Allen.Glover@us.mwhglobal.com, Michael.P.Spillane@us.mwhglobal.com, Bradley.Cahoon@us.mwhglobal.com
	Methods	<i>Approved for all inorganic and organic parameters in drinking water</i>
Olson Biochemistry Laboratories	Address	SDSU: Box 2170, ACS Rm. 133 Brookings, SD 57007 USA
	Contact	Nancy Thiex, Laboratory Director
	Phone	(605) 688-5466
	Fax	(605) 688-6295
	Email	Nancy.Thiex@sdstate.edu
	Methods	<i>Approved only for low level selenium analysis.</i>
Severn Trent Laboratories	Address	880 Riverside Parkway West Sacramento, CA 95605 USA
	Contact	Karen Dahl
	Phone	(916) 374-4384
	Fax	(916) 372-1059
	Email	kdahl@stl-inc.com
	Methods	<i>Approved for all inorganic parameters and hazardous waste organics except for Ammonia as Nitrogen. Ag analysis in sediment, when known quantity is present, request 6010B</i>
Sierra Foothill Laboratory, Inc.	Address	255 Scottsville Blvd, Jackson, CA 95642
	Contact	Sandy Nurse (Owner) or Dale Gimble (QA Officer)
	Phone	(209) 223-2800
	Fax	(209) 223-2747
	Email	sandy@sierralab.com
	Methods	<i>Approved for all inorganic parameters, microbiological parameters, acute and chronic toxicity.</i>
Twining Laboratories, Inc.	Address	2527 Fresno Street Fresno, CA 93721 USA
	Contact	Joseph Ureno, QA Officer
	Phone	(559) 268-7021
	Fax	(559) 268-0740
	Email	JosephU@twining.com
	Methods	<i>Approved only for general chemistry and boron analysis.</i>

U.S. Geological Survey - Denver	Address	Denver Federal Center Building 20, MS 973 Denver, CO 80225 USA
	Contact	Stephen A. Wilson
	Phone	(303) 236-2454
	Fax	(303) 236-3200
	Email	swilson@usgs.gov
	Methods	<i>Approved only for inorganic parameters in soil .</i>
USBR Technical Service Center Denver Soils	Address	Denver Federal Center Building 67, D-8750 Denver, CO 80225-0007 USA
	Contact	Juli Fahy or Stan Conway
	Phone	(303) 445-2188
	Fax	(720) 544-0576
	Email	
	Methods	<i>Approved only for general physical analysis in soils.</i>
Western Environmental Testing Laboratories	Address	475 East Greg Street # 119 Sparks, NV 89431 USA
	Contact	Ginger Peppard (Customer Service Manager), Andy Smith (Lab Director), Michelle Kramer (Owner)
	Phone	(775) 355-0202
	Fax	(775) 355-0817
	Email	ginger@WETLaboratory.com, andy@WETLaboratory.com, michelle@WETLaboratory.com
	Methods	<i>Approved only for inorganic parameters (metals, general chemistry).</i>

Laboratory: Northern California Area Office Water Quality Lab and Hydro Shop

Group: Water Quality Group

Organizational Parent: Environmental and Natural Resources Division -NCAO

Location: 16515 Keswick Dam Blvd. Redding, California

Contact Information: Diane Wisniewski, Team Leader
530-229-5200

Description: The Water Quality Group supports the Central Valley Project (CVP) operations in the Sacramento River, Trinity River and Shasta divisions including Shasta Reservoir/Dam, Whiskeytown Reservoir/Dam, Lewiston Reservoir/Dam, Trinity Reservoir/Dam, Buckhorn Dam, Spring Creek Debris Dam, Keswick Reservoir/Dam, and Red Bluff Diversion Dam, and Trinity River, McCloud River, Pit River, Spring Creek, Grass Valley Creek, Clear Creek, and Sacramento River.

Opportunities for Laboratory Services

Water quality data are required for CVP's meeting the following requirements: ESA for winter-run Chinook salmon and other threatened fisheries, California State Water Rights Order 90-5, the California Basin Plan (California Water Code), and the 1980 Spring Creek MOU. In addition the group assists the Trinity Restoration Program, the State of California and EPA.

The Water Quality Laboratory supplies quick (same day) results for water samples from the Iron Mountain Mine Superfund acid mine discharge into Spring Creek and Sacramento River water so that CVP can make prompt operation changes to keep in compliance with current water quality standards, statutes, regulations, plans, and/or policies. The lab is used for the preparation and analysis of samples. The lab is equipped with a graphite furnace/flame AA spectrophotometer, pH meter, fume hood, digestion block, and various other laboratory wares.

The Water Quality Group staff supports 23 satellite telemetry continuous water quality monitoring stations (CMS) located throughout the Northern California Area. The CMS provide real-time water quality conditions of temperature, dissolved oxygen, and turbidity. The staff calibrates, maintains, repairs and/or replaces these stations. The Hydro shop is used for the cleaning and calibration of probes and the programming and repair of data acquisition systems. In addition the staff supplies temperature profiles for three reservoirs.

Staff: Water Quality Group

- 1 chemist (team leader)
- 2 FT technicians; 1 PT technician
- 1 PT student

Workload: The Water Quality Group has had an average operating budget of about \$0.45 million per year for the past 3 years. The staff collects, prepares, and analyzes samples from five sites associated with the Spring Creek MOU on a weekly basis. The frequency of sampling can increase with increased reservoir elevations behind the Spring Creek Debris Dam. Each of the 23 continuous monitoring sites is calibrated/maintained on a monthly basis. Reservoir temperature profiling is done monthly at Shasta (twice a month from May to October), Trinity, Whiskeytown, and Lewiston.

Use of Contracting: Less than 4% of the operating budget is estimated to be spent on laboratory contracts by the Water Quality Group during any year.

Recent and Ongoing Efforts to Consolidate, Reduce Costs, and Retain

Capabilities: The Water Quality Group will be picking up additional work by monitoring 18 sites with data loggers. This work is being transferred from the Fish and Wildlife to the NCAO -Trinity River Division. The work should add no or minimal additional costs to the Water Quality Group's budget.

Pacific Northwest Region

Laboratory: Pacific Northwest Regional Laboratory

Group: Ecosystems Analysis (PN-6500)

Organizational Parent: Pacific Northwest Regional Office

Location: Boise, Idaho

Contact Information: Bryan Horsburgh, PN Regional Water Quality Coordinator
208-378-5035

Bill Stroud, Laboratory Supervisor
208-334-1540

Description: The Pacific Northwest (PN) Regional Laboratory provides sample collection, field analysis, and laboratory analysis for water quality studies in the PN Region. Laboratory services focus on providing water quality information related to the operation of Reclamation project facilities, and to assist States, Tribes, watershed councils, and irrigation/conservation districts in watershed planning and restoration. Data provided by the laboratory is used for TMDL development, water trend analysis, wetland design, irrigation drain water management, groundwater quality management, facility compliance monitoring, reservoir nutrient budgets, and special investigations.

Staff: 3 full-time chemists (1 supervisory)
4 part-time students

Workload: For the years 2003 through 2005, the PN Regional Laboratory has operated at a total cost of \$543,474, \$595,008, and \$598,335, respectively. Most of the work performed at the laboratory consists of laboratory chemical analysis and field sampling and analysis. The workload is highest during the irrigation season (April-September), but remains steady throughout the remainder of the year. Additional work performed by the lab includes training and report preparation. An average of 75% of all lab work is directly funded by individual projects.

The primary clients of the PN Regional laboratory are the PN Region area offices, the PN Regional office and TSC/other Regions. From 2003 through 2005, 76% of the work was performed for the PN Region area offices, 13% was performed for the PN Regional office, and 11% was performed for TSC and other Regions. The specific categories of work performed fall under general investigations, operating projects, water conservation field services, ESA recovery activities, Native American activities, and work for other entities.

Opportunities for Laboratory Services

The PN Regional Laboratory typically analyzes over 50,000 water and field parameters per year. Table 1 outlines the total number of parameters analyzed per year.

Table 1. – PN Regional laboratory sample analysis profile

Year	Total Number of Water Parameters	Total Number of Field Parameters	Total Analyses
2003	36,331	11,399	47,730
2004	34,791	15,436	50,227
2005	44,424	13,403	57,827

Contracting Activities: No contracting activities occur at PN Regional Laboratory. During periods of high workload (e.g. irrigation season), the lab has traditionally relied on student help.

Recent and Ongoing Efforts to Consolidate, Reduce Costs, and Retain Capabilities: The PN Regional Laboratory has reduced its staff by 1 FTE since 2002. Upgrades to more efficient automated equipment also occur on an ongoing basis. Lab space is provided on an as needed basis to PN area office biologists to perform bioassays for endangered snails and bull trout. Lab space and technical assistance is also provided to the Regional Hazmat program on an as needed basis. By providing in-kind lab space to these programs, the PN Regional Laboratory is reducing their costs. In addition, the total cost of operating the lab includes QA/QC costs to maintain quality control program for accreditation.

Potential Alternative Providers of Similar Services: Two large private labs and the State of Idaho Health Lab are located in the vicinity of the PN Regional Laboratory. The private labs are Alchem Labs and Analytical Labs, both located in Boise, ID. A comparative analysis shows that for the most part these labs offer the same analytical services as the PN Regional Laboratory.

The United States Geological Survey (USGS) operates a National Water Quality Laboratory in Denver, CO. A comparative analysis of classic water quality parameters shows that the USGS lab offers approximately 50% of the analytical services offered by the PN Regional Laboratory.

Numerous private consulting firms exist within the Pacific Northwest that could perform similar field work services. However, through the use of in-kind assistance, the PN Regional lab offers a convenient way for Reclamation to cooperate with clients on water quality activities within project areas. This opportunity is not available through private consultants.

Specialized Laboratories – Technical Resources

TSC Laboratory

Several disciplines in the TSC provide the majority of specialized laboratory services to Reclamation, so an attempt was made to characterize their makeup and workload as a group to gain an understanding of Reclamation’s use of laboratory services. For the three-year period beginning with FY 2004, financial reports were used to determine the number of billable staff days of work performed by each group to identify trends in workload. For FY 2005 specifically, each laboratory group manager was asked to categorize the individual jobs undertaken during that year to obtain estimates of the division of work between the categories discussed earlier: laboratory services, field services, and analytical/engineering services. TSC groups provide few construction management services (this is primarily a regional lab function), so this grouping was not included. Figure 1, presented earlier showed that in FY 2005, analytical, laboratory, and field services represented nearly one half, nearly one third, and nearly one quarter of the total workload, respectively.

Figure 4 shows the client base for the TSC laboratory in FY 2005. Work for regional and area office clients was nearly one half of the workload. The Science & Technology program was the second-largest single client, with about one fifth of the workload. The Dam Safety Office and other Reclamation programs provided 15% of the workload, and work for a variety of other Government agencies provided about one fifth of the workload. This is a healthy diversity of clients for the TSC laboratory as a whole.

