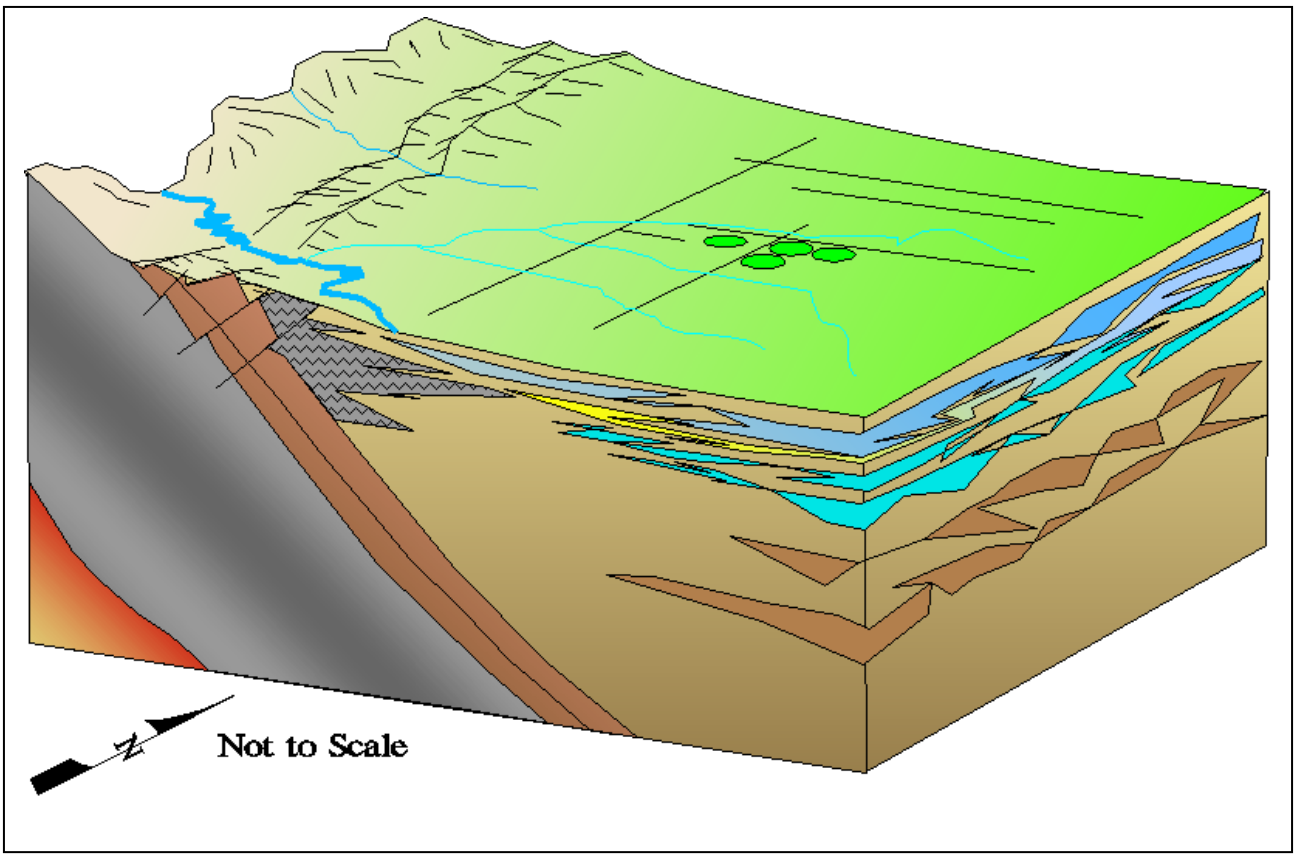
RIO GRANDE COUNTY
HYDROGEOLOGIC STUDY

Rio Grande Basin Roundtable



(COVER GRAPHIC: HRS WATER CONSULTANTS, INC.)

Water Supply Reserve Account

Grant Application

MAY 8, 2012

COLORADO WATER CONSERVATION BOARD

WATER SUPPLY RESERVE ACCOUNT APPLICATION FORM

RIO GRANDE COUNTY HYDROGEOLOGIC STUDY

Name of Water Activity/Project

RIO GRANDE COUNTY

Name of Applicant

RIO GRANDE BASIN

Approving Basin Roundtable(s)
(If multiple basins specify amounts in parentheses.)

Amount from Statewide Account:	0
Amount from Basin Account(s):	$99,564.00
Total WSRA Funds Requested:	$99,564.00

Application Content

Instructions

To receive funding from the Water Supply Reserve Account (WSRA), a proposed water activity must be approved by the local Basin Roundtable **AND** the Colorado Water Conservation Board (CWCB). The process for Basin Roundtable consideration and approval is outlined in materials in Appendix 1.

Once approved by the local Basin Roundtable, the applicant should submit this application **with a detailed statement of work including budget and schedule as Exhibit A** to CWCB staff by the application deadline.

WSRA applications are due with the roundtable letter of support 60 calendar days prior to the bi-monthly Board meeting at which it will be considered. Board meetings are held in January, March, May, July, September, and November. Meeting details, including scheduled dates, agendas, etc. are posted on the CWCB website at: http://cwcb.state.co.us Applications to the WSRA Basin Account are considered at every board meeting, while applications to the WSRA Statewide Account are only considered at the March and September board meetings.

When completing this application, the applicant should refer to the WSRA Criteria and Guidelines available at: http://cwcb.state.co.us/LoansGrants/water-supply-reserve-account-grants/Documents/WSRACriteriaGuidelines.pdf

The application, statement of work, budget, and schedule **must be submitted in electronic format** (Microsoft Word or text-enabled PDF are preferred) and can be emailed or mailed on a disk to:

Greg Johnson – WSRA Application
Colorado Water Conservation Board
1580 Logan Street, Suite 200
Denver, CO 80203
gregory.johnson@state.co.us

If you have questions or need additional assistance, please contact Greg Johnson at: 303-866-3441 x3249 or gregory.johnson@state.co.us.

Water Supply Reserve Account – Application Form
Revised December 2011

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

1.

Applicant Name(s):	**Rio Grande County**		
Mailing address:	**Board of County Commissioners** **Rio Grande County Courthouse** **925 6th Street Room 207** **Del Norte, CO 81132**		
Taxpayer ID#:	84-6000800		
Primary Contact:	Karla Shriver	Position/Title:	Commissioner
Email:	**Karla.shriver@gmail.com**		
Phone Numbers:	Cell: 719-850-5808	Office:	(719) 657-2744
Alternate Contact:	Suzanne Benton	Position/Title:	County Administrator
Email:	**sbenton@riograndecounty.org**		
Phone Numbers:	Cell: 719-850-1459	Office:	**719-657-2744**

2. Eligible entities for WSRA funds include the following. What type of entity is the Applicant?

X	Public (Government) – municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities and the local entity should be the grant recipient. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient.
	Public (Districts) – authorities, Title 32/special districts, (conservancy, conservation, and irrigation districts), and water activity enterprises.
	Private Incorporated – mutual ditch companies, homeowners associations, corporations.
	Private individuals, partnerships, and sole proprietors are eligible for funding from the Basin Accounts but not for funding from the Statewide Account.
	Non-governmental organizations – broadly defined as any organization that is not part of the government.

