January 5, 2007

Mr. Russell George
Mr. Eric Hecox
Mr. Rick Brown

Dear Russ/Eric:

At the December 18, 2006 Colorado Basin Roundtable (CBRT) meeting, the membership voted to pursue several projects, and are requesting that funding be allocated from the various funding sources available to support these projects. By previous letter, we have requested task order authorization for consultant work pursuant to HB 20006-1400, and are now requesting authorization and consideration for distribution of Funds pursuant to SB 2005-179, either discretionary basin funds or statewide funds.

At the December 18th meeting, funding requests were considered for the following projects:

PROJECT AND AMOUNT REQUESTED		SOURCE
TOWN OF PALISADE-WHITEWATER PARK -	$100,000	BASIN
GRAND COUNTY/VAIL DITCH	$1,500,000	STATEWIDE
BULL CREEK RESERVOIRS	$150,000	BASIN
EAGLE PARK RESERVOIR	$250,000	STATEWIDE
ROARING FORK WATERSHED ASSESSMENT	$40,000	BASIN
GRAND COUNTY STREAMFLOW MANAGEMENT PLAN	$30,000	BASIN
RECOVERY PROGRAM 10,825 STUDY	$200,000	STATEWIDE
ENERGY DEVELOPMENT WATER NEEDS ASSESSMENT	$300,000	STATEWIDE

Project proponents were provided time to make presentations, along with questions from the Roundtable Members. Twenty seven voting members of the Roundtable were present for this meeting, and after discussion, pre-printed ballots were distributed to all voting members. Members were instructed that even if a project had requested to be funded by Basin Funds, they could vote for both or just for Statewide Funds, if they felt that the project should be funded, but did not want to support funding from the Basin Funds.

After the ballots were filled out, they were collected by Rod Sharp, the CSU Extension Liaison, and were counted and transcribed to poster sheet. The By-Laws of the Colorado Basin Roundtable require a two-thirds majority vote of those present for any action, and thus 18 votes were required to support funding any proposal.

As a result of the discussion, review and balloting, the Colorado Basin Roundtable wishes to recommend the following projects for funding, to be considered at the March meeting of the Colorado Water Conservation Board.

SB 179 BASIN FUNDS

Roaring Fork Watershed Assessment
Grand County Streamflow Management Plan

SB 170 STATEWIDE FUNDS

Acquisition of Vail Ditch by Grand County Interests
Enlargement of Eagle Park Reservoir
Energy Development Water Needs Assessment
Upper Colorado Endangered Fish Recovery Program – Alternatives Analysis

The project recommended for Statewide Funds were so recommended because they attempted to address multi-Basin issues and/or had multi-basin Roundtable support.

a) The Acquisition of Vail Ditch is supported by Denver Water, and is an effort by Grand County entities to provide local solutions to water shortages due to transbasin diversions.
b) The Enlargement of Eagle Park Reservoir is a continuation of the actions initiated in the Eagle River MOU, an agreement among various Eagle River Basin entities and the Homestake Partners.
c) The Energy Development Water Needs Assessment is a joint project of the Colorado Basin and the Yampa-White Basin Roundtables in identifying and responding to the coming demands of major energy development in Garfield, Mesa, Rio Blanco and Moffat Counties.
d) The Upper Colorado Endangered Fish Recovery Program – Alternative Analysis is a project currently supported by the Colorado Basin, South Platte Basin and Metro Basin Roundtables, with support from the Arkansas Basin Roundtable, and is intended to identify a permanent supply of 10,825 Acre Feet of annual yield to assist with the recovery of the Endangered Colorado River fishes, an obligation of all of the water users from the Upper Colorado Basin.

By this letter, I am forwarding the ballot tabulation from the December meeting, as well as the applications and supporting materials for these projects.

The Colorado Basin Roundtable appreciates the support of the Department of Natural Resources, the Colorado Water Conservation Board and the Interbasin Compact Commission in furthering the development of Colorado's water and in fostering interbasin communications and discussions. We believe that these projects will assist in this effort.