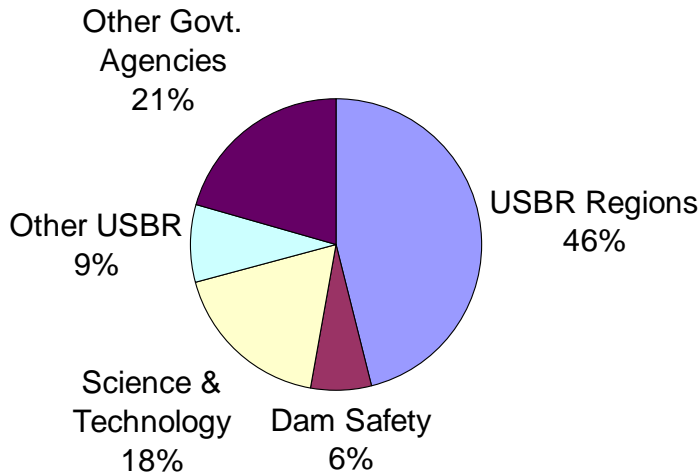


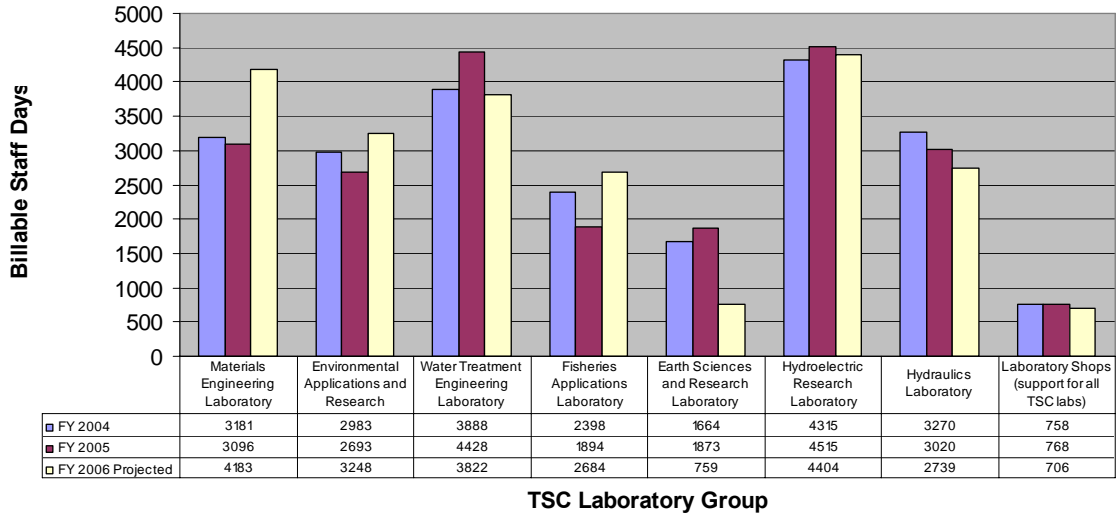
Figure 4. — Client base for TSC laboratory groups in FY 2005.

Figure 5(a) shows the total number of billable staff days charged by TSC laboratory groups during the three-year period beginning with FY 2004 (total of all labor, except K88 and K90 accounts). Figure 5(b) shows the estimated number of billable staff days associated only with laboratory services. Figure 5(b) was created using the data shown in Figure 5(a), combined with the percentage of each group's work associated with lab services in FY 2005. In both charts, the data for FY 2006 were projected for the full year (26 pay periods) using data from the first 24 pay periods.

Based on Figure 5(b), the most active disciplines in the TSC are Water Treatment Engineering, Hydraulics, and Hydroelectric Research. The work of the Laboratory Shops is predominantly construction of hydraulic models, and much of the laboratory work of the Fisheries Applications Research group also takes place in the hydraulics laboratory area thus sharing the same lab space to accomplish different objectives.

Figure 5 illustrates that the level of billable work for most laboratory groups in the TSC has been somewhat variable over the 3-year period, but few groups show definite trends. It should be emphasized that the number of billable staff days for some groups may be limited by staff size, not by workload availability. The Hydraulics discipline and Laboratory Shops are examples of this, where the loss of two staff members from the hydraulics discipline and one from the shop (two retirements, one transfer) accounts for the reduction in billed staff days in FY 2005 and FY 2006. While waiting for rehiring authority, short term contracts have been used to meet workload needs. The data in Figure 5 do not include contracted work.

The Earth Sciences and Research group was the smallest laboratory group in the TSC over the three year period, both in terms of total staff days and those staff days associated with laboratory work. Midway through FY 2006 Materials Engineering and Earth Sciences were merged, accounting for the larger and smaller numbers shown respectively for these groups in FY 2006. As a part of this merger, the combined laboratory space occupied by the merged groups will be reduced. This consolidation is an example of the continual evolution of laboratory services that takes place as Reclamation's needs change. Another recent example (prior to the period of this study) was the elimination of the Chemistry Laboratory and merger of the remaining chemical expertise into the Environmental Applications and Research group. This merger also led to a reduction of total laboratory space and the reassignment of some chemistry lab staff to other duties in Reclamation. As TSC labs have consolidated, regional laboratories and contract laboratories have often taken on portions of the previous workload (primarily standardized testing) leaving the TSC.

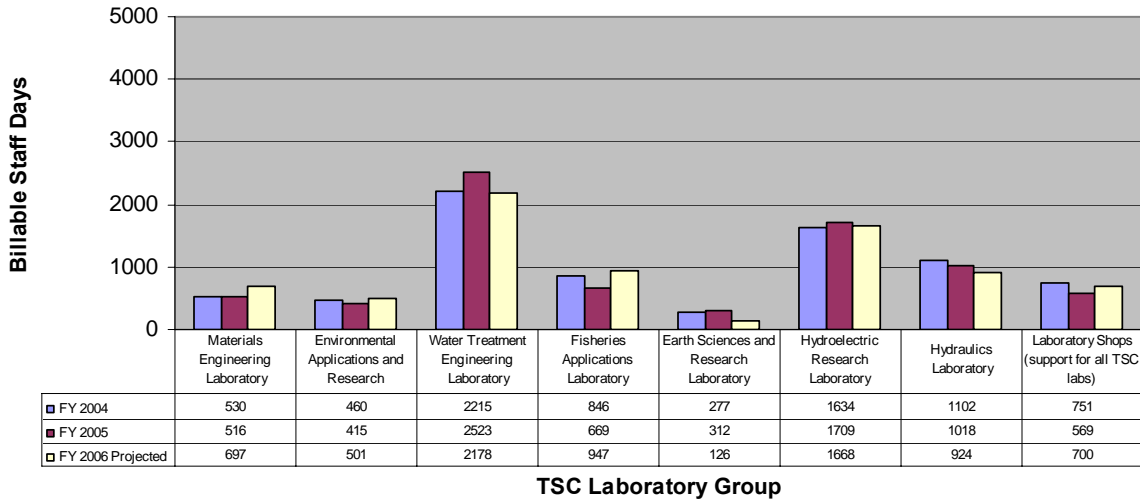


Total Billable Staff Days

(a)

Estimated Billable Staff Days - Lab Services ONLY

(FY 2004 to FY 2006 Financial Data with Estimated FY 2005 Percentage of Lab Services)

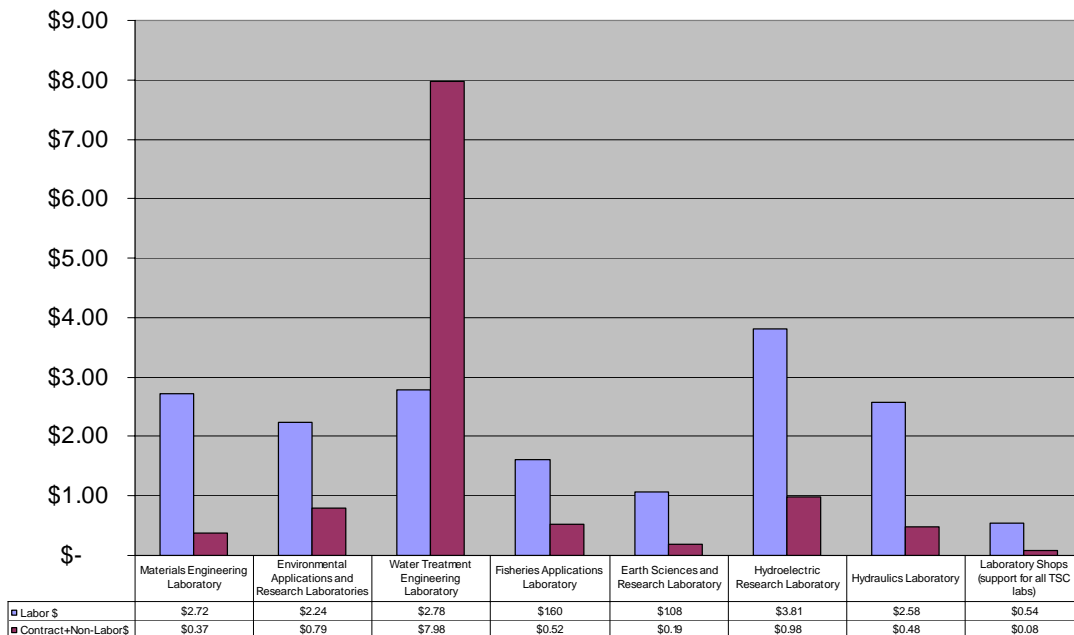


(b)

Figure 5. — (a) Total billable staff days for TSC laboratory groups, FY 2004 to FY 2006. These data include laboratory services, field services, and analytical services. (b) Billable staff days associated only with laboratory services for TSC groups.

Contracting by TSC Laboratory Work Groups

To estimate the degree to which contracting is used by laboratory work groups in the TSC, the laboratory work groups' labor and non-labor expenditures over the FY 2004 to FY 2006 period were determined from financial reports and are compared in Figure 6. The assumption is made that contracted work represents at least a majority of the non-labor expenses of each group. In the time available for this study, we felt that this approach was appropriate for gaining an appreciation for the use of contracting by TSC laboratory groups. More detailed financial reports with appropriate filters to identify only contract expenses could be used to obtain a more distinct picture. Figure 6 shows that most of the TSC laboratory groups expend about 15% to 30% of their budgets in the form of non-labor expenses (contracts and purchases); the Water Treatment Engineering Laboratory group is the exception, with the non-labor component of their expenses being about 3 times the labor component, indicating a very large amount of contracting. The Tularosa Lab at Alamagordo was largely contracted by the Water Treatment Group accounting for the large amount of contracting.



TSC Labor and Contract+Non-Labor Spending of TSC Laboratory Groups
Millions of Dollars (FY04-FY06 Average)

Figure 6. — Labor and non-labor spending by TSC laboratory groups.

Figure 7 shows the trends in the use of contracting by TSC laboratory groups. The figure shows the ratio of non-labor to labor expenses for each group over the FY 2004 to FY 2006 period. The other notable trend is the increase in contracting by the Laboratory Shops during this time. This has been the result of a gradual attrition in that group and the use of indefinite quantities contracts and contract labor to assist during times of heavy workload.

**Ratio of Contract+Non-Labor to TSC Labor Expenses, FY 2004 to FY 2006
TSC Laboratory Groups**

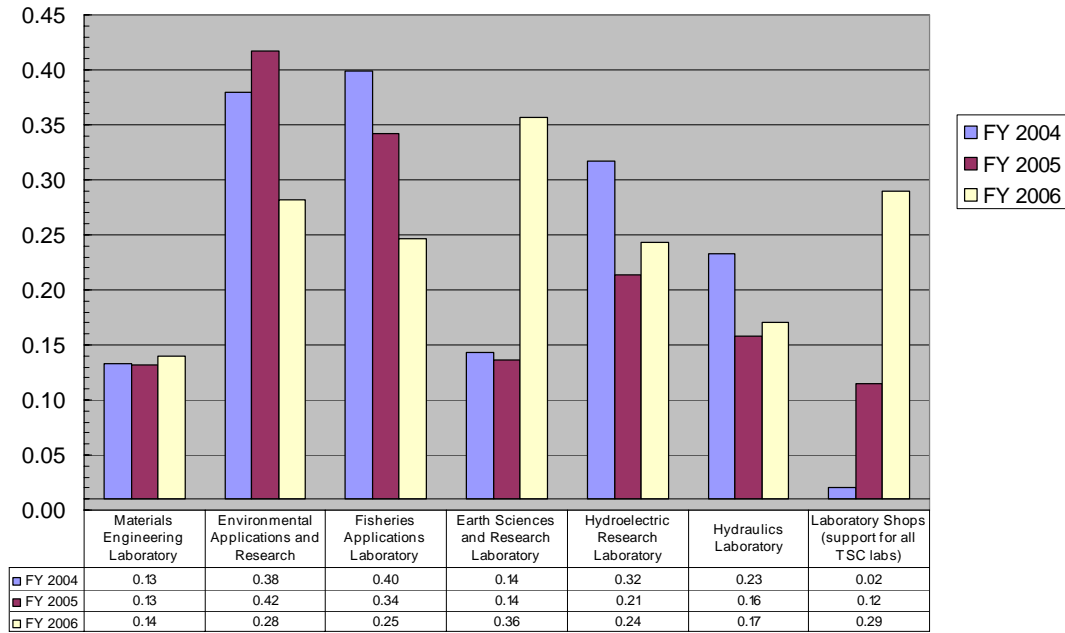


Figure 7. — Trends in the ratio of non-labor to labor expenses for TSC laboratory groups. Non-labor expenses of the Water Treatment Engineering Laboratory are not included.