3. Provide a brief description of your organization

Governance: Rio Grande County (the County) is located in South-Central Colorado in the west-central portion of the San Luis Valley. With a population of 11,982, the County is governed by three County Commissioners who serve for four year terms, with no term limits. Currently serving are Karla Shriver, Doug Davie, and Dennis Murphy. The County covers 913 square miles, or 584,382 acres.

Economy: Historically, the County's economy has been heavily dependent upon agriculture, relying on various systems of irrigation. Principal cash crops are potatoes, wheat, and barley, with 7,700 acres of spring wheat; 1,300 acres of oats; and 33,400 acres of alfalfa and native hay. Smaller acreages produce other vegetable crops including spinach, cabbage, carrots, and lettuce. Today's economy is somewhat diversified, with almost one in five jobs in the education sector and 12.7% in the retail sector.

Vision: The Vision Statement of The Rio Grande County Plan Framework is as follows:
Rio Grande County will balance the protection of its agricultural, rural, residential, and outdoor recreational economy with the direction of new growth and development into appropriate areas.

Planning: Funded by an Energy Impact Assistance Grant in 2003 from the Department of Local Affairs, the County and the Towns of Monte Vista and Del Norte developed the 2004 Joint Master Plan, a broad public policy tool for guiding decisions concerning land use and future growth. The Plan divides the County into Stable areas, Opportunity Areas, Joint Consultation Areas, and Community Areas. Goals of the Plan Framework are:

1. To conserve natural resources and preserve the County's cultural heritage
2. To sustain the County's traditional agricultural economy
3. To support the tourism and outdoor recreation economy
4. To appropriately integrate new development into rural areas

Growth: 45,168 acres or about 8% of the County are designated as Opportunity Area. This is where rural growth is anticipated within the next 5-10 years. Future development is identified as occurring in the following sectors: agriculture, rural commercial and industrial, recreation and tourism, RV parks, airports, and single family residences and manufacture/mobile homes on a minimum of two acres. Mineral, mining, drilling, and other extractive practices are recognized but are not specifically included in the Plan Framework's Opportunity Areas.

The Challenge: Recent interest in oil and gas exploration and pending requests for drilling permits require due diligence. The studies proposed in this application will provide critical data on the hydrogeologic factors inherent in such activities, enabling the County to weigh potential economic benefits against possible negative effects upon its citizens. The granting of drilling permits requires a thorough understanding of the environmental, economic, and natural resource values which the people of Rio Grande County hold most dear.

4. If the Contracting Entity is different than the Applicant (Project Sponsor or Owner) please describe the Contracting Entity here.

   The same entity is both applicant and contracting entity.

5. Successful applicants will have to execute a contract with the CWCB prior to beginning work on the portion of the project funded by the WSRA grant. In order to expedite the contracting process the CWCB has established a standard contract with provisions the applicant must adhere to. A link to this standard contract is included in Appendix 3. Please review this contract and check the appropriate box.

   [x] The Applicant will be able to contract with the CWCB using the Standard Contract

   [ ] The Applicant has reviewed the standard contract and has some questions/issues/concerns. Please be aware that any deviation from the standard contract could result in a significant delay between grant approval and the funds being available.

6. The Tax Payer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect the applicant.

The County completed a "De-Brucing" process in 1999, so there are no TABOR issues involved.

Water Supply Reserve Account – Application Form
Revised December 2011

Part II. - Description of the Water Activity/Project

1. What is the primary purpose of this grant application? (Please check only one)

XX	Nonconsumptive (Environmental or Recreational)
	Agricultural
	Municipal/Industrial
	Needs Assessment
	Education
	Other Explain:

2. If you feel this project addresses multiple purposes please explain.

Developing hydrogeologic data so that the County is better prepared to

- Protect water quality in the County and beyond
- Eliminate human-caused risk to the confined and unconfined aquifers
- Preserve surface and underground water sources for consumptive and nonconsumptive uses
- Reduce the risk of environmental damage and pollution
- Safeguard the County's irrigation-dependent agricultural economy

3. Is this project primarily a study or implementation of a water activity/project? (Please check only one)

XX	Study		Implementation

4. To catalog measurable results achieved with WSRA funds can you provide any of the following numbers?

	New Storage Created (acre-feet)
	New Annual Water Supplies Developed, Consumptive or Nonconsumptive (acre-feet)
	Existing Storage Preserved or Enhanced (acre-feet)
	Length of Stream Restored or Protected (linear feet)
	Length of Pipe/Canal Built or Improved (linear feet)
	Efficiency Savings (acre-feet/year OR dollars/year – **circle one**)
	Area of Restored or Preserved Habitat (acres)
XX	Other -- Explain: Confined/unconfined aquifers of the San Luis Valley

5. To help us map WSRA projects please include a map (Exhibit B) and provide the general coordinates below:

Latitude: (various) Longitude: (various)

6. Please provide an overview/summary of the proposed water activity (no more than one page). Include a description of the overall water activity and specifically what the WSRA funding will be used for. A full **Statement of Work** with a detailed budget and schedule is required as **Exhibit A** of this application.

(next page)

The Project Goal: The goal of this study is to provide hydrogeological information in the vicinity of two currently proposed oil wells that will be useful to the Rio Grande County Commissioners and others. This information will assist the Commissioners and others in judging whether the health, safety and welfare of present and future residents of the County, in relationship to the water quality of ground-water aquifers, will be reasonably protected by proposed well construction plans for the proposed oil wells. The results from this study will also be useful in the consideration of possible future proposed oil or gas wells and furthering the general understanding of subsurface water resources in the San Luis Valley and the eastern San Juan Mountains.

Collaborative Context: On February 29, 2012, Governor Hickenlooper created a special Task Force to clarify and better coordinate the regulatory jurisdiction between state and local governments. The purpose is to create a collaborative process through which issues of local concern can be resolved without requiring litigation or new legislation, encouraging local governments to designate a Local Government Designee (LGD) and to participate in the Colorado Oil and Gas Conservation Commission's (COGCC's) rules on substantive issues listed in the Executive Order. In 2009, Rio Grande County, ahead of the curve, appointed its Land Use Administrator, Rose Vanderpool, as LGD. The County is committed to maintaining an open and collaborative relationship with COGCC, BLM, private parties, and all entities involved as it considers granting drilling permits for exploratory and extractive activities.