Sincerely yours,

David H. Merritt, P.E.
Chair, Colorado Basin Roundtable

From: Thomas R. Sharp [sharp@sharpsteinke.com]
Sent: Monday, January 08, 2007 11:29 AM
To: Dan Birch
Subject: Fw: Energy SOW

Attachments: Energy SOW 0606 Draft.doc
Dan: Here's the email I sent to Hecox on August 8. Is this enough, or do you need a letter or something? Tom

----- Original Message -----
From: Thomas R. Sharp
To: Eric Hecox
Cc: Robert Weiss ; Dan - CRWCD Birch ; David H. Smith ; Darryl Steele ; Russell George
Sent: Tuesday, August 08, 2006 10:12 AM
Subject: Fw: Energy SOW

Eric:

Please consider the enclosed Scope of Work as a formal proposal from the Yampa-White Basin Roundtable to the IBCC and CWCB for inclusion of such Scope of Work within the needs assessment to be undertaken and supervised by the IBCC and CWCB. The SOW is directed toward assessing the needs for water development on the White River related to energy development. As Chair of the Yampa-White Basin Commission, this certifies that this Scope of Work was reviewed and approved by the Yampa-White Basin Commission at its July 19 meeting in Craig.

Thank you.

Sincerely,

Tom Sharp
Chair, Yampa-White Basin Commission
----- Original Message -----
From: Dan Birch
To: Thomas R. Sharp
Sent: Thursday, July 20, 2006 9:32 AM
Subject: Energy SOW

Hi Tom,

Attached is the SOW as approved by the Roundtable last night.

Dan

COLORADO WATER CONSERVATION BOARD

WATER SUPPLY RESERVE ACCOUNT
2006-2007 GRANT APPLICATION FORM

Colorado, White, and Yampa River Basins Energy Development Water Needs Assessment

Name of Water Activity/Project **River Basin Location**

$300,000		Basin Account	X	Yes
	X	Statewide Account		No
Amount of Funds Requested	Please Check Applicable Box		Approval Letter Signed By Roundtable Chair and Description of Results of Evaluation and Approval Process	

*** For the Basin Account, the Application Deadline is 60 Days Prior to the Bimonthly CWCB meeting. The CWCB meetings are posted at www.cwcb.state.co.us and are generally the third week of the month.**

*** For the Statewide Account, the Application Deadline is 60 Days Prior to the March and September CWCB Board Meetings.**

*** In completing the application you may attach additional sheets if the form does not provide adequate space. If additional sheets are attached please be sure to reference the section number of the application that you are addressing (i.e., A.1. etc.).**

Instructions: This application form should be emailed, typed, or printed neatly. The Water Supply Reserve Account Criteria and Guidelines can be found at http://cwcb.state.co.us/IWMD/. **The criteria and guidelines should be reviewed and followed when completing this application**. You may attach additional sheets as necessary to fully answer any question, or to provide additional information that you feel would be helpful in evaluating this application. Include with your application a cover letter summarizing your request for a grant. If you have difficulty with any part of the application, contact Rick Brown of the Intrastate Water Management and Development (Colorado Water Conservation Board) for assistance, at (303) 866-3514 or email Rick at rick.brown@state.co.us.

Generally, the applicant is also the prospective owner and sponsor of the proposed water activity. If this is not the case, contact the Rick Brown before completing this application.

Water Supply Reserve Account – Grant Application Form

Form Revised October 2006

Part A. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Colorado River District

Mailing address: 201 Centennial Street, Suite 200
P.O. Box 1120
Glenwood Springs, CO 81602

Taxpayer ID#: 84-6000156 Email address: dbirch@crwcd.com

Phone Numbers: Business: 970 945 8522

Home:

Fax: 970 945 8799

2. Person to contact regarding this application if different from above:

Name: Daniel R. Birch

Position/Title Deputy Manager

3. Provide a brief description of your organization below: Refer to Part 2 of criteria and guidance for required Information. Attach additional sheet(s) as needed.

The Colorado River District is a public water agency chartered by the Colorado General Assembly in 1937 (CRS 37-46, et seq) to be "the appropriate agency for the conservation, use and development of the water resources of the Colorado River and its principal tributaries in Colorado." The District is comprised of 15 West Slope counties in the Colorado River Basin in the State of Colorado. These counties are Moffat, Routt, Grand, Eagle, Summit, Pitkin, Gunnison, Rio Blanco, Garfield, Mesa, Ouray, Delta, and portions of Montrose, Saguache and Hinsdale. The District covers approximately 29,000 square miles, roughly 28% of the land area of Colorado. The District is governed by a 15-member board of directors, appointed by the Board of Commissioners from each of the 15 counties within the District.