Technical Service Center – Denver, Colorado

Laboratory Group: Hydroelectric Research

Group: Hydroelectric Research and Technical Services Group (86-68450), Denver, Colorado

Contact Information: Bert Milano, Group Manager
303-445-2300

<http://www.usbr.gov/pmts/hydroelectric/>

Description: The Hydroelectric Research and Technical Services Group provide specialized electrical and mechanical technical services to Reclamation power facilities. Services include non-biased on-site technical advice, assistance, diagnostics, analysis, troubleshooting, failure investigation, inspection, program consultation, testing, and unique in-house support services.

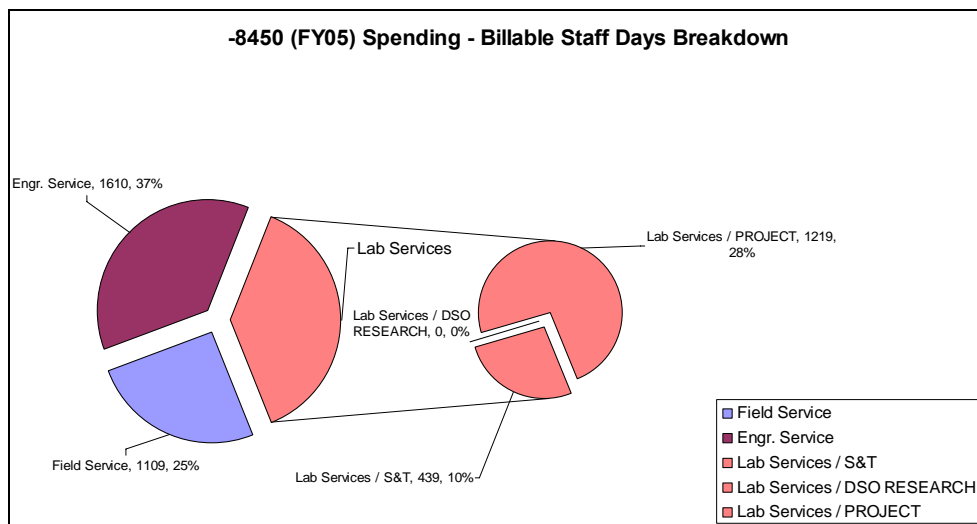
Staff: Hydroelectric Research and Technical Services Group

- 23 engineers (1 supervisory); 0 engineering positions vacant at this time
- 1 engineering technician;

Opportunities for Laboratory Services

- 1 IT specialist
- 1 Program Analyst
- 1 secretary; currently vacant
- 1 student engineering aid

Workload: The Hydroelectric Research and Technical Services Group has had an operating budget of over \$5.6 million per year for the past 3 years. Work consists of lab services, field support including diagnostics, and engineering services including design and consulting to various Reclamation offices. Approximately 75 percent of all lab work is funded by individual field-funded projects. The Science and Technology program funds about 18 percent of all Denver laboratory and about 10 percent of the Hydroelectric Research and Technical Services Group's laboratory work.



Much of the field support and services this group provides is derived from the technical capability obtained from performing lab work. The lab provides a controlled environment where equipment and procedures can be developed, tested, and perfected before implementation in the field. This allows the engineers to determine better practices and techniques that in turn provide quality support and the associated cost savings.

The lab is also used to verify the operation of equipment that will be installed in the field to monitor critical systems. These services include working with design engineers to functional test new equipment and to ensure that this equipment meets the needs of Reclamation. The lab is also used to modify and confirm operation of existing equipment to ensure that it will operate as designed once installed in the field. Finally, there are times when equipment is not commercially available that will meet Reclamation's needs, in these cases, new equipment is developed, designed, and built in house. The Hydroelectric Research and Technical Services Group currently holds four patents and there are

two more pending for unique equipment that benefits not only Reclamation, but the industry as a whole.

Contracting Activities: Due to the extremely specialized nature of work performed within this group, it is difficult to contract this work outside of Reclamation. The past three years, we have utilized two contract employees that have become permanent employees. Presently, there are no contract employees within the group.

Recent and Ongoing Efforts to Consolidate, Reduce Costs, and Retain Capabilities: In the past few years, the group has reduced the amount of storage space that is utilized for storing equipment. All equipment storage is now located within our designated space in building 56 in high-density storage modules. Further, this group has a comparatively small space requirement, considering nature, size, and range of services provided.

Potential Alternative Providers of Similar Services: Due to the complexity of the work performed, along with the specialized equipment and training required to provide necessary services, there are very few labs similar to the Hydroelectric Research lab in the world.

Hydro Quebec and BC Hydro, both in Canada, have a knowledge base and facility for providing electrical lab services similar to those required by Reclamation. Both organizations have a very knowledgeable staff of engineers that have specialized training and equipment necessary to address issues that are essential for operation and maintenance of their similarly sized hydroelectric capacity.

There are a few university laboratories that appear to have some capabilities similar to those performed by Reclamation's Hydroelectric Laboratory; however, most lack the specialized equipment and training needed to provide the unique services required by our clients. In the past, Reclamation has worked with several of these laboratories only to determine that contracting the work out to these labs was not beneficial to Reclamation due to high staff turnover, unfamiliarity with Reclamation projects, and lack of utility oriented knowledge. For the type of work performed here, university laboratories simply are not a viable fit.

There are no other laboratories within the United States that offer all of the services provided by the Hydroelectric Research laboratories. Portions of the work could be performed by individual laboratories at an elevated cost to Reclamation. Maintaining a hydroelectric laboratory is vital to maintain the essential core knowledge and technical capability required when performing field work and analytical services for our clients. In many instances the support we provide must be made available to field facilities on a moment's notice to avoid the four Ds (death, dollars, disaster, and disgrace). This usually is not possible in using outside sources that are not familiar with Reclamation technical approaches,

equipment, system responsibilities, and O&M guidelines and practices, nor with our historical interface responsibilities with other utilities and our very unique system stability-related responsibilities to ensure that Reclamation does not cause the next regional blackout.

Laboratory Group: Hydraulics and Laboratory Shops

Group: Water Resources Research Laboratory (86-68560)
Laboratory Shops (86-68561)

Organizational Parent: Technical Service Center, Water Resources Services Division

Location: Denver, Colorado

Contact Information: Clifford A. Pugh, Group Manager
303-445-2151
http://www.usbr.gov/pmts/hydraulics_lab

Michael McDonald, Shop Foreman
303-445-2167
http://www.usbr.gov/pmts/hydraulics_lab/lab_shops

Description: The Hydraulic Investigations and Laboratory Group applies hydraulic modeling, analysis, and field testing expertise to the solution of water resources, hydraulics, and fluid mechanics problems. The group addresses site-specific problems and pursues applied research that develops new water resource management tools for Reclamation projects. Work is performed in four broad program areas: environmental hydraulics, water conservation, hydraulic equipment operation and maintenance, and dam safety. The staff operates Reclamation's only hydraulics laboratory, with a history of over 75 years of developing cutting-edge hydraulic engineering technologies. The group performs work for Reclamation and other organizations, including international clients, Federal, State, and local Governments, and private entities. The indoor laboratory has about 54,000 square feet of floor space for testing of scale models. Flows of 0.1 to 30 ft³/s can be delivered to most experiments, and our specialized facilities include a high-head pump for gate and valve testing, low-ambient pressure chamber for cavitation testing, fixed and tilting flumes, and a canal system simulation and control model.

The Laboratory Shops are affiliated with the Hydraulics laboratory area. The shop staff constructs hydraulic models and fabricates custom-designed, specialized laboratory and field test equipment. The shop constructs functioning small-scale hydraulic models, full-scale experimental prototypes, and small-scale

architectural models for display purposes. The shop also provides services to all of Reclamation, and especially to the other laboratory groups in the TSC.

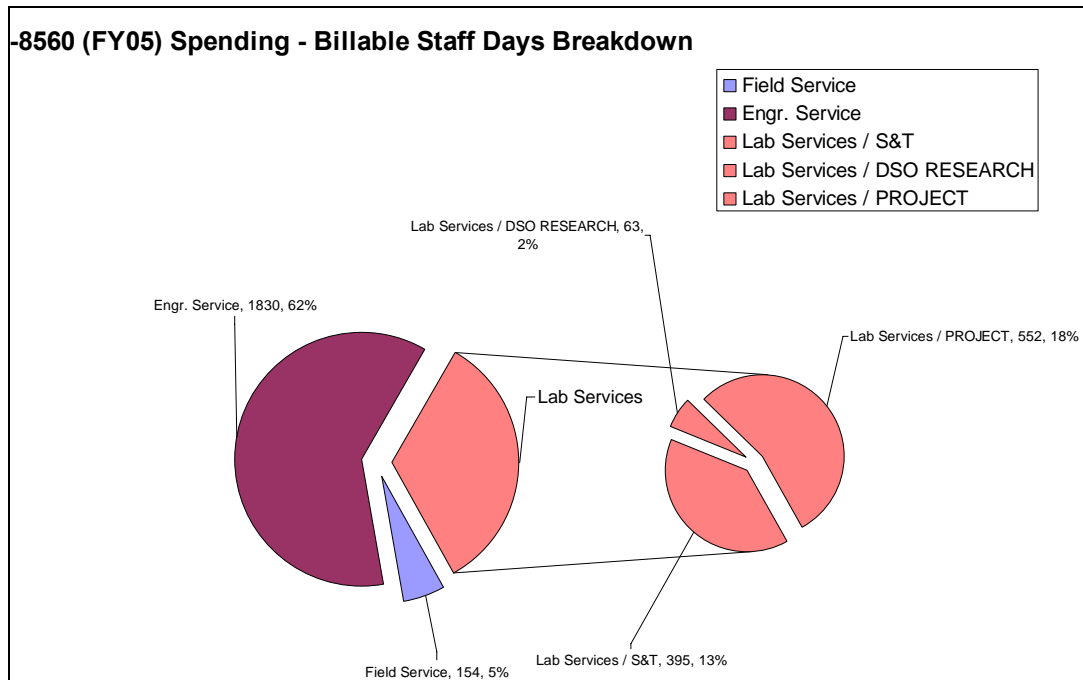
Staff: Hydraulic Investigations and Laboratory Group

- 12 engineers (1 supervisory); 2 engineering positions vacant at this time
- 2 technicians; 1 vacancy at this time
- 1 secretary
- 1 student intern

Laboratory Shops

- 1 foreman
- 2 model makers
- 1 machinist
- 1 electrician
- 1 general equipment mechanic

Workload: The Hydraulic Group has had an operating budget of about \$3.0 million for the past 3 years, declining somewhat in FY 2005 and FY 2006 because of staff vacancies that have not been filled during a time when it has been difficult to obtain hiring authority. Work consists of lab testing, field testing, and analysis, design, and consulting services (Engr. Services in figure below). More than half of all lab work is funded by individual projects. The Science and Technology program funds about one third of the work in the laboratory and about 13% of the Group’s work.