Current Challenge: Today the County is dealing with a renewed interest in oil and gas exploration and the potential for increased drilling activity within its boundaries. Three specific cases are of concern:

- Dan A. Hughes Company LP San Francisco Creek #1 proposed well location: Latitude 37.607890 Longitude -106.377440 -- The Dan A. Hughes application to drill permit (ADP) is pending approval at the state/federal level. This wildcat exploration is awaiting determination from the COGCC and the Bureau of Land Management (BLM). Rio Grande County will not accept a conditional use permit application until the operator has completed and complied with all state and federal requirements.
- First Liberty Energy Inc. Basin #1 proposed well location: Latitude 37.726122 Longitude -106.425207 -- The County has asked the COGCC to delay action/approval of The First Liberty Energy, Inc. Basin #1 well permit and any other pending permits, until a thorough hydrogeologic study is completed. (Exhibit C).
- The proposed location of the Basin #1 well is approximately 620 feet from the old Jynnifer well (there appears to be some discrepancy in the exact location of the Basin #1 proposed well). The County is concerned that the COGCC has not reclaimed this site in a timely manner and has not enforced its own regulations to protect the citizens of Rio Grande County. The old Jynnifer Well has never been reclaimed; the tanks need to be demobilized; and BTEX testing needs to be performed prior to the County considering any further drilling operations. The County is gravely concerned that for the past fifteen to twenty years there has been clearly visible seepage of some unknown substance onto the ground.

Use of Funds: This application requests $99,564.00 to (1) Review, identify and consolidate information from past geological and hydrogeological work that is applicable to the Del Norte/South Fork area. This will begin the process of describing geologic structures and the existence of water within these structures that is tributary to groundwater aquifers and surface streams that are utilized for domestic, municipal, commercial and agricultural purposes; (2) Expand these findings to include data developed and collected by the oil & gas industry during previous exploration and drilling efforts; (3) Collect, compile and evaluate data on water wells near the two proposed oil and gas well drilling locations, collecting construction information, water levels and existing water quality data; (4) Identify deep water wells in Rio Grande County and nearby areas that may be suitable for future study to better understand the regional hydrogeologic characteristics; 5) Interpret and make recommendations; and (6) Prepare and deliver a report to Rio Grande County, with data assembled in a GIS format, as appropriate, providing GIS Shapefiles.

Part III. – Threshold and Evaluation Criteria

1. Describe how the water activity meets these **Threshold Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines.)

   a) The water activity is consistent with Section 37-75-102 Colorado Revised Statutes.[1]

   By performing the hydrogeological tests proposed in this project, this water activity has no effect whatsoever on Colorado's current system of allocating water, nor does it in any manner affect the existing water rights adjudication system. The purpose of this study is rather to support those systems and those rights, providing valuable tools to the County which will enhance its ability to act impartially, fairly, and with full knowledge of available data as it determines whether to award drilling permits. Rather than causing any injury to vested water rights or decreed conditional water rights, this project provides a significant level of protection by increasing the County's oversight and vigilance in its efforts to protect water quality within the County and maintain the integrity of the San Luis Valley's confined and unconfined aquifers.

   b) The water activity underwent an evaluation and approval process and was approved by the Basin Roundtable (BRT) and the application includes a description of the results of the BRTs evaluation and approval of the activity. At a minimum, the description must include the level of agreement reached by the roundtable, including any minority opinion(s) if there was not general agreement for the activity. The description must also include reasons why general agreement was not reached (if it was not), including who opposed the activity and why they opposed it. Note- If this information is included in the letter from the roundtable chair simply reference that letter.

   This information is included in the letter from the Rio Grande Basin Roundtable Chair, which accompanies this proposal.

[1] 37-75-102. Water rights - protections. (1) It is the policy of the General Assembly that the current system of allocating water within Colorado shall not be superseded, abrogated, or otherwise impaired by this article. Nothing in this article shall be interpreted to repeal or in any manner amend the existing water rights adjudication system. The General Assembly affirms the state constitution's recognition of water rights as a private usufructuary property right, and this article is not intended to restrict the ability of the holder of a water right to use or to dispose of that water right in any manner permitted under Colorado law. (2) The General Assembly affirms the protections for contractual and property rights recognized by the contract and takings protections under the state constitution and related statutes. This article shall not be implemented in any way that would diminish, impair, or cause injury to any property or contractual right created by intergovernmental agreements, contracts, stipulations among parties to water cases, terms and conditions in water decrees, or any other similar document related to the allocation or use of water. This article shall not be construed to supersede, abrogate, or cause injury to vested water rights or decreed conditional water rights. The General Assembly affirms that this article does not impair, limit, or otherwise affect the rights of persons or entities to enter into agreements, contracts, or memoranda of understanding with other persons or entities relating to the appropriation, movement, or use of water under other provisions of law.

c) The water activity meets the provisions of Section 37-75-104(2), Colorado Revised Statutes.[2] The Basin Roundtable Chairs shall include in their approval letters for particular WSRA grant applications a description of how the water activity will assist in meeting the water supply needs identified in the basin roundtable's consumptive and/or non-consumptive needs assessments.

This information is included in the letter from the Rio Grande Basin Roundtable Chair.

d) Matching Requirement: For requests from the **Statewide Fund**, the applicants is required to demonstrate a **20 percent** (or greater) match of the request from the Statewide Account. Statewide requests must also include a minimum match of **5 percent** of the total grant amount from Basin Funds. Sources of matching funds include but are not limited to Basin Funds, in-kind services, funding from other sources, and/or direct cash match. Past expenditures directly related to the project may be considered as matching funds if the expenditures occurred within 9 months of the date the application was submitted to the CWCB. Please describe the source(s) of matching funds. (NOTE: These matching funds should also be reflected in your Detailed Budget in **Exhibit A** of this application)

This request is for funds from **the Rio Grande Basin WSRA Account.**

2. For Applications that include a request for funds from the **Statewide Account**, describe how the water activity/project meets all applicable **Evaluation Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines and repeated below.) Projects will be assessed on how well they meet the Evaluation Criteria. **Please attach additional pages as necessary.**

This request is for funds from **the Rio Grande Basin Roundtable fund** of the Water Supply Reserve Account, so there is no requirement to meet these Evaluation Criteria.

Evaluation Criteria – the following criteria will be utilized to further evaluate the merits of the water activity proposed for funding from the **Statewide Account**. In evaluation of proposed water activities, preference will be given to projects that meet one or more criteria from each of the three "tiers" or categories. Each "tier" is grouped in level of importance. For instance, projects that meet Tier 1 criteria will outweigh projects that only meet Tier 3 criteria. WSRA grant requests for projects that may qualify for loans through the CWCB loan program will receive preference in the Statewide Evaluation Criteria if the grant request is part of a CWCB loan/WSRA grant package. For these CWCB loan/WSRA grant packages, the applicant must have a CWCB loan/WSRA grant ratio of 1:1 or higher. Preference will be given to those with a higher loan/grant ratio.