The River District plans, develops and operates water projects such as Wolford Mountain Reservoir near Kremmling and Elkhead Reservoir near Craig, and participates in the wide range of matters pertaining to the waters of the Colorado River basin. The River District has a General Fund Budget of $3.95M and an Enterprise budget of $6.5M. The River District has a staff of about 20 employees.

Part B. - Description of the Water Activity – Please Refer to Criteria and Guidance Document for Eligibly Criteria

1. Name of water activity/project:

Reconnaissance level analyses of water demands and supply to serve energy development in Northwest, Colorado in the White/Yampa River Basins, the Colorado River Basin and resultant State-wide impacts.

2. What is the purpose of this grant application? Check one.

[ ] Environmental compliance and feasibility study

[ ] Technical assistance regarding permitting, feasibility studies, and environmental compliance

[X] Studies or analysis of structural, nonstructural, consumptive, nonconsumptive water needs, projects, or activities (Please specify)

[ ] Structural and/or nonstructural water project or activity

3. Please provide an overview of water project or activity to be funded including – type of activity, statement of what the activity is intended to accomplish, the need for the activity, the problems and opportunities to be addressed, expectations of the participants, why the activity is important, the service area or geographic location, and any relevant issues etc. Please include any relevant Tabor issues. Please refer to Part 2 of criteria and guidance document for additional detail on information to include. Attach additional sheets as needed.

Please see Attachment B.3.

4. Please provide a brief narrative of any related or relevant previous studies. Attach additional sheets as needed.

Energy Development on the West Slope was a well studied activity in the 20th Century. Most notably, the energy crisis of the early 1970's led to a number of significant efforts to explore, research, and assess the feasibility and economics of extracting petroleum from the extensive oil shale deposits in the Colorado and White River Basins. These efforts produced a large number of studies, reports, and environmental assessments of the impacts of oil shale development. A critical element to these studies and reports was the need and availability of water supplies to serve development activities.These activities crashed on the infamous "Black Sunday" in 1982.

The 2004 Statewide Water Supply Initiative examined issues surrounding oil shale and other energy development. SWSI stated that due to market, technical and other unknowns it was not possible to gage the level of possible future demands but concluded that annual demands could be more than 100,000 acre-feet.

Since SWSI, world demand and the price of oil have risen dramatically and this has led to a renewed interest in energy development. Currently the Bureau of Land Management is conducting a programmatic environmental impact statement on energy development. Additionally, the BLM conducted environmental assessments and awarded leases on tracts in the Piceance Basin for oil shale research programs. It is not clear at this point to what extent these efforts have or will address water issues. They will be reviewed and consulted as possible to avoid any duplication of effort.

5. Please provide a copy of the proposed scope of work. Please refer to Part 2 of the criteria and guidance document for detailed requirements. Attach additional sheets as needed.

Please see Attachment B.5. prepared by the State of Colorado's study contractor.

6. List the names and addresses of any technical or legal consultants retained to represent the applicant or to conduct investigations for the water activity/project.

Name	Address/Phone Number
John Sikora, P.E. URS Corporation (working as a subcontractor to CDM, the State's study contractor)	2520 Grand Avenue, Suite 204 Glenwood Springs, CO 81601 970 945 2143

7. Water Availability and Sustainability – this information is needed to assess the viability and effectiveness of the water project or activity. Please provide a description of each water supply source to be utilized for, or the water body to be affected by, the water activity. For water supply sources being utilized, describe its location, yield, extent of development, and water right status. For water bodies being affected, describe its location, extent of development, and the expected effect of the water activity on the water body, in either case, the analysis should take into consideration a reasonable range of hydrologic variation. Attach additional sheets as needed.

Not Applicable since this is a water needs assessment.

8. If you have not specifically and fully addressed the Evaluation Criteria found in Part 3 of the criteria and guidance document please provide additional detail here. Attach additional sheet(s) if needed.

See Attachment B-8.

9. Additional Information – If you feel you would like to add any additional pertinent information please feel free to do so here. Attach additional sheets as needed.