Contracting Activities: Contracting is a small, but significant component of the group's work. About 10% to 15% of the operating budget is estimated to be spent on contracts during any year. Contracts bring in additional expertise to supplement staff capabilities and additional staff to respond to periods of heavy workload. Contracts have been used to obtain expert peer review services and to take advantage of laboratory facilities in other locations that exceed the testing range of our own facilities, either with respect to flow rate, head, or lab space.

The lab shops have increased utilization of contracts in the past two years (approaching 30% in FY 2006). The number of permanent shop staff has been reduced, so contract labor is used during periods of heavy workload. Contracts are also used to obtain specialized services at lower cost, such as construction of stainless steel three-dimensional formed intake conduits.

Recent and Ongoing Efforts to Consolidate, Reduce Costs, and Retain Capabilities: The Hydraulic Investigations and Laboratory Group and the Laboratory Shops are working now to consolidate shop space, eliminating redundant shop space within the laboratory area and reducing the size of the carpenter and machinist shop as they are moved into areas nearer to and within the hydraulics laboratory area. This will reduce total space used by about 16,700 ft², producing a cost savings of about \$400,000 per year. This will also reduce the physical separation between the lab shop and the hydraulics lab, increasing work efficiency on a daily basis.

Potential Alternative Providers of Similar Services: Several Federal agencies operate hydraulic laboratories, each specializing on research and testing appropriate to their agency's needs.

The U.S. Army Corps of Engineers Coastal & Hydraulics Laboratory at Vicksburg, Mississippi is the largest, focused on issues related to navigation, flood control, and sedimentation in large river systems. USACE is under pressure to reduce the size of this laboratory and has recently been contracting with Reclamation to obtain hydraulics laboratory testing and design services related to large gates and valves (a Reclamation specialty) and spillway structures.

The USDA-Agricultural Research Service has several hydraulic and hydrologic laboratories with capabilities that overlap with some of the capabilities of Reclamation's hydraulics lab [e.g., Phoenix, Arizona (water measurement and canal operations); Stillwater, Oklahoma (hydraulic structures, channel stabilization); Oxford, Mississippi (sedimentation)]. These labs are experiencing staff reductions through attrition and will soon have difficulty sustaining themselves. Furthermore, they are prevented from doing work that does not contribute directly to fulfilling established research objectives. Recently, Reclamation performed dam overtopping tests on a dam with a roller compacted concrete stepped spillway face (a procedure developed by Reclamation) for the USDA-Natural Resources Conservation Service because the Stillwater, Okla.

laboratory could not accept work to solve a site-specific problem that was too unique to contribute to basic research goals. Reclamation's hydraulics laboratory works in partnership with the ARS labs on many projects, but they are not a viable replacement for Reclamation's lab.

The USGS operates two hydraulics laboratories, the first being the Hydrologic Instrumentation Facility (HIF) at the Stennis Space Center in Bay St. Louis, Mississippi. The HIF's primary focus is on flow meter and instrumentation testing and flow across floodplains. A second USGS lab at Turners Falls, Massachusetts conducts testing of anadromous fish passage and screening structures. Reclamation has the only hydraulics laboratory in the country that address issues of screening and passage for non-anadromous (i.e., inland waters native) species.

The Federal Highway Administration operates a small 4000 ft² laboratory at the Turner-Fairbank Highway Research Center, McLean, Virginia. Their focus is on the testing of highway drainage structures, flow through and around bridges, and other transportation-related hydraulic phenomena.

The Tennessee Valley Authority closed its hydraulics laboratory several years ago.

Two private full-service hydraulics laboratories are operated in the United States. ENSR has a 24,000 ft² lab at Redmond, Washington, and the Alden Hydraulic Laboratory is a 100,000 ft² facility located in Holden, Massachusetts. These two labs offer many services that overlap with those in Reclamation, but use of these labs would require compensating for a loss of familiarity with Reclamation projects and the synergy that comes from having designers, program managers, and laboratories located together so that the best possible day-to-day interaction can take place.

Other specialized labs exist. For example, the Colorado Engineering Experiment Station, Inc., Nunn, Colorado, provides NIST-traceable flow meter calibration services. This is a service that Reclamation's lab does not provide.

There are several (6-12) university laboratories in the U.S. that have some capabilities similar to those in Reclamation's laboratory. The Hydraulic Investigations and Laboratory Group contracts with them to deal with heavy workload and obtain unique capabilities, but significant oversight is needed due to high staff turnover and unfamiliarity with Reclamation projects.

Laboratory Group: Environmental and Greenhouses

Group: Environmental Applications and Research Group (86-68220)

Organizational Parent: Technical Service Center, Environmental Services Division

Location: Denver, Colorado

Contact Information: Chris Holdren, Group Manager
303-445-2178
children@do.usbr.gov

Description: The Environmental Applications and Research Group uses applied research to examine the interrelationships between the environment and regulated aquatic systems. Major focus areas for the group includes aquatic site pest management, reservoir monitoring and research, environmental impact assessment studies, riparian and wetland studies, environmental chemistry, and water quality monitoring. This work combines numerous disciplines to help understand and manage aquatic and riparian ecosystems with the overall goal of optimizing water system operation. Studies conducted by the group assist in increasing the operational efficiency of these systems, as well as helping to reduce adverse environmental impacts. These activities serve to support the multiple resource values of Reclamation projects and to protect aquatic environments. The group performs work for Reclamation and other organizations, including water districts and Federal, State, and local Government agencies.

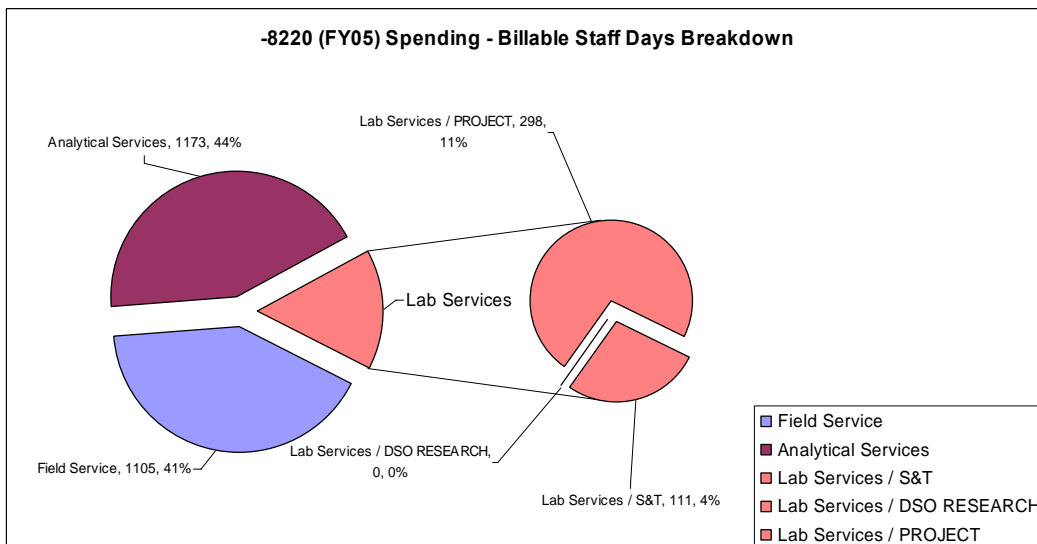
Group facilities include approximately 4,200 square feet of laboratory space in the 1200 Wing of Building 56 that are used for routine chemical and biological testing and as a staging area for field studies. The space also contains six environmental chambers used for performing experiments under controlled conditions. The group also maintains 3,395 square feet of greenhouses that are used for biocontrol experiments, pesticide screening projects, plant physiology and morphology studies, and for projects requiring plant culture and propagation. The group also has several boats and extensive monitoring and collection equipment for field studies.

Staff: Environmental Applications and Research Group

- 2 Aquatic biologists (1 research grade)
- 3 Aquatic scientists (2 research grade)
- 1 Biologist
- 7 Botanists (3 research grade)
- 2 Chemists (1 research grade)
- 1 Ecologist
- 1 Fishery biologist
- 1 Physical scientist

- 1 Secretary (shared with 86-68290)
- 1 Supervisory Biological Scientist
- 1 Student intern (currently vacant)

Workload: The Environmental Applications and Research Group has had an operating budget of about \$3.5 million for the past 3 years. Work consists of data analysis and reporting, field surveys and data collection, lab testing, and consulting services. The group maintains interagency agreements and Memorandums of Understanding with the Corps of Engineers, USGS, USDA-ARS, NPS, water districts, and other agencies to facilitate work. Most of the group’s work is funded by individual projects. The Science and Technology Program is the largest single contributor, funding about 30% of the Group’s work.



Contracting Activities: The group regularly contracts with other agencies and facilities to obtain services and expertise that are not provided by Reclamation. About 20% of the operating budget is estimated to be spent on contracts during a typical year. Contracts bring in additional expertise to supplement staff capabilities, additional staff to respond to periods of heavy workload, and additional facilities to perform specialized work. Contracts are regularly used for chemical and biological analyses not routinely performed by Reclamation labs, for providing specialized capabilities, such as large-scale plant propagation for revegetation projects, and to obtain expert peer review services.

Recent and Ongoing Efforts to Consolidate, Reduce Costs, and Retain Capabilities: The Environmental Applications and Research Group was part of a recent (May 2006) consolidation that merged three existing groups into two. Earlier this year, four (of 10) environmental chambers were removed and approximately 40% of the 1,170 square foot laboratory housing those chambers was converted to fish tanks for use by the Fisheries and Wildlife Resources Group(86-68290) to reduce water use and space requirements at the greenhouses.

Alternatives to the current greenhouses are also under investigation. We recently developed a plan to create two new greenhouses, with a total of 1,600 square feet of space, to replace the current 3,395 square feet of greenhouse space when those units are removed from service by the GSA in the near future. The Environmental Applications and Research Group is working closely with the Fisheries and Wildlife Resources Group to evaluate total space requirements for field and sampling gear for the two groups.

Potential Alternative Providers of Similar Services: Other agencies and universities conduct research that is similar to the work performed by the Environmental Applications and Research Group. Those facilities focus on research and testing appropriate to their individual needs and lack the focus on Reclamation requirements.

The U.S. Army Corps of Engineers, Waterways Experiment Station in Vicksburg, MS, conducts research on both reservoir operations and invasive species that are similar to projects conducted by the Environmental Applications and Research Group. The focus of the USACE has been primarily in the eastern United States. As a result, their work complements, but does not duplicate, research in these areas being conducted by Reclamation.

The USDA-Agricultural Research Service in Temple, TX, works actively with biocontrol insects. The USDA-ARS focus has been on locating and developing suitable biocontrol insects. Other agencies, including Reclamation, have taken the lead in deploying these insects as part of our integrated pest management programs.

The USGS Fort Collins Science Center (FORT), Ft. Collins, CO, conducts research on biological systems, including specific research on wetlands and invasive species. The TSC, through the Environmental Applications and Research Group, has a Memorandum of Understanding that allows close collaboration between the two agencies to prevent duplication of effort and maximize use of available resources. Four scientists from FORT have offices within the Environmental Applications and Research Group to help maximize interactions between the two groups.

Reclamation chemistry laboratories in Boise, ID, and Boulder City, NV, provide a wide range of analytical services that are used to support research conducted by the Environmental Applications and Research Group. We routinely contract with both of those laboratories, as well as with commercial laboratories that provide more specialized analyses, such as pesticides and organic chemicals. University laboratories are also used for some services. For example, the Olson Biochemistry Laboratory at South Dakota State University is routinely used for selenium analyses because of their expertise with this element, which is of particular concern for many Reclamation projects. In addition to using commercial and university laboratories for our own work, the Environmental

Applications and Research Group assists other groups within the TSC and other Reclamation offices with locating suitable laboratories to meet their analytical requirements.