[2] 37-75-104 (2)(c). Using data and information from the Statewide Water Supply Initiative and other appropriate sources and in cooperation with the on-going Statewide Water Supply Initiative, develop a basin-wide consumptive and nonconsumptive water supply needs assessment, conduct an analysis of available unappropriated waters within the basin, and propose projects or methods, both structural and nonstructural, for meeting those needs and utilizing those unappropriated waters where appropriate. Basin Roundtables shall actively seek the input and advice of affected local governments, water providers, and other interested stakeholders and persons in establishing its needs assessment, and shall propose projects or methods for meeting those needs. Recommendations from this assessment shall be forwarded to the Interbasin Compact Committee and other basin roundtables for analysis and consideration after the General Assembly has approved the Interbasin Compact Charter.

This request is for funds from **the Rio Grande Basin Roundtable fund** of the Water Supply Reserve Account, so there is no requirement to demonstrate a match.

However, please note that the scientists who will perform this study submit the following "Project Justification," attesting to the regional urgency, statewide significance, and scientific impact this of proposed project:

> **Project Justification:** Although there have been many studies of ground water in the San Luis Valley (SLV), some of which are still ongoing, and some studies have been done relating to the geology and oil and gas potential of the eastern San Juan mountains, few scientific investigations have sought to determine the existence and characteristics of potential ground water pathways between the deep strata targeted by oil and gas exploration, and the shallower strata that provide water to domestic wells in western Rio Grande County and that may provide ground water recharge to the confined aquifer layers of the western SLV. This study seeks to bring together and assess the adequacy of the existing studies, identify data gaps, and begin to develop new data to further understand the hydrogeologic relationships of this critical area.

[Application requirements for this section of the application form have been deleted, as they do not apply.]

Part IV. – Required Supporting Material

1. **Water Rights, Availability, and Sustainability** – This information is needed to assess the viability of the water project or activity. Please provide a description of the water supply source to be utilized, or the water body to be affected by the water activity. This should include a description of applicable water rights, and water rights issues, and the name/location of water bodies affected by the water activity.

This project will not involve acquisition or use of existing water rights. Information will be assembled and provided to local governments and state regulators that will improve resource management decisions, protect and enhance existing water rights, and ensure the continued availability of high quality water for existing and future domestic, municipal, and commercial uses.

The water bodies that may be most directly affected by the resource management decisions include San Francisco, Pinos and Old Woman Creeks, all of which are tributary to the Rio Grande in the vicinity of Del Norte, Colorado.

Further, and perhaps more directly, domestic, municipal, commercial and agriculture wells in these drainages and possibly extending easterly within the westerly portion of the San Luis Valley could be affected. Water in San Francisco and Pinos Creeks is diverted by very senior water rights that are used for irrigation. The Town of Del Norte residents obtain their water supply from municipal wells near the Rio Grande between the confluence of San Francisco Creek and Pinos Creek. Old Woman Creek is not commonly a live stream to its confluence with the Rio Grande, but the drainage does enter the Rio Grande in this vicinity.

Rio Grande Basin: Rio Grande County is within the Rio Grande Drainage Basin. The Rio Grande Drainage Basin drains approximately 8000 square miles in south central Colorado, and accounts for 7.2 percent of Colorado's surface area. A major tributary to the Rio Grande in Rio Grande County is the South Fork of the Rio Grande. The Alamosa River almost reaches the Rio Grande, but is not tributary.

Steams within the County: The County has the following streams with water rights within its boundaries: Alder Creek, Bear Creek, Beaver Creek, Bennett Creek, Burro Creek, Cross Creek, East Bellows Creek, East Fork Pinos Creek, Elk Creek, Embargo Creek, Kelly Creek, Lost Mine Creek, Middle Fork San Francisco Creek, Park Creek, Pinos Creek, Race Creek, Rock Creek, San Francisco Creek, Trout Creek, West Alder Creek, West Fork Pinos Creek, and West Fork San Francisco Creek.

Irrigation: Rio Grande County has been irrigated with a system of ditches and canals since 1866. The Rio Grande Canal was constructed in 1881 north of The Rio Grande, followed by the Monte Vista Canal south of the river. Additional irrigation is handled by the Empire, Farmers Union, Travelers, Centennial and San Luis Valley canals, and the Prairie Ditch. Groundwater is generally obtainable on the valley floor, but its availability varies in the mountain area. The San Luis Valley Water Conservancy District transports water through a ditch over the Continental Divide to a storage reservoir to cover deficiencies from well withdrawal in the Rio Grande drainage.

Water Quality: A portion of the Rio Grande and its tributaries above Del Norte are gold medal fisheries. The County intends to keep it that way. Water quality of the Alamosa River, however, has been significantly impacted by mining activities in the 1980's by Summitville Consolidated Mining Company, Inc., which ran a large-scale surface gold mining operation using the heap-leach process. The mining, milling, and recovery processes greatly increased the exposure of pyrite to oxygen and water, causing increased acidity, and the heap leach contributed to dissolved metals which eventually reached the headwaters of the Alamosa River. Much of the aquatic life and downstream irrigated farmlands were severely impacted, resulting in the EPA declaring Summitville Mine a Superfund site. Thanks to the EPA, CDPHE and persistent hard work of Alamosa Riverkeeper, water quality in the Alamosa now supports a fishery at Terrace Reservoir and CWCB funding has been secured to help create an Alamosa instream flow.

Floodplain: The Environmental Conditions map (Exhibit B) shows the areas of the County lying within Federal Emergency Management Agency floodplain areas. The areas located within the 100-year floodplain present development constraints, as flooding is likely in these areas.

Stream Buffer Ordinance: One of the planning tools of the Rio Grande Headwaters Restoration Project is a stream buffer ordinance for Rio Grande County. The draft ordinance proposes a setback and review process for uses and activities within a buffer area adjacent to the river.

Wetlands: As indicated by National Wetland Inventory mapping shown on the Environmental Conditions map, Rio Grande County has scattered areas of wetlands, predominantly along the Rio Grande corridor and south of Monte Vista. These wetlands are an important environmental resource for Rio Grande County. They act as a sponge to absorb floodwaters, as a filter to clean water, provide habitat for wildlife and attract a number of bird species. The annual Monte Vista Crane Festival and other bird watching activities contribute significantly to the tourism economy.

River Corridor Areas: The County is explicit in its policies to protect the natural character of the Rio Grande and the river corridors within its boundaries. The Framework Plan identifies 17,120 acres within the Rio Grande floodplain as "River Corridor Areas." The intent of this designation is "to preserve a valuable environmental resource, provide for appropriate residential development and recreational opportunities, and ensure public safety." This study is motivated not only by the letter of the County's Framework Plan policies, but also by the spirit of its citizens, who so carefully crafted them.

2. Please provide a brief narrative of any related studies or permitting issues.

A primary focus of this water activity is to collect, compile, and evaluate the body of available hydrogeologic knowledge, and to develop new data which will help to inform and guide the County as it responds to requests for drilling permits.

Related Studies: Following is a preliminary bibliographical reference to related studies. Other sources may be added as investigations continue.