The above statements are true to the best of my knowledge:

Signature of Applicant:

Print Applicant's Name: Daniel R. Birch, Colorado River District

Project Title: Colorado, White, and Yampa River Basins Energy Development Water Needs Assessment

Return this application to:

Mr. Rick Brown
Intrastate Water Management and Development Section
COLORADO WATER CONSERVATION BOARD
1580 Logan Street, Suite 600
Denver, CO 80203

To submit applications by Email, send to: rick.brown@state.co.us

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Reference Information

The following information is available via the internet. The reference information provides additional detail and background information regarding these criteria and guidelines and water policy issues affecting our state.

Colorado Water Conservation Board Policies

Loan and Grant policies and information are available at - http://cwcb.state.co.us/Finance/

Water Supply Reserve Account Criteria and Guidelines –
http://cwcb.state.co.us/IWMD/tools.htm#Water_Supply_Reserve_Account

Interbasin Compact Committee and Basin Roundtables

Interbasin Compact Committee By-laws and Charter –
http://dnr.state.co.us/Home/ColoradoWaterforthe21stCentury/Interbasin+Compact+Committee/IbccHomePage.htm

Basin Roundtable By-laws –
http://dnr.state.co.us/Home/ColoradoWaterforthe21stCentury/IbccHome.htm

Legislation

House Bill 05-1177 - Also known as the Water for the 21st Century Act –
http://cwcb.state.co.us/IWMD/statutes.htm

House Bill 06-1400 – Adopted the Interbasin Compact Committee Charter –
http://cwcb.state.co.us/IWMD/statutes.htm

Senate Bill 06-179 – Created the Water Supply Reserve Account –
http://cwcb.state.co.us/IWMD/statutes.htm

Statewide Water Supply Initiative

General Information - http://cwcb.state.co.us/IWMD/

Phase 1 Report - http://cwcb.state.co.us/IWMD/PhaseIReport.htm

Attachment B-3
CWCB SB179 Grant Application

Colorado, White, and Yampa River Basins Energy Development Water Needs Assessment

Geographic Area to be covered

The geographic area to be covered in this review are the counties making up Central and Northwest Colorado drained by the river systems of the Yampa, White, Green, and Colorado main stem. This application is a joint effort of the basin roundtables responsible for these river systems. Energy development and resultant impacts are inter-basin in nature: shale development in the Piceance Basin, for example, affects not only Rangely and Meeker, but also Rifle. Gas development in Rio Blanco County also affects the regional economy of Grand Junction, in Mesa County.

The opportunity to be addressed

Energy development in the Yampa/White and the Colorado Basins will continue into the near future (2030). Energy development requires water. This water will come from a series of projects that will encompass many combinations: energy-alone sponsored water development; cooperative energy/government development; private and semi-private development.

The proposed study will provide a management and analytical *framework*, a guide, from which the demands can be estimated, supply sources can be identified, and cooperative management arrangements outlined. The study will not provide a detailed analysis of the total energy development demand/supply picture. However, it will provide a general, flexible and adaptive range of demand and supply possibilities from which additional study may be suggested, from which current government or industry studies can be reviewed for adequacy, and from which future technical, legislative, and financial plans can be developed.

"Energy development" includes the following interrelated activities: extraction and development of oil/natural gas, coal, and oil shale; municipal demands resulting from the socio-economic impacts of direct/indirect industry workers and, subsequent, multiplied impacts; electrical generation to serve these extractive industries and supportive municipal infrastructures. It is recognized that energy development has impacts beyond Northwest, Colorado.

There is urgency

There has been a substantial increase in natural gas well development in the Yampa/White and Colorado River Basins in the last three years. The following table from the November 27, 2006 Staff Report from the State of Colorado Oil and Gas Conservation Commissioner illustrates the increase.

County	2006 (% of Total)	2005	2004
Garfield	1564 (31%)	1508	796
Weld	1202(24%)	901	832
Yuma	661 (13%)	782	237
Las Animas	409 (8%)	413	332
Rio Blanco	336 (7%)	161	154
Mesa	230 (5%)	136	54
La Plata	199 (4%)	117	102

This table demonstrates that in 2006, 43% of all natural gas drilling activity in the State of Colorado was in these basins.