The Environmental Applications and Research Group has close relationships with a number of universities that provide specific expertise for our projects. Recent examples include work with Cornell University on rearing biocontrol insects, which resulted in a joint patent between Reclamation and Cornell, work with the University of California-Davis and University of California-Riverside on issues related to the Salton Sea, and work the New Mexico State University and Denver University/Denver Botanic Gardens on salt cedar control and revegetation projects. In each case, university personnel and facilities were used to supplement and complement Reclamation capabilities. Significant oversight is required on most projects conducted in cooperation with universities due to student turnover and specific requirements for Reclamation projects.

Laboratory Group: Fisheries and Aquaculture Facilities

Group: Fisheries and Wildlife Resources Group (86-68290)
(combination of former Fisheries Applications Research Group and a large portion of the Ecological Planning and Assessment Group)

Organizational Parent: Technical Service Center, Environmental Services Division

Location: Denver, Colorado

Contact Information: Steve Hiebert, Group Manager
303-445-2206
<http://www.usbr.gov/pmts/fish/>

Description: The Fisheries and Wildlife Resources Group combines the expertise of professional fisheries scientists, wildlife biologists, natural resource specialists and environmental chemists. This broad expertise allows the staff to effectively conduct a wide variety of multidisciplinary environmental field and laboratory studies concerning fish, wildlife, and their aquatic/terrestrial environments, often in conjunction with environmental impact assessment studies. We also assist in design and evaluation of applied technologies associated with Reclamation's water development facilities and operations. We are a full-service environmental research group capable of large scale research program management and execution, as well as specific technical tasks and consultations. The group performs work for Reclamation and other organizations, including international clients, Federal, State, and local Governments, and private entities. The group

Opportunities for Laboratory Services

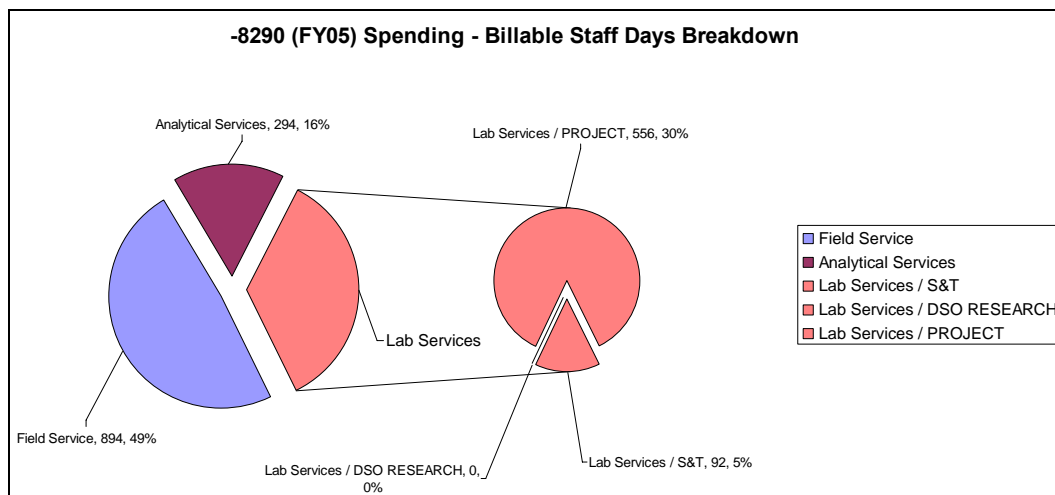
addresses site-specific problems and pursues applied research that develops new water resource management tools for Reclamation projects.

The staff operates the fish culture facility providing live fish for testing in models and flumes in the indoor 54,000 square foot model laboratory operated by the Hydraulic Investigations and Laboratory Group. Being able to test project modifications and perform experiments with live fish species that are present at existing and proposed project sites provides a unique opportunity to design projects and operations that reduce effects on fish prior to a field installation.

Staff: Fisheries and Wildlife Resource Group

- 8 Fisheries biologists (1 supervisory)
- 2 Wildlife biologists
- 7 Natural resource specialists
- 1 Environmental chemist
- 1 Technician; 1 vacancy at this time
- 1 Shared services secretary
- 1 Student intern

Workload: The Fisheries and Wildlife Resource Group has had an operating budget of about \$3.2 million. The recent combination of 2 existing groups to form this group has brought together a wide spectrum of expertise and further group growth is expected. Work consists of field survey and data collection; analysis and reporting; fish culture; consulting services; and NEPA and ESA Compliance, mitigation planning and implementation. The group cooperates under a memorandum of understanding with the local biological research group of the U S Geological Survey on several fisheries projects along with interagency agreements with several other Federal agencies. More than half of all work is funded by clients for work on individual projects. The Science and Technology program funds about 18% of the Group's work, and about 5% of the work that takes place specifically in the laboratory.



Contracting Activities: Contracting is a small, but significant component of the group's work. About 10% to 15% of the operating budget is estimated to be spent on contracts during any year. Contracts bring in additional expertise to supplement staff capabilities and additional staff to respond to periods of heavy workload. Contracting has allowed the group to augment our existing expertise while retaining control in the broad public interest. Contracts have been used to obtain expert hydroacoustic analysis services, peer review services and to take advantage of rapid deployment of field crews.

Recent and Ongoing Efforts to Consolidate, Reduce Costs, and Retain Capabilities: The Fisheries and Wildlife Resource Group currently represents a consolidation of personnel from 2 groups (May 2006). In this consolidation we were able to optimize our ability to perform a wider range of fishery and wildlife research studies, often utilizing staffs that possess a broad fish and wildlife background. Several of the combined staff possess an extensive knowledge of NEPA compliance and assist in alternative development which can minimize or eliminate potential adverse project impacts to fish and wildlife resources. This consolidation has resulted in a more efficient use of field gear and shared office facilities. Other cost reduction efforts planned involve either consolidation of boat and trailered field gear or locating them in less expensive storage locations. The field basis of many of our projects and our ability to respond with proper fisheries and wildlife surveying technologies is important and it is essential not to lose these abilities.

Potential Alternative Providers of Similar Services: Several Federal agencies conduct similar type work as the Fisheries and Wildlife Resources Group, many of which are specific to their local issues and agency needs, but lack the ecosystem knowledge that our group possesses.

The U.S. Fish and Wildlife Service focuses on issues related to endangered species and law enforcement and serves more in regulatory capacity and lacks the appropriate staff to conduct field investigations. USFWS has contracted with various Reclamation offices to have work performed on fish passage and screening investigations and evaluations. USFWS also recognizes members of the Fisheries and Wildlife Resources Group as experts in endangered avian biology and asks them to instruct classes on endangered bird protocol, wetland delineation, and data analysis.

The NOAA has many in-land fish biologists primarily working on anadromous fisheries issues. NOAA has contracted Reclamation recently for assistance and advice in salmon fish habitat and water allocation modeling. The NOAA offices we have dealt with are unable to perform long term field surveys or fish protection evaluations because these are low priorities compared to enforcement and policy development for rare fish; they are also discouraged from doing work that does not contribute directly to fulfilling established research objectives.

Opportunities for Laboratory Services

The USGS, FORT biological group out of Fort Collins performs research on fish and wildlife. The Fisheries and Wildlife Resources Group coordinates many projects and functions with the FORT group and from this both agencies perform coordinated projects benefiting Reclamation and USGS and the resources.

Commercial aquaculture facilities exist through the west. The Fisheries and Wildlife Resources Group uses some of these hatcheries to provide fish for laboratory experiments. For many of the tests performed with live fish, all life stage (larval, juvenile, adult) forms are needed, but hatcheries generally do not specialize in life stages other than adult specimens.

There are several university and their associated laboratories that have some capabilities similar to those in the Fisheries and Wildlife Resources Group. We contract with universities for specialized expertise or to obtain unique capabilities, but significant oversight is needed due to high staff turnover and unfamiliarity with Reclamation projects.

Laboratory Group: Materials Engineering and Research

Group: Materials Engineering and Research Laboratory (86-68180)

Organizational Parent: Technical Service Center, Civil Engineering Services Division

Location: Denver, Colorado

Contact Information: William Kepler, Group Manager
303-445-2386
http://www.usbr.gov/pmts/materials_lab

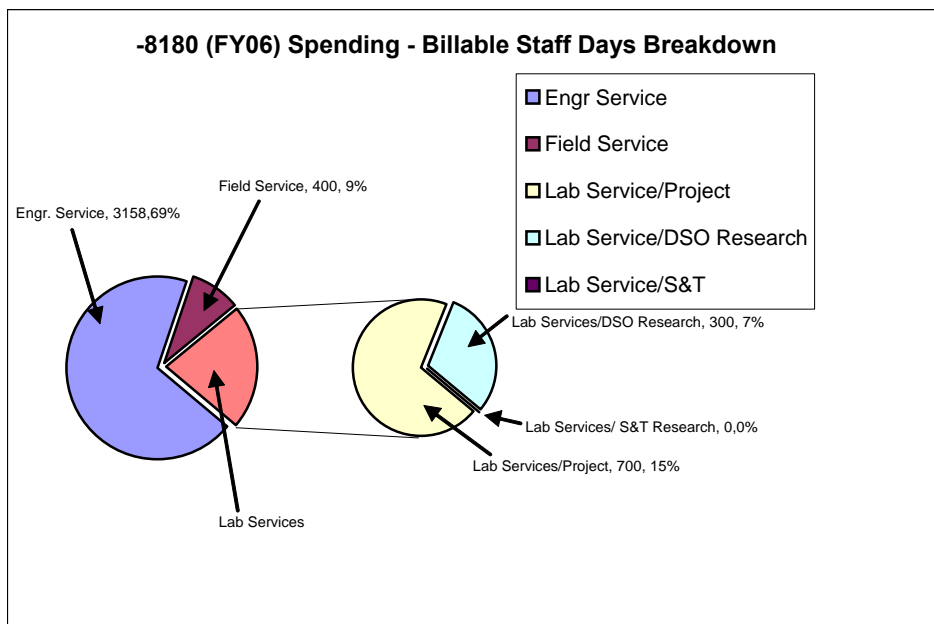
Description: The Materials Engineering and Research Laboratory specializes in the technology of engineering materials used to construct and maintain Reclamation facilities. It provides testing and a wide variety of services and assistance related to engineering. Testing is primarily unique and specialized, but the group is capable of performing testing using national standards. The group is organized in 6 subgroups in different technical areas each of which provides design (including Government specifications) and technical expertise related to the proper use of materials and technologies in their area. Each subgroup also conducts applied research to evaluate new, improved, or conventional materials and methodologies to effect more economical construction, less frequent maintenance, and new repair or design approaches. The technological areas are as follows:

1. Corrosion Technology (corrosion, corrosion monitoring, and cathodic protection)
2. Coatings (paints and protective coatings)
3. Plastics Technology (geosynthetic/polymeric materials, sealants, waterstops, roofing, gaskets, and plastic pipe).
4. Concrete technology (materials, mix proportions, structural testing)
5. Concrete repair (repair or infrastructure and historic preservation)
6. Soils, rock, (including petrographic examinations) and groundwater (including subsurface contaminants)

Staff: Materials Engineering and Research Group

- 13 engineers, (1 supervisory);
- 9 technicians
- 1 Petrographer
- 1 secretary

Workload: The Materials Engineering and Research Group has had an operating budget of about \$4.0 million for the past year and slightly less in previous years, dependent on on-board staff. Work consists of engineering design, analysis, consulting (Engr. Serves in figure below) laboratory testing (shown as lab services below), field testing and support (shown as Field Service in figure below). Approximately two-thirds of all lab work is funded by individual projects. Dam Safety technology development funds support about one-third of the lab work, while no funding is received from the Science and Technology program for lab work.