Brendle, D., 2002, Geophysical Logging to Determine Construction, Contributing Zones, and Appropriate Use of Water Levels Measured In Confined-Aquifer Network Wells, San Luis Valley, Colorado, 1998-2000. USGS WRI-02-4058. U.S. Geological Survey in cooperation with the CWCB and CDWR. 62p.

Brister, B.S., 1990, Tertiary sedimentation and tectonics: San Juan Sag-San Luis Basin region, Colorado and New Mexico: unpublished Ph.D. thesis, New Mexico Institute of Mining and Technology, Socorro, 267 p.

Brister, B.S., and Chapin, C.E., 1994, Sedimentation and tectonics of the Laramide San Juan Sag, southwestern Colorado: The Mountain Geologist, v. 31, p. 2-18.

Brister, B.S., and Gries, R.R., 1994, Tertiary stratigraphy and tectonic development of the Alamosa Basin (northern San Luis Basin), Rio Grande Rift, south-central Colorado, *in* Keller, G.R., and Cather, S.M., eds., Basins of the Rio Grande Rift; Structure, stratigraphy, and tectonic setting: Geological Society of America Special Paper 291, p. 39-58.

Burroughs, R.L., 1981, A summary of the geology of the San Luis Basin, Colorado-New Mexico, with emphasis on the geothermal potential for the Monte Vista Graben: Colorado Geological Survey, Special Paper 17, 30 p.

Gries, R.R., 1985, San Juan Sag: Cretaceous rocks in a volcanic-covered basin, south central Colorado: The Mountain Geologist, v. 22, no. 4, p. 167-179.

Gries, R.R., 1989, San Juan Sag; Oil and gas exploration in a newly discovered basin beneath the San Juan volcanic field, *in* Lorenz, J.C., and Lucas, S.G., eds., Energy frontiers in the Rockies: Albuquerque Geological Society, New Mexico, p. 69-78.

Gries, R.R., and Brister, B.S., 1989, New interpretations of seismic lines in the San Luis Valley, south-central Colorado, *in* Harmon, E.J., ed., Water in the valley: Colorado Ground-Water Association, 8th annual field trip, p. 241-254.

HRS Water Consultants, 1987, San Luis Valley confined aquifer study, phase one, final report: unpublished report prepared for the Colorado Water Resources & Power Development Authority, Denver, Colorado, by HRS Water Consultants, Lakewood, Colorado

HRS Water Consultants, Inc., 1999, Assessment of Ground Water Recharge from the San Juan Mountains to the San Luis Valley. Unpublished consultants' report prepared for Davis Engineering and the Rio Grande Water Conservation District.

HRS Water Consultants, 2002, RGDSS Task 32 Final Report: Hydrogeologic Mapping and Data Assessment of the San Luis Valley. Unpublished consultants' report prepared for the Colorado Water Conservation Board and the Colorado Division of Water Resources.

Huntley, D., 1976, Ground water recharge to the aquifers of northern San Luis Valley, Colorado—A remote sensing investigation: unpublished Ph.D. thesis, Colorado School of Mines, Golden, 240 p.

Powell, W.J., 1958, Ground-water resources of the San Luis Valley, Colorado: U.S. Geological Survey, Water-Supply Paper 1379, 284 p.

Siebenthal, C.E., 1910, Geology and water resources of the San Luis Valley, Colorado: U.S. Geological Survey, Water-Supply Paper 240, 128 p.

Permitting Issues -- Federal: The Obama administration recently issued a proposed rule governing hydraulic fracturing for oil and gas on public lands that will for the first time require disclosure of the chemicals used in the process. However, in a significant concession to the oil industry, companies will have to reveal the composition of fluids only **after they have completed drilling, not before.** In this County people do not need a long memory to recall the Summitville disaster, so it is disappointing to see that the previous requirement, which would have required disclosure of the chemicals 30 days before a well could be started, have been removed by this proposed new rule. (http://www.doi.gov/news/pressreleases/loader.cfm?csModule=security/getfile&pageid=293916.)

Permitting Issues – State: In 2004, the Rio Grande Water Conservation District (RGWCD) supported legislation (SB04-222) that granted the State Engineer wide discretion to permit the continued use of underground water consistent with preventing material injury to senior surface water rights and ensuring sustainability of the unique aquifer systems in the San Luis Valley. This effort, undertaken by RGWCD as well as other water interests in the San Luis Valley, was an attempt to reduce the negative economic impacts experienced by other basins as the result of strict priority administration of groundwater by the state.

Permitting Issues – San Luis Valley: The bill became law, as section 37-92-501. It prevents the State Engineer from curtailing groundwater withdrawals so long as those withdrawals are (1) included in a groundwater management subdistrict and (2) are made pursuant to the subdistricts' properly adopted and approved groundwater management plan.

Permitting Issues – Rio Grande County: Exhibit C contains important documentation, copies of COGCC forms, and communications between Rio Grande County's LGD and the COGCC. Frequent references are made to the Rio Grande County Oil and Gas Regulations, calling attention to numerous errors, omissions, and the apparent laxity or refusal of the COGCC to enforce its own regulations. Exhibit C includes the LGD's summary of recommendations to the COGCC. In addition, LGD Rose Vanderpool states that "A comprehensive study of the Conejos Formation/aquifer and all water conduits in the San Luis Valley should be done before any new drilling occurs in Rio Grande County. The San Luis Valley is unique, and should be acknowledged in setting high standard practices to protect the citizens who live here." She continues, "In a rural community the impact of this type of industry is very impeding to the ways of life here in the San Luis Valley. [For t]he wells that serve the residents near the proposed [drilling sites] THE WATER NEEDS TO BE PROTECTED!" She calls for the COGCC to support Rio Grande County Regulations and to enforce the strictest regulations to safeguard the health and safety of the County and the Rio Grande Basin as a whole. A careful review of the material in Exhibit C is encouraged.

The Development of Subdistricts: The County supports the development of subdistricts in the San Luis Valley, as they help to protect senior surface water rights and to ensure the viability of the Valley's aquifer systems – unique in the world as vast high-altitude underground reservoirs. They work to preserve the Valley's local economy, which is highly dependent upon sophisticated modern irrigating technologies, while at the same time protecting senior vested rights and sustaining the aquifer.

Sustainability: Section 37-92-501 allows the State Engineer to recognize this subdistrict approach and specifically requires three critical provisions. Any water management plan adopted by a subdistrict must ensure that: (1) unconfined and confined aquifers shall be regulated so as to maintain a sustainable water supply in each system; (2) injurious stream depletions must be replaced in accordance with the rules adopted by the State Engineer, and the state shall not permit the expanded use of groundwater; (3) the plans shall not unreasonably interfere with the state's ability to fulfill its obligation under the Rio Grande Compact.

Jurisdiction: The Water Court also retains jurisdiction over any approved groundwater management plan to ensure that the plan is operated in accordance with its decree and that injury is prevented. All of these criteria honor, maintain, support and sustain Colorado's prior appropriation doctrine.