There is continuing discussion of the development of oil shale with several research programs authorized by the Department of Interior, Bureau of Land Management, with lands leased in the Piceance Basin, in northwest Colorado.

The Energy Information Administration (EIA) in their Annual Energy Outlook Report in 2006 states, "In the United States, the commercial viability of syncrude produced from oil shale largely depends on oil prices. Although the production costs for oil shale syncrude decline through 2030 in all cases, it becomes economical only in the high price case, with production starting in 2019 and increasing to 405,000 barrels per day in 2030, when it represents 4 percent of U.S. petroleum production." EIA projects the production in 2019 of syncrude will be 45,000 barrels per day. (1 barrel equals 42 gallons).

Although the commercial production of 405,000 barrels a day will require a massive surface or in-situ retorting and support capacity, the technology for which is not developed, several research projects are underway today in Western Colorado and Eastern Utah. These will build on the work already conducted by the shale industry. In-situ development on Federal lease tracks CA and CB and surface retorting on private lands owned by Union Oil, ARCO, Tosco, and Exxon are the most recent examples of the late 1970's and early 1980's.

The Colony Oil Shale Project (first by ARCO and, later, by Exxon) took the most comprehensive approach to shale development, including the design and construction of the Battlement Mesa New Town with its attendant water and wastewater treatment facilities. Exxon's water supply analysis also included twin, 84-inch pipes importing water through the Continential Divide to the West Slope from the Missouri River basin.

Municipal water supply and infrastructure needs, like Battlement Mesa and the 1970's water development at Rangely, Meeker, Rifle, DeBeque, and Glenwood Springs would be required of any future oil shale industry in the scope of 405,000 barrels per day. Ditto for the electrical generation needed to fuel a massive syncrude industry.

Water development planning, permitting, financing and construction requires a 10-20-year lead time. This aspect, alone, will take the full energies of the State of Colorado and its water supply agencies. Aside from energy development, this planning is taking place now, not only within the State of Colorado but also on an interbasin level with the lower basin States.

A guidance document is needed now for the State, area water supply agencies, and development review agencies to evaluate the regional hydrologic impacts of energy development.

Work to be accomplished

- Quantify the direct use of water for extraction and development.
- Quantify the additional municipal demand from direct/indirect worker populations and multiplier impacts from resultant growth.
- Quantification of water demands from off-site electrical generation needed for industrial and municipal development.
- Comparison and integration of these demands with recently-developed SWSI demand and supply data.
- Creation of a "demand and supply range matrix" for near, moderate, and long-term development with modest, moderate and full production scenarios.

Tabor issues

The White/Yampa /Colorado River Basin Roundtables are requesting this work to be done by the URS/CDM team. The Roundtables have created an energy subcommittee to scope and manage the study process and results. The Roundtables are not public corporate bodies empowered to manage funds. It is anticipated that either one of the many municipalities will manage payments to the consultant via its water enterprise funds or that the CWCB will make direct payments to the consultant team as directed by either the Roundtable bodies, their Needs Assessment Committees, the actual grant recipient, or an entity designated to be the grant administrator.

URS

Memorandum

Attachment B-5
CWCB SB179 Grant Application

Colorado, White, and Yampa River Basins Energy Development Water Needs Assessment

Scope of Work

Purpose and Need

The USGS predicts there is 1.5 to 1.8 trillion barrels of recoverable oil to be developed in the Green River Formation. A portion of the Green River Formation is located within the Yampa, White and Colorado basins. To put this number in perspective this reserve is larger than the known reserves in Saudi Arabia and could supply the US with energy for 400 years. This fossil fuel in the Green River Formation is in a different form than crude oil, coal and natural gas, which we mainly use today. As new technology is developed and the international energy market demands additional forms of energy will be developed.

There are numerous coal mines throughout the Yampa, White and Colorado Basins. Coal historically had been the major source of energy development in these basins. Currently, there is an explosion of natural gas development. The Bureau of Land Management has recently approved research scale oil shale development near Meeker, Colorado. Because there is large energy resources available in these basin, the Department of Energy, National Energy Technology Laboratory predicts there will be emerging forms of energy development such as Coal Liquefaction and Coal Gasification.