Contracting Activities: Contracting is an important component of the group's work. Specialty contractors are used to provide services for equipment in areas where contractors have expertise not available on staff, and in areas, such as calibration where an independent source is best for credibility. About 10% of the total operating budget is estimated to be spent on contracts and purchases during any year. (Note that contracted services for experiments and lab studies would far exceed this amount but are not from the budget and expenditure of this group. – see below). Contracts have been used to obtain expert peer review services, to provide expertise not available in the lab, and to take advantage of laboratory facilities in other locations that exceed the testing range of our own facilities.

Recent and Ongoing Efforts to Consolidate, Reduce Costs, and Retain Capabilities: A recent reorganization combined the Materials Engineering and Research Group with the former Earth Sciences and Research Group. This resulted in a net reduction of 12 staff from the combined 2 groups. The Materials Engineering and Research Group is working now to consolidate space. This will reduce total space used by about 20,000 ft², producing a cost savings of about \$500,000 per year.

Potential Alternative Providers of Similar Services: The Materials Engineering and Research Group hosts many unique capabilities available in only 1 or 2 other locations. An example of this type of unique capability is the 5 million pound testing machine, a 5 story tall facility that can test samples up to 50 feet tall and 10 x 10 feet in cross section. One other device does exist at LeHigh University, but the academic and industry testing does keep this equipment fairly busy. In addition, some of the staff knowledge, particularly in mix formulation for mass concrete and repair materials, creates a unique environment to pursue and prove novel approaches to problems specialized in the water storage and delivery functions. Due to these combinations of unique knowledge and equipment, other Government agencies actively sought out our expertise for approximately 850 staff days, or approximately 20% of the total work load.

Several private and Federal agencies do operate laboratories each of which could do some of the work of this laboratory group. Standardized testing of construction materials for quality control purposes or simpler material properties is in some cases already conducted by private laboratories close to the site of the work and in some cases by the construction contractor. Of the workload reported in this section, standardized testing represents about one-tenth of the Lab Services for Projects, or about 1% of the total workload.

The U.S. Army Corps of Engineers Engineering Research and Design Center at Vicksburg, Mississippi also has a materials laboratory. Cooperative efforts are in place to have this lab perform or assist in some specialized testing in areas such as blast testing. USACE is under pressure to reduce the size of their laboratories and has recently been contracting with Reclamation to obtain laboratory testing and analysis by the Reclamation's Materials Engineering and Research Group.

The Naval Laboratories in locations such as Blossom Point, Maryland are currently being used to also assist in blast testing and mitigation studies. This cooperative also includes Sandia National Laboratories, and New Mexico School of Technology. This study is primarily funded from Reclamation funds, but these funds are managed from the Security program and are not included in any percent of dollars contracting for this written section. The Materials Engineering and Research Group is, however, heavily involved in these studies.

The Federal Highway Administration operates the Turner-Fairbank Highway Research Center, McLean, Virginia. Their focus is on the testing of highway features such as pavements and bridges. Staff communicates with the staff at this laboratory and occasionally has projects of mutual interest.

There are several university laboratories that have some capabilities similar to those in Reclamation's laboratory, or may have unique capability. However, significant oversight is needed due to high staff turnover and unfamiliarity with Reclamation projects.

Laboratory Group: Water Treatment

Group: Water Treatment Engineering and Research Group (86-68230)

Organizational Parent: Technical Service Center, Environmental Services Division

Location: Denver, Colorado

Contact Information: Kevin Price, Group Manager
303-445-2260
<http://www.usbr.gov/pmts/water/index.html>

Description: Water Treatment Engineering and Research Group (WaTER Group) researches and designs advanced water treatment technologies and desalination and wastewater treatment systems - systems designed to remediate water containing hazardous chemicals and compounds to meet current requirements, including the Safe Drinking Water Act, the Clean Water Act, and water quality requirements for water reuse or discharge. Work is carried out in the Denver laboratory, at Reclamation project sites for pilot plant and demonstration testing, and through cooperative agreements with non-Federal entities. The WaTER Group performs work for Reclamation and other organizations, including international clients and, Federal, State, and local Governments. The Denver laboratory has about 8,000 square feet of floor space for bench-scale and pilot-scale testing and for construction and field mobilization of process test equipment.

Opportunities for Laboratory Services

The services provided by the WaTER Group include:

- research studies and laboratory tests on advanced treatment technologies
- appraisal, feasibility, and final design and analysis for new (as well as retrofit) water and wastewater treatment systems
- pilot and demonstration-scale desalination plant (both thermal & membrane) design/construction/testing/O&M
- project management (and COTR duties) for research as well as design projects
- review of private A&E firm designs and specifications
- preparation of O&M manuals for treatment plants
- alternative and renewable energy applications
- energy optimization
- concentrate disposal
- technology transfer/technical communications
- water treatment process cost /economics
- water supply planning tool creation
- computers/electronics/process programming
- standards setting

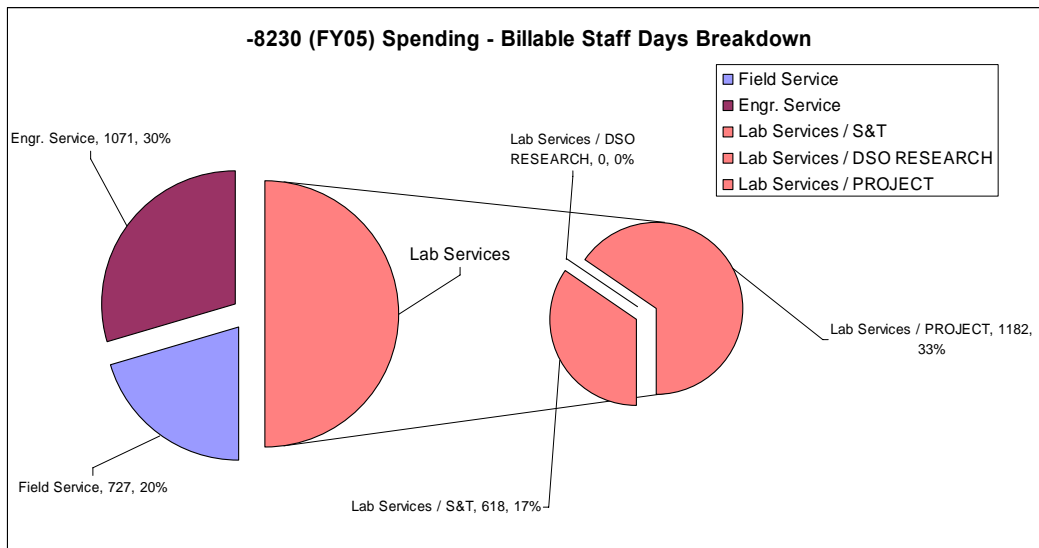
The WaTER Group installs and tests pretreatment systems using a mobile water treatment pilot plant, water treatment and desalting pilot plants, low-grade heat brine disposal systems, salt-gradient solar ponds, and renewable energy-driven pumping and desalting systems. In addition, the WaTER Group has an ongoing investigation of the potential for creating new water supplies from impaired waters using advanced treatment technologies in the West.

Staff: WaTER Group

- 15 engineers (1 supervisory, 1 general, 6 environmental, 5 chemical, 2 mechanical)
- 1 physical scientist
- 1 research chemist
- 1 chemist
- 3 technicians

- 1 program analyst
- 1 secretary

Workload: The WaTER Group had an operating budget of about \$4 million in FY 2005. See the figure below. Work consisted of lab services for projects, (management of the Desalination and Water Purification R&D program, Tularosa facility construction, Yuma desalting plant research, other agencies, and international research projects), lab services for S&T, field services (San Joaquin selenium pilot plants, Office of Naval Research EUWP demonstration testing, Katrina EUWP response, EPA site testing, and Salton Sea tests), and engineering services (appraisal, feasibility, and design). Very roughly, the Science and Technology program funds about one third of the work in the laboratory and about 17% of the WaTER Group’s work.



Contracting Activities: In FY 2005, the WaTER Group spent over \$20,000,000. The majority was for contracts for the Tularosa Facility, the WateReuse Foundation, and the Desalination and Water Purification R&D program. This amount fluctuates dramatically year to year because much of the money is written into the budget by Congress. The Tularosa facility received a large write-in in FY 2005 and again in FY 2006. The Administration has requested funds for O&M of the Tularosa facility in FY 2007.

Cooperative agreements are a significant percentage of the funds spent by the WaTER Group. These agreements are research related and are an important component in keeping the WaTER Group at the cutting edge of the rapidly changing field of advanced treatment technology. These changes are driven by declining costs, more stringent regulations, and the need for additional water supplies. Through in-house research, project specific research, cooperative

agreements, appraisal and feasibility designs, the WaTER Group is “finding new and more cost-effective tools to purify wastewater and saltwater to increase usable water supply.”¹

Recent and Ongoing Efforts to Consolidate, Reduce Costs, and Retain Capabilities: The WaTER Group consolidated high value laboratory space and storage space in FY 2004. While the overall square footage did not decrease, the second floor bench-scale laboratory was moved into the existing pilot plant laboratory, and storage space was consolidated with the pilot plant laboratory.

Advanced water treatment and desalination are undergoing the development of a Reclamation-wide strategy. The **objective** is to focus investments on R&D and leverage investments with other Federal and non-Federal entities to facilitate the efficient advancement and deployment of desalination technologies and best practices. A secondary objective is to ensure that knowledge generated from this investment is available/transferable to communities looking for solutions nationwide.

Our **goal** is to advance the state-of-the-art in high risk, applied research and development specifically targeted at reducing the cost of treating impaired waters and to enhance non-Federal partnerships to accelerate the implementation of improved technology, including the resolution of non-technical impediments to water use, consistent with the Administration’s R&D investment criteria.

Potential Alternative Providers of Similar Services: Several Federal agencies operate advanced treatment laboratories, pilot-scale testing, and demonstration-scale testing, each specializing in research and testing specific to their agency’s mission. As a part of Reclamation’s advanced treatment and desalination strategy, the WaTER Group will be enhancing and developing intra-agency and inter-organizational communication and collaboration networks. This should reduce duplication, improve the efficient use of our limited resources, and should lead to new solutions to Reclamation’s problems.

¹ U.S. Department of the Interior, Draft GPRA Strategic Plan, Fiscal Year 2007-2012, Avoiding Crisis: Water for the West, p. 8.

Laboratory: Soil and Sediment

Group: Water Resources Planning and Operations Support Group (86-68520)

Organizational Parent: Technical Service Center, Water Resources Services Division

Location: Denver, Colorado

Contact Information: Craig Albertsen, Group Manager
303 445-2526

Description: The Soil and Sediment laboratory area specializes in physical and chemical soil analyses primarily directed toward agricultural projects, and physical, chemical, and transport characteristics of sediments. Occasional plant analyses are also done. Testing includes both routine and specialized work, as well as supporting applied research directed toward Reclamation interests. Water samples are processed primarily for particle analyses, or occasionally for chemistry as part of larger projects.

Laboratory Facilities: The lab area currently occupies approximately 2700 sq. ft. in the 1500 wing of Building 56. One area is dedicated to sample receiving, prep, and sieving. A second area is used for extracts, hydrometer tests, pH, conductance, column leachates, filtrations, and other assorted tests, including specialized testing. The remaining area is used for computer data analyses, particle counters, laser particle size analysis, chemistry, hood work, refrigeration, weighing, Ultra-Pure water filtration, and short term sample storage.