Drought, Scarcity, and the Valley's Water Crisis: The San Luis Valley's unconfined aquifer this year sank to its lowest level since water officials began monitoring it in 1976. High commodity prices and a below-average snowpack prevented the normal recharge of the shallower of the Valley's two major groundwater bodies. They have not bounced back, as they usually do. The Valley is in a deep water crisis.

3. Statement of Work, Detailed Budget, and Project Schedule

The statement of work will form the basis for the contract between the Applicant and the State of Colorado. In short, the Applicant is agreeing to undertake the work for the compensation outlined in the statement of work and budget, and in return, the State of Colorado is receiving the deliverables/products specified. **Please note that costs incurred prior to execution of a contract or purchase order are not subject to reimbursement**. All WSRA funds are disbursed on a reimbursement basis after review invoices and appropriate backup material.

Please provide a detailed statement of work using the template in Exhibit A. Additional sections or modifications may be included as necessary. Please define all acronyms and include page numbers.

(Exhibits A, B, and C follow the signature page)

REPORTING AND FINAL DELIVERABLE

Reporting: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of the executed contract. The progress report shall describe the completion or partial completion of the tasks identified in the statement of work including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Deliverable: At completion of the project, the applicant shall provide the CWCB a final report that summarizes the project and documents how the project was completed. This report may contain photographs, summaries of meetings and engineering reports/designs.

PAYMENT

Payment will be made based on actual expenditures and invoicing by the applicant. Invoices from any other entity (i.e. subcontractors) cannot be processed by the State. The request for payment must include a description of the work accomplished by major task, and estimate of the percent completion for individual tasks and the entire water activity in relation to the percentage of budget spent, identification of any major issues and proposed or implemented corrective actions. The last 5 percent of the entire water activity budget will be withheld until final project/water activity documentation is completed. All products, data and information developed as a result of this grant must be provided to the CWCB in hard copy and electronic format as part of the project documentation. This information will in turn be made widely available to Basin Roundtables and the general public and help promote the development of a common technical platform.

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

Signature of Applicant:

Print Applicant's Name:

Project Title:

Return an electronic version (hardcopy may also be submitted) of this application to:

Greg Johnson – WSRA Application
Colorado Water Conservation Board
1580 Logan Street, Suite 200
Denver, CO 80203
gregory.johnson@state.co.us

Exhibit A

Statement of Work

WATER ACTIVITY NAME – RIO GRANDE COUNTY HYDROGEOLOGIC STUDY

GRANT RECIPIENT – RIO GRANDE COUNTY

FUNDING SOURCE – RIO GRANDE BASIN ROUNDTABLE – WSRA ACCOUNT

INTRODUCTION AND BACKGROUND
Provide a brief description of the project. (Please limit to **no more than 200 words**; this will be used to inform reviewers and the public about your proposal)

Rio Grande County is experiencing a renewed interest in oil and gas exploration and the potential for multiple future applications for drilling permits. The goal of this study is to provide hydrogeological information in the vicinity of two currently proposed oil wells that will be useful to the Rio Grande County Commissioners and others. This information will assist the Commissioners and others in judging whether the health, safety and welfare of present and future residents of the County, in relationship to the water quality of ground-water aquifers, will be reasonably protected by proposed well construction plans for the proposed oil wells. The results from this study will also be useful in the consideration of possible future proposed oil or gas wells and furthering the general understanding of subsurface water resources in the San Luis Valley and the eastern San Juan Mountains.

OBJECTIVES
List the objectives of the project

Although there have been many studies of ground water in the San Luis Valley (SLV), some of which are still ongoing, and some studies have been done relating to the geology and oil and gas potential of the eastern San Juan mountains, few scientific investigations have sought to determine the existence and characteristics of potential ground water pathways between the deep strata targeted by oil and gas exploration, and the shallower strata that provide water to domestic wells in western Rio Grande County and that may provide ground water recharge to the confined aquifer layers of the western SLV. This study seeks to bring together and assess the adequacy of the existing studies, identify data gaps, and begin to develop new data to further understand the hydrogeologic relationships of this critical area.

Task 1-Review of Past Work

The objective of this task is to review, identify and consolidate information from past geological and hydrogeological work that is applicable to the Del Norte/South Fork area. This will begin the process of describing geologic structures and the occurrence and movement of ground water within these structures that is tributary to groundwater aquifers and surface streams that are used for domestic, municipal, commercial and agricultural purposes in the eastern San Juan region and the confined aquifer layers of the San Luis Valley. Following is a list of past work that will be incorporated into this task:

1.1 1987 CWRPDA HRS Deep Aquifer Study, including a specific study of an oil and gas exploratory well in San Francisco Creek watershed (HRS, 1987).
1.2 David Huntley's Thesis on ground water recharge to the Closed Basin of the San Luis Valley.
1.3 Dr. Alan Mayo's Water Quality Report & Data on confined aquifer characteristics by environmental isotope studies.
1.4 Robbie Gries' Papers on the geology and petroleum potential, San Juan Sag / eastern San Juan region.
1.5 Brian Brister's Thesis and Papers on the geology of the San Juan Sag and San Luis Basin.
1.6 RGDSS Information, including Task 32 final report (aquifer layer tops, bases, thicknesses); confined aquifer piezometer installations and aquifer tests near Monte Vista and the MV NWR.
1.7 HRS study for Davis Engineering and RGWCD on eastern San Juan ground water recharge to the SLV (2000)
1.8 Past gain and loss studies of the flow in San Francisco Creek.

1.9 Existing water quality data of surface water in the stream.

1.10 USGS data regarding deep aquifer production depths (Brendle, D., 2002)

1.11 Recent (2011) USGS study on ground water recharge in eastern San Juan Mountains

1.12 Others.

Task 2 - Collect, compile and evaluate existing oil & gas data

This task is an expansion of the previous task to include data that has been developed and collected by the oil & gas industry during their previous exploration and drilling efforts. Approximately 15 oil or gas wells have been drilled in and near Rio Grande County in the past, and several seismic lines have been run across parts of the County. 15.

2.1 Collect and compile data from Colorado Oil and Gas Commission, and Denver Earth Resources Library if needed.

2.2 Interpret geophysical logs from oil and gas wells. Pick formation tops. Evaluate logs for aquifers in the Conejos Formation and perhaps underlying formations. Estimate TDS of water within the formations of interest. Identify potential zones of fracture permeability. If possible estimate porosity and permeability.

2.3 Collect and compile water quality data and formation permeability from drill stem tests conducted in the oil and gas wells.

2.4 Determine availability of seismic data and review interpretations.

Task 3 - Collect, compile and evaluate data on water wells near the two proposed oil & gas well drilling locations.

This task will focus on locating existing water wells that are near the currently proposed drilling sites and collecting construction information, water levels and existing water quality from the wells.