There has been a tremendous increase in natural gas well development in the Yampa/White and Colorado River Basins in the last three years. The following table from the November 27, 2006 Staff Report from the State of Colorado Oil and Gas Conservation Commissioner illustrates the increase.

County	2006 (% of Total)	2005	2004
Garfield	1564 (31%)	1508	796
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Mesa	230 (5%)	136	54
La Plata	199 (4%)	117	102

This table demonstrates that in 2006, 43% of all natural gas drilling activity in the State of Colorado was in these basins.

There has been much discussion on the development of oil shale. The Energy Information Administration (EIA) in their Annual Energy Outlook Report in 2006 states, "In the United States, the commercial viability of syncrude produced from oil shale largely depends on oil prices. Although the production costs for oil shale syncrude decline through 2030 in all cases, it becomes economical only in the high price case, with production starting in 2019 and increasing to 405,000 barrels per day in 2030, when it represents 4 percent of U.S. petroleum production." EIA projects the production in 2019 of syncrude will be 45,000 barrels per day. (1 barrel equals 42 gallons).

The purpose for planning for the increased demand for water from oil and gas development is to avoid catastrophic consequences to the way of life in the Yampa/White and Colorado River Basins. The global demand for energy is increasing and the natural resources in Western Colorado are large and relatively untapped. Without proper planning for this increased demand the impacts to water resources in these basins could be detrimental to existing uses of water.

Resources

http://www.rand.org/pubs/monographs/2005/RAND_MG414.pdf

http://www.eia.doe.gov/oiaf/archive/aeo06/index.html

http://oil-gas.state.co.us/

http://www.shell.com/home/Framework?siteId=us-en&FC2=/us-en/html/iwgen/shell_for_businesses/exploration_production_shared/mahogany_shared/zzz_lhn.html&FC3=/us-en/html/iwgen/shell_for_businesses/exploration_production_shared/mahogany_shared/about_mahogany.html

http://radio.weblogs.com/0101170/categories/coloradoWater/2006/09/04.html

http://www.netl.doe.gov/technologies/oil-gas/publications/AP/IssuesforFEandWater.pdf

Scope for Water Demand Projections

The demand for energy development in the Yampa/White and the Colorado Basins will continue into the near future (2030) because of increased market demands as well as national security issues with the stability of domestically produced energy. Energy development requires a tremendous amount of water. The water necessary for to develop these energy

sources needs to be quantified as part of the House Bill 05-1177, the Colorado Water for the 21st Century Act process. The consumptive used demand was not quantified as part of the Statewide Water Supply Initiative process. Potentially, this is the largest gap between demand and water supplies in the State.

It is believed the energy development activities will require Environmental Impact Statements (EIS). We believe most of the development will occur on BLM Land as well as individually owned land. We will interview the Meeker, Glenwood and Grand Junction BLM offices to understand the near and long term future for energy demands in the region. The Meeker BLM is currently updated their Resource Management Plan to include natural gas drilling and some oil shale development. We will also contact the White River National Forest to understand if there is potential for energy development in the National Forest. It is anticipated this document may be used to help guide the EIS process as it relates to water development.

The amount of water used can be broken into three categories. The first category is the amount of water used in the extraction and development of the product. The second category is the additional municipal demand placed on the basins by the addition of energy related workers. The third category is the water required for electricity generation for the extractions and development processes and the additional demand from the energy related workers.

It is anticipated this will be a conceptual level assessment of the water needs for energy development. The scope of work includes interviews with a number of state and federal agencies to make sure we reasonable capture the anticipated rate of energy development. The meetings are documented in this text.

Direct Use

To quantify the direct use of water in the extraction and development, we will contact several natural gas companies to estimate the average amount of water that is used per well for drilling and dust control purposes. We will meet with the Colorado Oil and Gas Commission staff (natural gas regulators) to understand if there are any limiting production factors that will alter the rate of increase in production to consider with natural gas production.

According to the US Department of Energy, National Energy Technology Laboratory, estimates of water requirements for mining activities range from 10 gallons per ton to more than 150 gallons per ton of coal mined, with the lower range applicable to western coals with minimal revegetation activities and the higher end applicable to underground mining of eastern coals (Gleick 1994).