Laboratory Instrumentation:

- Coulter LS-100 Particle Size Analyzer
- Beckman Coulter Multisizer 3 Particle Counter
- Beckman Coulter N4 Plus Submicron Particle Analyzer
- Balances – Mettler AE200 w/ auto recorder
 - Mettler PM6100
 - Mettler PL1200
- Patterson-Kelley Twin Shell dry blender – 8 qt.
- Nasco – Asplen Soil Grinder
 - w/ porcelain head & bowl
 - w/ hammer mill
- LaMotte 2020 Turbidity Meter
- Orion Model 162 Conductivity Meter
- Orion Research Model 811 pH Meter
- Corning 480 Flame Photometer
- IEC International Centrifuge Model UV

Opportunities for Laboratory Services

- Beckman Coulter Allegra 6 High-Speed Centrifuge
- Retsch PT 1000 Laboratory Sample Splitter

In-House Analyses:

- Extracts – Saturated Paste, variable dilutions (1:5; 1:10, etc)
- Conductivity, pH, TDS, % Moisture
- Ca, Mg, Na, K (titration, flame photometer)
- SAR, CEC, ESP
- Column Leachates (specialized test)
- Gypsum Content -Acetone
- Gypsum requirement – Ca / Mg conc. differences
- Specific Gravity – Flask method
- Carbonate content – gravimetric loss of CO₂
- Turbidity
- Grain Size
 - Seiving
 - Hydrometer
 - Laser Diffraction
- Textural Classification
- Specific Gravity
- Percent Salt
- Hydraulic Conductivity (permeability)
- Particle Counting (water samples)

Contracting Activities: (USGS, Colo. St. U., private labs)

The lab contracts out most chemical analyses that include the following:

- Total Soil Analyses &/or Extracts Chemistry
 - ICP, Se, As, Hg, U/Th, Nitrates, Sulfates, Chlorides

Over the last 3 years, this has averaged about 600 analyses/year.

Staff: 1 Physical Scientist full time; part-time Physical Scientists, Soil Scientists, or Physical Science Technicians as needed on a project basis (past staffing has included as many as 5 full-time people, but current extra staffing needs are covered by temporary assignments in an effort to reduce costs)

Workload: Over the last 3 years, the lab has handled approximately 1000 samples per year for specific Reclamation projects, and approximately 500 samples per year for Reclamation Science & Technology work and outside agencies, primarily the USGS. Almost all samples require multiple analyses, so the actual analyses performed would number closer to 5000 – 6000 analyses annually.

Potential Alternate Providers of Similar Services: Water analyses are available from labs within other Government agencies and private labs. However, it is difficult to find labs that can deal with soil & sediment samples in

Reclamation type methods, or that allow for unique, specialized project-driven testing that may need to be developed on a one-time basis (column testing, for example). Any such out-sourced work would likely require such a large amount of time and oversight that it would be more cost effective and reasonable to do it in-house.

Laboratory: National Research Center for Groundwater Desalination
Alamogordo, New Mexico

This is a new research laboratory under construction in the Tularosa Basin. This facility is slated for completion in 2007.

General Background

The Center is designed to provide state-of-the-art research facilities for Reclamation and visiting researchers involved in desalination research studies, pilot-scale projects and small demonstration projects. The Center will also offer public tours and feature an information display area as part of its public awareness program. The Center is unique in that it is the only major research facility in the United States dedicated solely to the desalination of brackish and impaired groundwater. The Center is intended to be the national focal point for cooperative research in brackish groundwater desalination when it officially opens in early 2007.

Mission of the Center

The mission of the Center is to be the intellectual powerhouse that attracts outstanding researchers to work on developing cost effective, efficient desalination technologies that can be applied to brackish and impaired groundwater—resulting in new supplies of usable water for municipal, agricultural, industrial, and environmental purposes. This objective is promoted by the National Research Council in *Envisioning the Agenda for Water Resources Research in the Twenty-First Century* (2001). The Center is also dedicated to bridging the gap between science and engineering and to speed the transfer of supply enhancing technologies to users.

Objectives of the Center

The Center will pursue its mission of developing supply-enhancing technologies by initiating research projects that focus on:

- Development of solutions to concentrate management problems.
- Development of renewable energy/desalination hybrids.
- Development of desalination technologies for produced waters.
- Development of small-scale desalination systems.
- Reducing the costs of desalinating brackish groundwater.

Research conducted at the Center will be primarily applied research; however, some basic research will take place as part of the effort to develop “disruptive” technologies.

Capability

The Center is unique in its capability to provide innovative solutions to the above objectives because of the following characteristics:

- The Center is the only major research facility in the United States dedicated solely to the desalination of brackish and impaired groundwater. Other research facilities around the country focus primarily on desalination of seawater, surface water, irrigation return flows, and wastewater.
- The Center is the only major research facility in the United States to focus on renewable energy sources in combination with desalination processes. Part of the Center’s 40 acre site is set aside for future research into renewable energy sources such as wind and solar power.
- The Center is located within the Tularosa Basin in Alamogordo, New Mexico, which was identified as the top-rated demonstration site in the United States for brackish groundwater desalination demonstration projects by Interior’s Office of Water Research and Technology in 1978.
- Because of the available supply of groundwater resources with a variety of water chemistries, this site provides a unique opportunity to evaluate new desalination technologies over a wide range of natural water qualities at one location.
- The Center is equipped to store and test impaired groundwater which may adversely affect materials used in typical water treatment systems. Future desalination efforts will focus on desalinating these high Total Dissolved Solids (high TDS) waters. The Center is also located close to the produced waters generated by New Mexico’s oil and gas production facilities. Samples of produced waters can be trucked by tanker to the Center, stored onsite, and distributed to research bays for research project testing.
- The results of the Center’s programs have the potential to impact peoples around the globe, since the water issues it can address are common to many areas.

Infrastructure

The Center’s research building and external features are designed for flexibility in meeting the needs of any research study conducted at the Center. The cost of well

field exploration and development, water rights, design, construction, construction management (Reclamation), and equipping of the Center is approximately \$20,000,000.

The research building is designed as a passive solar facility which encompasses a 15,350 square foot area. Contained within the building are six research bays for desalination technology pilot testing, a resource area and information center for visitors, a monitoring room, offices, a conference room, a water analysis laboratory, and a mechanical shop.

A high bay area contained in the rear of the building houses six research bays, a workshop and storage areas. Each bay is equipped with quick release connections so that pilot-scale research units can easily be hooked up to water, power, chemicals, instrument air, data ports and drain. Each bay has access to three different water qualities available from onsite wells and storage tanks. One of the bays is equipped with a working reverse osmosis unit that is used as a demonstration unit for public tours. The bays can accommodate more than one research experiment at a time depending upon the characteristics of the specific units under investigation.

Researchers have the opportunity to utilize the adjoining monitoring room or research offices to gather and analyze data from their research projects in the bays. Data is also available from the large external pads located behind the building. Researchers can use the monitors and controls to detect a failure and to take the necessary actions to resolve the problem without being physically present in the bays. Large glass windows enable researchers to view all areas of the high-bay area.

There are seven offices for researchers working at the facility. Most of the offices can accommodate two researchers comfortably. Each researcher has access to the Internet, and the use of phone, fax, and a copy machine. The office areas are clustered together to provide a team-based environment.

The conference room provides a professional atmosphere for meetings and presentations for up to 15 people. The conference room is available for small-group workshops and seminars.

A basic laboratory is available for researchers to test and analyze water samples obtained from research projects. The laboratory is equipped with calibrated analytical equipment to ensure the reliability and accuracy of test results.

Onsite External Research Features

All external research features on the site can be monitored from the central research building. Limited centralized controls are available as well for start up and emergency shut down procedures.

Opportunities for Laboratory Services

Four onsite source water wells supply water to the facility for research purposes. Water is pumped to large water storage tanks where it can be stored or distributed to individual research bays as needed. Internal research bays are supplied with up to 30 gallons per minute for pilot-scale testing while the three larger external pads can accommodate larger demonstration units operating at up to 60 gallons per minute.

Brackish groundwater sources containing a variety of Total Dissolved Solids concentrations (TDS) are available for research:

Low TDS source water (TDS of 1,000-1,200 mg/L)
50,000 gallon source water storage tank

Temperature before cooling tower stripping of 41 degrees C (106 degrees F)

Mid TDS source water (TDS of 3,350-6,400 mg/L)
100,000 gallon source water storage tank

100,000 gallon source water storage tank

High TDS source water (TDS of 10,000mg/L or greater including produced waters)

Needs to be trucked to site from nearby sources

50,000 gallon source water storage tank

An additional reserve well has been purchased along with Center water rights from a ranch bordering the 40 acre site. This well will be rehabilitated and brought online as needed in the future. The well produces mid TDS source water which is typical of brackish groundwater found throughout the Southwest.

The 40 acre site also contains 3 large evaporation ponds that can store the concentrates separated from the product water by research test units. The ponds are used to conduct concentrate management research studies and pilot-scale testing, i.e. beneficial uses of concentrated reject, byproduct development and zero liquid discharge systems. The evaporation pond area is fenced for safety reasons and instrumented to detect any leaks in the liners. An agricultural research area is located adjacent to the evaporation ponds. It is designed for research into salt tolerant plants or halophytes.

One part of the site has been set aside for future renewable energy research into solar and wind power units coupled with desalination technologies. Wind turbines or solar panels can be positioned in this area and connected to the onsite water and power networks as needed.

The site is leased from the City of Alamogordo at a cost of \$1 for a period of 20 years with optional 10-year extensions up to 40 years. Reclamation entered into a 5-year agreement with an adjacent local rancher for perpetual water rights—leasing for five years at \$80,000/year and purchase for \$630,000.at the end of year five. The agreement includes the donation of an existing well and an easement for access to the well from the Center after year five. All permits have been obtained from the State of New Mexico for water rights and facility O & M. Water discharged from the site is provided to the City of Alamogordo at no charge through a connector to the City’s water reuse line. This enables the City to operate its system and to provide some support for Holloman AFB.

Location: The Center is located within the Tularosa Basin in Alamogordo, New Mexico. A central research building and external research areas are situated on a 40 acre fenced site within Alamogordo city limits and about 4 miles east of Holloman Air Force Base. The Center is easily accessible by car from Albuquerque, NM (north), Las Cruces, NM (west) and El Paso, TX (south). A number of major airlines service both El Paso and Albuquerque, while small commuter flights fly directly into Alamogordo. The facility location was chosen to effectively conduct activities that would support national and international research on inland brackish ground water desalination. Because of its supply of groundwater resources with a variety of water chemistries, this site provides a unique opportunity to evaluate new desalination technologies. In addition, there is close proximity to sources of produced waters.

The Center is located within the Upper Colorado Region but, because of its national scope, plans call for it to be managed by the Denver Office through the Director, Technical Resources. The Center, its programs, and budget are incorporated into Water 2025 for FY 2007. Authority for the design, build, operation and maintenance has been provided by Congress through Reclamation’s Desalination & Water Purification R & D Program (DWPR).

Upon completion of the [Tularosa Basin Desalination] facility, Reclamation is directed to select an organization to operate the facility under Bureau direction. In this selection, the Bureau should give priority to local educational institutions with expertise, do not need to relocate and have on-going water research activities. (FY 2006 Budget, Conference Report 109-275)

Customer and percentage of your workload the customer gets: The Center is designed to serve clients from universities, companies, research organizations, and State and local water entities. The Center will also engage other Federal agencies in collaborative efforts. Reclamation researchers will participate in cooperative research at the Center according to individual project needs. The following program elements and clients are proposed in the Draft Business Plan prepared by Reclamation. The final percentage of workload among these elements will vary yearly based on the quality of research proposal received and funds available;

Merit-Based Cooperative Research: An effective method for attracting outstanding researchers is to provide financial assistance awards that are competitive, merit-reviewed and cost-shared. Under the Water Desalination Act of 1996, Reclamation put in place the Desalination and Water Purification Research & Development Program (DWPR) for cooperative research with universities, companies, research organizations, municipal water districts, and State and local entities. Successful proposals receive awards for research and laboratory studies, pilot-scale projects, and demonstration-scale projects. Successful research studies lead to pilot testing which in turn can lead to a larger field-based demonstration to determine commercial viability. This sequential process facilitates technology transfer and screens out research that is not successful or practical. Another attractive feature of this research is the cost-share requirement of at least 50 percent by the researcher. This cost sharing ensures commitment, leverages research dollars, and creates partnerships with users. The cost share also enables companies with modest resources to obtain funding for research that could not be accomplished without Government assistance. This competitive, cost shared cooperative research activity would be the core of the Center's research programs.