3.1 Location of wells.

3.2. Depth of wells.

3.3. Completion information, including cemented (grouted) depth intervals and slotted or screened intervals.

3.4. Static and final pumping water levels and pumping rates reported by driller.
Collect U.S. Geological Survey data and Colorado DWR / CWCB data on water quality
Note any quality-related characteristics of the water noted by driller or well owner, including elevated temperature, turbidity, color, odor, or taste

3.5. Sample approximately 40 selected wells for water quality parameters such as major and minor ions, alkalinity, SAR, BTEX, dissolved gases, and perhaps total organic carbon and total petroleum hydrocarbons.

3.6. Measure field parameters of selected wells, such as conductivity, total dissolved solids, pH, and temperature.

3.7. Measure water levels in sampled wells where feasible.

Task 4 - Collect, compile and evaluate data on deeper water wells in and near Rio Grande County.

This task will be an expansion of the previous task focusing on selected deeper water wells located beyond the proposed oil and gas exploratory drilling sites. The purpose of this task is to identify deep water wells in the eastern San Juan mountain / foothills region of Rio Grande County and nearby areas that may be suitable for future study to better understand the regional hydrogeologic characteristics.

4.1 Location of wells.

4.2 Depth of wells.

4.3 Completion information. Top & bottom of screened interval and cemented (grouted) depth intervals. Indicators of groundwater movement, including reported depth zones of water production and non-production; static and pumping water level, pumping rate, and the presence of cascading water in the well

4.4 Water levels reported by drillers, Make field measurements if budget and well conditions permit.

4.5 Compile existing water quality data from previously collected samples, and/or collect and analyze samples from these deeper wells if budget permits.

4.6 Evaluation of these wells for future sampling and water level measurements.

4.7 Change in head

Task 5 - Data Interpretation and Recommendations

5.1. Once the study review and data collection tasks are well under way and most of the studies and data are in hand, the investigation team will interpret the data to assess several characteristics:

- Potential subsurface pathways of ground water movement between the deeper strata targeted by oil and gas exploration, and the shallower strata (largely within the Conejos Formation) that comprise aquifers to domestic wells in the mountains and foothills areas of Rio Grande County.

- The existing water quality of a representative number of water wells in the potential oil and gas exploration areas.

- Estimates of the directions of movement, and (if the data allow) estimates of the rate of movement of ground water from the oil and gas exploration areas to the confined aquifer of the western San Luis Valley.

- Mapping, to the extent the data allow, will provide an estimate of likely future oil and gas exploration areas, and the potential vulnerability of shallower strata to ground water contamination.

5.2 From these interpretations, the study team will develop a set of recommendations to the Commissioners of Rio Grande County. The study teams' recommendations will become part of the final report document of this study. Based on our present knowledge, we envision the recommendations to include the following:

- Recommended oil and gas well drilling / completion /testing precautionary measures (if judged to be needed) to protect against contamination of surface water and near-surface (i.e. alluvial) ground water within the immediate watershed.
- Recommended longer-term water quality baseline studies to establish a fund of information against which to compare post-drilling water quality.
- Recommended longer-term hydrogeologic investigations designed to fill significant gaps in the knowledge base about ground water occurrence and movement of significance to Rio Grande County.
- Recommended measurements, water quality sampling, or other short-term activities to be undertaken by the County, by individual well owners, or by others, before, during, and after exploratory oil and gas drilling.
- Other recommendations may be included depending upon the findings of the previous study tasks and the severity of the data gaps that are encountered.

Task 6 – Final Product

This task will assemble and present collected data in a report format including charts, maps, geologic cross sections and tabulations. The final report will be produced in hard copy and in digital format, and data will be entered into a GIS.

6.1.1 Prepare and deliver report.
Prepare a report that includes data collected in each of the previous tasks and provides the reader with explanations, interpretations and significance of the information included.

6.1.2 Prepare at least one east-west geologic cross section extending across Rio Grande County and if sufficient information is available prepare one or more north-south cross sections. Hydrogeological information will be incorporated where appropriate.

6.1.3. Prepare structure contour maps showing the top of the relevant formations.

6.1.4. Prepare isopach (thickness) maps for the relevant geologic formations.

6.2.0 Prepare GIS shapefiles, spreadsheet and database formats as appropriate.

6.2.1. Prepare one or more maps that depict interpreted ground water travel paths relevant to protection of ground water resources.

6.2.2. Prepare one or more maps that depict any localities, watersheds, or aquifers that the study team concludes are particularly vulnerable to contamination due to oil and gas exploration or production. Include written recommendations (developed in Task 5) as part of the final report.

6.3.0. Provide printed and digital copies of all information to County.

6.4.0. Create a PowerPoint program and present to the County and the public the findings and recommendations of the study team, answering questions.

REPORTING AND FINAL DELIVERABLE

Reporting: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of the executed contract. The progress report shall describe the completion or partial completion of the tasks identified in the statement of work including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Deliverable: At completion of the project, the applicant shall provide the CWCB a final report that summarizes the project and documents how the project was completed. This report may contain photographs, summaries of meetings and engineering reports/designs.

BUDGET

Provide a detailed budget by task including number of hours and rates for labor and unit costs for other direct costs (i.e. mileage, $/unit of material for construction, etc.). A detailed and perfectly balanced budget that shows all costs is required for the State's contracting and purchase order processes. Sample budget tables are provided below. Please note that these budget tables are examples and will need to be adapted to fit each individual application. Tasks should correspond to the tasks described above.

(next page)