The U.S. Water Resources Council estimated that oil shale development will increase annual consumptive water use in the Upper Colorado Region by about 150,000 acre-feet per year for each million barrels (oil equivalent) per day of production, which is the equivalent of about three barrels of water per barrel of oil (U.S. Water Resources Council, 1981). Other estimates range from 2.1 to 5.2 barrels of water per barrel of shale oil product (OTA, Volume I, 1980).

We will meet with the Division of Reclamation and Mine Safety (oil shale regulators) to understand if there are any limiting production factors to consider with oil shale production.

Factors to Consider:

- Spatial analysis of the spread of new natural gas development
- Rate of new well development
- Average amount of produced water to offset demand

Municipal Demand

According to the US Department of Energy, National Energy Technology Laboratory, both plant operations and construction for oil shale development, will bring an estimated 70,000 workers. Beyond these direct employment increases, indirect increases in employment will occur, stemming from two general effects:

- Supplier effects: Jobs will be created in industries that provide equipment, materials, supplies, or services associated with construction or plant operations.
- Respending effects: Jobs will be created in those sectors where workers spend their paychecks.

Government employment: Additional employment generates taxes that support jobs in federal, state, and local governments.

Considering both direct and indirect employment, roughly 200,000 to 300,000 jobs will be associated with an oil shale industry producing 3 million barrels per day. Using the same methodology, the total employment impact at 1 million and 2 million barrels per day would be roughly 100,000 to 150,000 and 150,000 to 200,000, respectively.

To quantify the additional demand we will meet with the Garfield and Rio Blanco County's Planning Departments to understand the near term population increases and compare these numbers to the State Demographer projections. We will meet with several natural gas

development companies to understand their near term plans for location of drilling activities, increases amount of drilling activity and workers.

We will review the CRWCD files for previous oil shale development reports for the amount of production and the number of workers required to support the industry. We will also review the Rand Reports for the estimated amount of workers to produce oil shale.

Factors to Consider:

- Location of the population increases.
- Evaluate Energy Information Administration projections for natural gas development in the Rocky Mountain Region to understand if natural gas development will increase or decrease.
- Use State Demographer numbers for secondary workers (service) to support the increase in energy related employees.
- Use 350 gallons/day demand with 10 percent consumption for inside use demand and 0.5 ac-ft of water per year for outside uses with 80 percent consumption.

New Electrical Energy Demands

The largest increase in electrical demand may come from oil shale development. The current process under consideration by the oil shale industry is to heat the ground in-situ with electrical heaters to 700 degrees to extract the oil shale. We will meet with Shell Oil representatives to understand the estimated amount of energy required per barrel of oil. Shell Oil is the farthest along in developing this technology. About 250 to 300 kilowatt-hours are required for down-hole heating per barrel of extracted product. An operation producing 100,000 barrels per day requires approximately 1.2 gigawatts of dedicated electric generating capacity.

Identify if compressor stations and other natural gas process require significant electrical resources. The increase in population will require additional electricity for residential, goods and services. Water is used for cooling and scrubber technology in power production.

The USGS estimates that for every 1 kWh of power there are 25 gallons of water consumed.

The increase in demand locally may be supplied from existing regional sources. We will meet with the local electrical companies to understand their planning processes.

We will meet with the Colorado Public Utilities Commission staff to identify any on going planning efforts to meet this new electrical demand.

Factors to Consider:

- Electrical power to meet this additional demand can be produced just about any where in the US. The limiting factor maybe the environmental impacts from transmission lines to bring power to this area.

Analysis of Water Demand

The water estimates for each of the three categories will be combined into near- and long-term projections for water demand. A high and low projection for water demand will be made for the near and long term demands. This analysis will also include a GIS spatial analysis of where the water demand will be located. The report will include text explaining the reports reviewed, agencies interviewed and assumption made during the analysis. The report will also include GIS layers demonstrating the location of the water demand.

Scope for Meeting the Increased Demand

A conceptual level assessment of various alternatives and combination of alternatives will be considered to meet the water demand. We will evaluate instream flow water rights to evaluate the validity of previous studies that were conducted in the 1970's. We will also assess and discuss the potential requirements for impacting the endangered species and consultation procedures with the Fish and Wildlife Service.