Cooperative Research and Development Agreements: The Federal Technology Transfer Act of 1986 (Public Law 99-502) authorized Federal laboratories to enter into Cooperative Research and Development Agreements (CRADAs). The Center will use this tool in order to match its facilities and expertise with that of companies, research organizations and municipal water authorities. The CRADA process is streamlined, leverages Federal and private sector resources, and speeds the transfer of commercially useful technologies to the private sector and ultimately to the users.

Federal Partnerships: Partnerships between Government agencies will play a major role in the research program operated by the Center. The Center can help to serve a coordinating function among Federal agencies by providing a location for collaboration on brackish groundwater desalination. Reclamation and its Government partners can therefore leverage research dollars through cost sharing of research projects, avoid unnecessary and costly duplication, bring additional expertise to bear, and establish a professional cadre of resource people. Some potential Federal partners who are already involved in desalination research are the Office of Naval Research, Sandia National Laboratory, Lawrence Livermore National Laboratories, National Renewable Energy Laboratories and the Environmental Protection Agency.

Professional and Industrial Membership Group: Establishing a Professional and Industrial Membership Group is critical to creating a center of innovation and excellence. The Group's structure and activities are patterned after the NSF university-based technology centers that link science and engineering in a flexible research environment. The resulting interaction and collaboration strengthen the Center by ensuring relevance of research, speeding the transfer of technology, and

keeping the Center abreast of cutting edge technologies. Membership fees enable the group members to pool resources for sponsored research projects conducted at the Center.

Student Internship/ Work Program: The Center will work with local universities in setting up an organized internship program for graduate and post-graduate students. This arrangement is mutually beneficial in that it allows students to work on research topics relevant to their professional interests, and it supplies the Center with promising talented researchers. In most cases, the university would support the assistantship or scholarship program, although it would be desirable for the Center to fund one or two interns per year if funds are available.

Activity Based Costing: Estimated costs for Center activities have been projected for three years, and a funding level of \$2,700,000 requested for FY 2007 as part of Water 2025. The following Center costs were developed as part of the backup for the Draft Business Plan under consideration.

Estimated Center Budget

		Year 1 (FY 2007)		Year 2 (FY 2008)		Year 3 (FY 2009)
Facility Management and Operations						
		\$		\$		\$
O&M Contract						
Staff¹		1,031,000		1,416,000		1,458,000
Utilities		50,000		52,000		53,000
Security		60,000		62,000		64,000
Contract subtotal		1,141,000		1,530,000		1,575,000
Unlisted²		114,000		153,000		158,000
Total Contract		1,255,000		1,683,000		1,733,000
Water Rights³		80,000		80,000		80,000
Scheduled Replacement (capital costs)⁴		107,000		107,000		107,000
Program Manager (Reclamation)⁵		180,000		185,000		190,000
Subtotal		1,622,000		2,055,000		2,110,000
Research Project Funding⁶						
Research Projects	3	300,000	3	300,000	6	600,000
Pilot-scale projects	1	150,000	2	300,000	2	300,000
Second year Pilot	0	0	1	120,000	2	240,000
Demonstration Projects	0	0	1	500,000	1	500,000

Opportunities for Laboratory Services

		Year 1 (FY 2007)		Year 2 (FY 2008)		Year 3 (FY 2009)
Second Year Demo	0	0	0	0	1	500,000
Third Year Demo	0	0	0	0	0	0
Subtotal		450,000		1,220,000		2,140,000
		Year 1 (FY 2007)		Year 2 (FY 2008)		Year 3 (FY 2009)
Technical Support⁷						
COTR Work		142,000		210,000		326,000
Technical Assistance		25,000		40,000		50,000
Peer Review						20,000
Subtotal		167,000		250,000		396,000
Total Government cost		2,239,000		3,525,000		4,646,000

Notes:

1. Cost for contract staff includes G&A, Margin and Benefits. First year staffing costs cover 9 months only and are reduced by 25% of the total year cost. See Table 2 for further information. A cost of living increase of 3% is included for years two and three.
2. Contract unlisted costs include daily operational supplies, routine maintenance and the replacement of minor equipment.
3. The \$650,000 payment for water rights is the sixth and final increment for the purchasing of perpetual water rights for the Center. See Table 3 for further information.
4. Table 4 shows the scheduled replacement costs for major items over the 40-year life of the facility.
5. The Reclamation Project Manager is expected to be a GS-14 level 5 with an annual salary of \$103,593. A factor of 3 is used in calculating G&A and Benefits totaling \$310,779. However, since the position is expected to require only 50% of the individual's time, the amount is reduced to \$155,000. An additional \$25,000 is included to cover the costs of travel and per diem.
6. The Research Project Funding and Technical Support sections of this table refer to the DWPR merit-based cooperative research program discussed in Section 6.1. These funds will be utilized in accordance with Reclamation's Annual Budget Requests proposed by the Budget Review Committee.
7. Support costs are derived from current budgets for DWPR research projects. The Center's five program offerings have the potential to leverage substantial research dollars and services in kind as programs grow. Leveraged dollars and in-kind services can be obtained from the following sources:
 - Cost sharing through merit-based research and Federal partnerships
 - Contributions from CRADA partners
 - Membership dues from industrial and professional partners
 - User fees for Center services

APPENDIX B

LABORATORY DATA SPREADSHEET

Table B-1. Reclamation Laboratory Capabilities

MANAGING FOR EXCELLENCE, TEAM 32-33 -- LAB SERVICES/CAPABILITIES

RECLAMATION LAB CAPABILITIES

Standardized Testing Lab Services	TSC		MPCO Lab, Willows CA		NCAO Lab, Shasta Lake CA	
	Staff-days		Staff-days		Staff-days	
	Lab Services	Eng. & Scientific Services	Lab Services	Eng. & Scientific Services	Lab Services	Eng. & Scientific Services
Water Quality Testing & Analysis					468	
Concrete Testing	100	300	100	25		
Soil Testing & Analysis	100	300	350	75		
Rock Testing						
Lead in Paint Analysis						
Microbiological Analysis						

Standardized Testing Lab Services	PN Regional Lab, Boise ID			UC Region, WCAO Lab, Grand Junction CO ⁵ Mark Wernke	
	Staff-days			Staff-days	
	Lab Services	Eng. & Scientific Services		Lab Services	Eng. & Scientific Services
Water Quality Testing & Analysis	560	100		60	
Concrete Testing				60	
Soil Testing & Analysis				60	
Rock Testing					
Lead in Paint Analysis					
Microbiological Analysis					

Standardized Testing Lab Services	UC Region, Four Corners Construction Office Lab, Farmington NM/Durango CO ² Mike Deming		UC Regional Lab, Provo UT Curt Pledger		UC Regional Lab, Alamosa CO	
	Staff-days		Staff-days		Staff-days	
	Lab Services	Eng. & Scientific Services	Lab Services	Eng. & Scientific Services	Lab Services	Eng. & Scientific Services
Water Quality Testing & Analysis					660	
Concrete Testing	1120		618			
Soil Testing & Analysis	1200		266			
Rock Testing						
Lead in Paint Analysis						
Microbiological Analysis						

Standardized Testing Lab Services	LC Regional Lab, Boulder City NV Amy Stephenson		LC Regional Lab, Yuma AZ ¹ Bob Adams/Hong Nguyen DeCorse		LC Regional Lab, Yuma Desalting Plant ⁴ Wayne Johnson	
	Staff-days		Staff-days		Staff-days	
	Lab Services	Eng. & Scientific Services	Lab Services	Eng. & Scientific Services	Lab Services	Eng. & Scientific Services
Water Quality Testing & Analysis	358.8				840	360
Concrete Testing			60			
Soil Testing & Analysis	19.5		60			
Rock Testing						
Lead in Paint Analysis	1					
Microbiological Analysis						

Standardized Testing Lab Services	LC Regional Lab - PXAO Jeff Riley			GP Regional Lab, Loveland CO	
	Staff-days			Staff-days	
	Lab Services	Eng. & Scientific Services		Lab Services	Eng. & Scientific Services
Water Quality Testing & Analysis					
Concrete Testing	6			87	
Soil Testing & Analysis				87	
Rock Testing					
Lead in Paint Analysis					
Microbiological Analysis					

Table B-1. Reclamation Laboratory Capabilities (Continued)

MANAGING FOR EXCELLENCE, TEAM 32-33 -- LAB SERVICES/CAPABILITIES

RECLAMATION LAB CAPABILITIES

Specialized Services (Non-standard testing; TSC only)	Staff-days in FY 2005		TOTAL
	Lab Services	Engineering & Scientific Services	
MATERIALS ENGINEERING	490	3410	3900
Canal Lining Materials	0	180	Detailed data is provided for this group, as an example.
Seepage Prevention Methods	0	0	
Protective Coatings	60	540	
Corrosion Protection	0	600	
Concrete Mix Design	50	500	
Rock Mechanics	200	400	
Metals Testing	50	50	
Plastics Testing	20	0	
Concrete Repair Methods	50	600	
Structural testing	60	540	
ENVIRONMENTAL APPLICATIONS & RESEARCH	410	2280	
	Total (above) is provided for this group; detailed data is not readily available.		
WATER TREATMENT ENGINEERING	2670	2015	4685
	Total (above) is provided for this group; detailed data is not readily available.		
FISHERIES APPLICATIONS	1100	2270	3370
Fish Protection & Passage	Total (above) is provided for this group; detailed data is not readily available.		
Fish Screens			
Stream Restoration			
Stream Bank Stabilization and Restoration			
Erosion Protection			
EARTH SCIENCES & RESEARCH	295	1470	1765
	Total (above) is provided for this group; detailed data is not readily available.		
HYDROELECTRIC RESEARCH	1980	3030	5010
Electric Power and Diagnostics	Total (above) is provided for this group; detailed data is not readily available.		
Electric Power Program Services			
Mechanical Power Program Services			
Control System Analysis and Testing			
Powerplant Automation			
HYDRAULICS (including LAB SHOPS)	1595	1985	3580
Environmental Hydraulics	Total (above) is provided for this group; detailed data is not readily available.		
Water Conservation			
Hydraulic Equipment Operation & Maintenance			
Dam Safety			

Table B-2. Detailed Summary of Reclamation Laboratory Activities

MANAGING FOR EXCELLENCE, TEAM 32-33 -- LAB SERVICES/CAPABILITIES
 Detailed Summary - RECLAMATION LAB ACTIVITIES

General Lab Services	TSC Lab - Denver			Regional Labs			Contracted Work	
	Staff-days			Staff-days			1000\$	
	Lab Services	Engrg. & Scientific Services	Totals	Lab Services	Engrg. & Scientific Services	Totals	Lab Services Obtained by Regions via Contract	All Services Obtained on Contract by TSC Lab Groups
STANDARDIZED TESTING	200	600	800	7041	560	7601	\$ 1,075	
HYDROELECTRIC RESEARCH & TECHNICAL SERVICES	1980	3030	5010	0	0	0		\$ 980
MATERIALS ENGINEERING	490	3410	3900	261	0	261		\$ 370
EARTH SCIENCES	295	1470	1765	0	0	0		\$ -
HYDRAULICS	1595	1895	3490	0	0	0		\$ 560
FISHERIES APPLICATIONS	1100	2270	3370	0	0	0		\$ 520
ENVIRONMENTAL APPLICATIONS & RESEARCH	410	2280	2690	0	0	0		\$ 790
WATER TREATMENT ENGINEERING	2670	2015	4685	0	0	0		\$ 7,980
MISC. ACTIVITIES	0	300	300	250	0	250		\$ -
Totals	8,740	17,270	26,010	7,552	560	8,112	\$ 1,075	\$ 11,200

APPENDIX C

DECISION TREE