These new demands on the basins will change the "call" regimes in the basin. No modeling is anticipated for this conceptual level assessment, but we will discuss conceptually how the "call" regime will change. The location of the potential projects will be documented in the GIS database.

Factors to Consider:

- Location of the demand
- Change in "Call" Regime
- Other affected water rights
- Existing conditional water rights on the Colorado River

- Source of supply (groundwater, direct flow rights and storage)
- Potential water right locations

Report and Documentation

The first step in this investigation will be to produce a detailed outline of the study as well as figures and tables to be produced.

The assumptions, analysis and conclusions will be documented in a report. Maps will be included showing the projected areas of water demand and population increases. The location for possible alternatives will be shown on the maps.

Attachment B-8
CWCB SB179 Grant Application

Colorado, White, and Yampa River Basins Energy Development Water Needs Assessment

Evaluation Criteria

Promoting Collaboration and Cooperation

a. & b: This energy demand and supply analysis is part of the White/Yampa and Colorado Basin Roundtable basin-wide water needs assessment for activities within its basins. It is also part of the State-wide SWSI effort to refine demand and supply data for the entire State of Colorado. It meets the multiple needs of both the White/Yampa basins as well as the Colorado River main-steam. The effort to draft a study scope has brought cooperation and collaboration between the White/Yampa and the Colorado River basin groups. The study, itself, will further cooperation as the project is managed by the basins. The study results will allow both basins to conduct a common review of area-wide federal environmental impact analysis for shale development (Such as BLM's programmatic environmental impact statement) and provide a "check" against which the Basins can judge the accuracy of other detailed, project-specific water supply studies. The study results will foster water efficiency by allowing affected interests to review demand and supply alternatives, proposed by public and private users, to avoid duplication, competition, and conflicting priorities.

Facilitating Water Activity Implementation

c. d. & h: There is great urgency to assess water needs stemming from energy development in Northwest and Central Colorado and there is no local source of funding to conduct such an effort. Without the grant it is not likely there will be any comprehensive assessment of needs and development and evaluation of alternatives to meet those needs.

Oil shale industry representatives have indicated they expect to make a decision within the next three to five years about whether to proceed with a commercial project. And they are planning to have needed permits in hand at that time so that they may proceed directly to a commercial project, which they expect to require about seven years to develop. In other words, we could see commercial production of oil shale within 10 to 12 years. Such a timeframe will also be required if we want to develop a water supply project that could help meet energy needs and/or offset the impacts from the energy development. We are therefore on the “critical path” for such a project and it is imperative to begin immediately with the requisite needs assessment.

e: Initial results are expected within 6-months to one-year.

f: The Colorado River District has an extensive history of successful water planning and development including Wolford Mountain Reservoir and Elkhead Reservoir. We have also lead and cooperated in a large number water planning efforts.

g: An extensive amount of in-kind contributions will be made for this study. Already the River District has undertaken extensive data gathering of previous studies, water rights, and possible water projects that has been or will be made available to the Study Consultant. We expect to work closely with the Study Consultant and help support their work.

Meeting Water Management Goals and Objectives and Identified Water Needs

i. & j: The Statewide Water Supply Initiative identified a potential for energy development but at the time it was not possible for SWSI to go into any detail about actual water needs. This study helps round-out SWSI's findings.

k: This study will not promote water conservation per se.

m: It is possible that the upshot of the assessment will be the identification of a water project that would utilize a portion of Colorado's remaining Colorado River compact apportionment.

n: In the course of evaluating alternatives to supply energy needs, reoperation and enlargement or rehabilitation of existing facilities will be fully explored and considered.

The Water Activity Addresses Issues of Statewide Value

o. p. & q: There is considerable local concern that energy development will take water away from existing agricultural uses and may unfavorably impact the environment of the White River and its tributaries. It is possible that the outcome of this effort will be the identification of a project or projects that not only help meet needs from the energy sector but also provide water for agriculture and environmental purposes. Such a project would also utilize a portion of Colorado's unused compact entitlement.

r.& t: The amount of economic potential represented by energy development is dramatic. In order to realize that potential it is necessary and important to plan for water needs. A $300,000 investment towards billions of dollars of economic activity is an appropriate State investment.

s: This study complements and helps round-out SWSI and is consistent with the CWCB's mission to conserve, develop, protect, and manage Colorado's water.