Rio Grande County Hydrogeologic Study Budget

TASK	Description	Labor												Expenses						TOTAL
		Bob Kirkham		Allen Davey		Eric Harmon		"tech"		GIS		petrophysics		sample analysis		Travel		equipment & misc		
		Rate =	$110	Rate =	$130	Rate =	$155	Rate =	$65	Rate =	$85	Rate =	$200	Rate =	$500	Rate =	$0.70	Rate is Lump Sum		
		Hrs.	Extension	Hrs.	Extension	Hrs.	Extension	Hrs.	Extension	Hrs.	Extension	Hrs.	Extension	Numbe	Extension	Miles	Extension	Type	Extension	
1	Review past work	16	$1,760	16	$2,080	8	$1,240		$0		$0		$0		$0		$0			
2.1	collect O&G data	16	$1,760		$0		$0		$0		$0		$0		$0		$0			
2.2	Interpret logs	24	$2,640		$0	4	$620		$0		$0	40	$8,000		$0		$0			
2.3	DSTs	12	$1,320		$0	4	$620		$0		$0		$0		$0		$0			
2.4	avail. of seismic	8	$880		$0		$0		$0		$0		$0		$0		$0			
3.1	H_2O well location	0	$0	4	$520		$0	2	$170		$0		$0		$0		$0			
3.2	depths	0	$0	2	$260		$0	2	$170		$0		$0		$0		$0			
3.3	completion info	0	$0	2	$260		$0	2	$170		$0		$0		$0		$0			
3.4	water levels	0	$0	2	$260		$0	2	$170		$0		$0		$0		$0			
3.5	sample wells	60	$6,600		$0		$0	60	$5,100		$0		$0	40	$20,000	1000	$700	misc equip	$150	
3.6	field parameters	20	$2,200		$0		$0	20	$1,700		$0		$0		$0		$0	multimeter	$500	
3.7	measure W.L.	0	$0		$0		$0		$0		$0		$0		$0		$0			
4.1	location deep wells	0	$0	4	$520	4	$620	4	$340		$0		$0		$0		$0			
4.2	depths	0	$0	2	$260		$0	2	$170		$0		$0		$0		$0			
4.3	completion info	0	$0	2	$260		$0	2	$170		$0		$0		$0		$0			
4.4	water levels	0	$0	2	$260		$0	2	$170		$0		$0		$0		$0			
4.5	H2O quality data	0	$0		$0		$0		$0		$0		$0		$0		$0			
4.6	evaluation	8	$880		$0	8	$1,240		$0		$0		$0		$0		$0			
4.7	change in head	12	$1,320		$0	4	$620		$0		$0		$0		$0		$0			
5.1	Interpret data		$0		$0	24	$3,720		$0		$0		$0		$0		$0			
5.2	Prepare recos.	12	$1,320	8	$1,040	8	$1,240		$0		$0		$0		$0		$0			
6.1	prepare report	60	$6,600	30	$3,900	32	$4,960		$0		$0		$0		$0		$0	Printing	$300	
6.2	GIS shapefiles	10	$1,100	2	$260		$0		$0	48	$4,080		$0		$0		$0			
6.3	printing/digital files	8	$880	2	$260		$0		$0	8	$680		$0		$0		$0			
6.4	PowerPoint	12	$1,320	4	$520	4	$620		$0		$0		$0		$0	120	$84			
subtotal		278	$30,580	82	$10,660	100	$15,500	98	$8,330	56	$4,760	40	$8,000	40	$20,000	1120	$784		$950	
																			Total =	$99,564

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SCHEDULE

Provide a project schedule including key milestones for each task and the completion dates or time period from the Notice to Proceed (NTP). This dating method allows flexibility in the event of potential delays from the procurement process. Sample schedules are provided below. Please note that these schedules are examples and will need to be adapted to fit each individual application.

After NTP / TASK	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11	WEEK 12
1 Review of Past Work	X	X										
2 Existing Oil/Gas Data		X	X	X								
3 Water Wells Near Sites		X	X	X	X	X	X					
4 Deeper Wells					X	X	X					
5 Interpret Data				X	X	X	X	X				
6 Final Product/Study									X	X	X	X
Final Report to CWCB											X	X

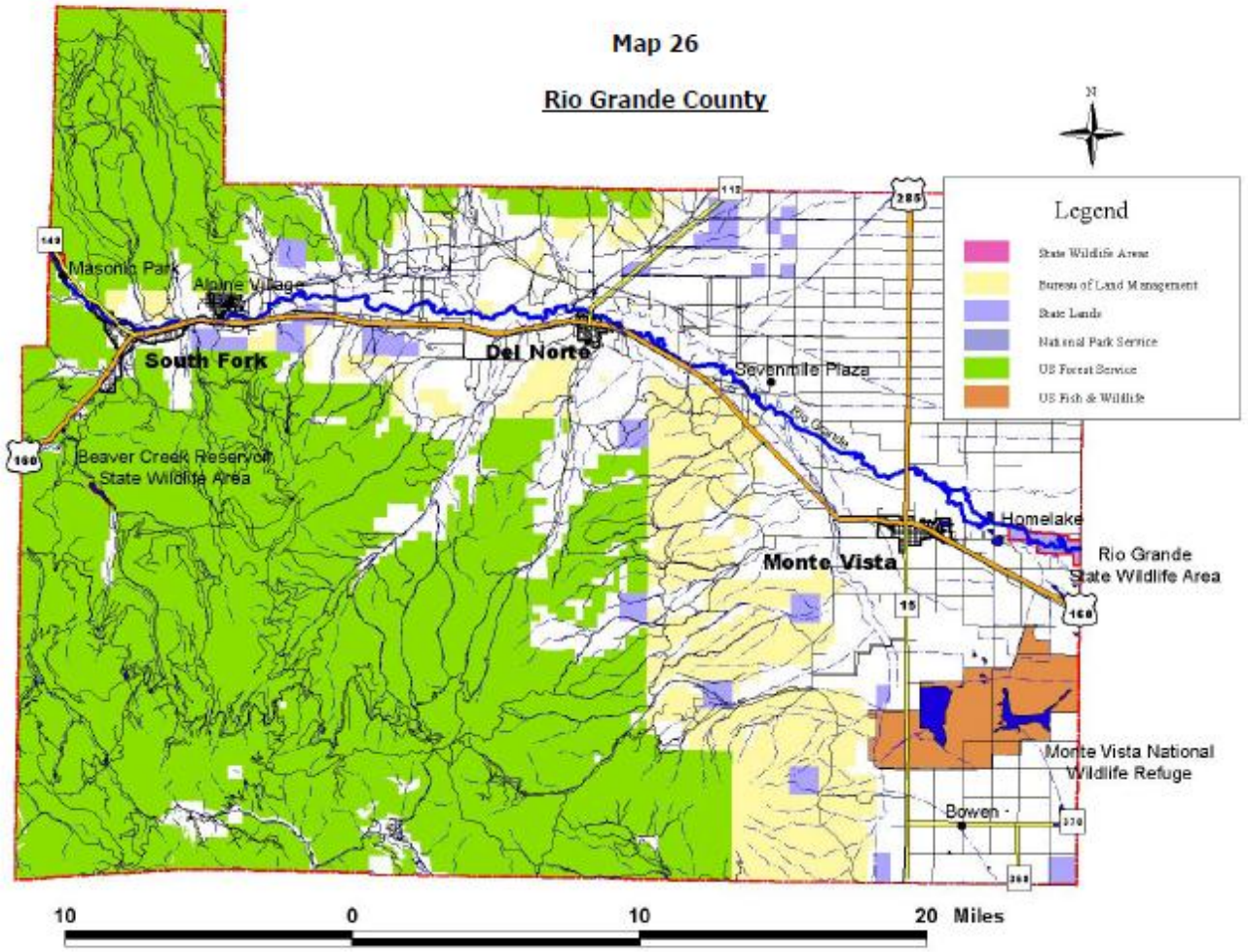
Exhibit B

PROJECT MAP and COUNTY MAPS

1. Project Map
2. Rio Grande County Environmental Conditions Map
3. Rio Grande County Existing Land Use Patterns
4. Rio Grande County Plan Framework
5. Del Norte Conejos Formation (excerpts from text & map HRS Water Consultants, 1987, San Luis Valley confined aquifer study, phase one, final report: unpublished report prepared for the Colorado Water Resources & Power Development Authority, Denver, Colorado, by HRS Water Consultants, Lakewood, Colorado

Map 26

Rio Grande County



Source: San Luis Valley GIS/GPS Authority.

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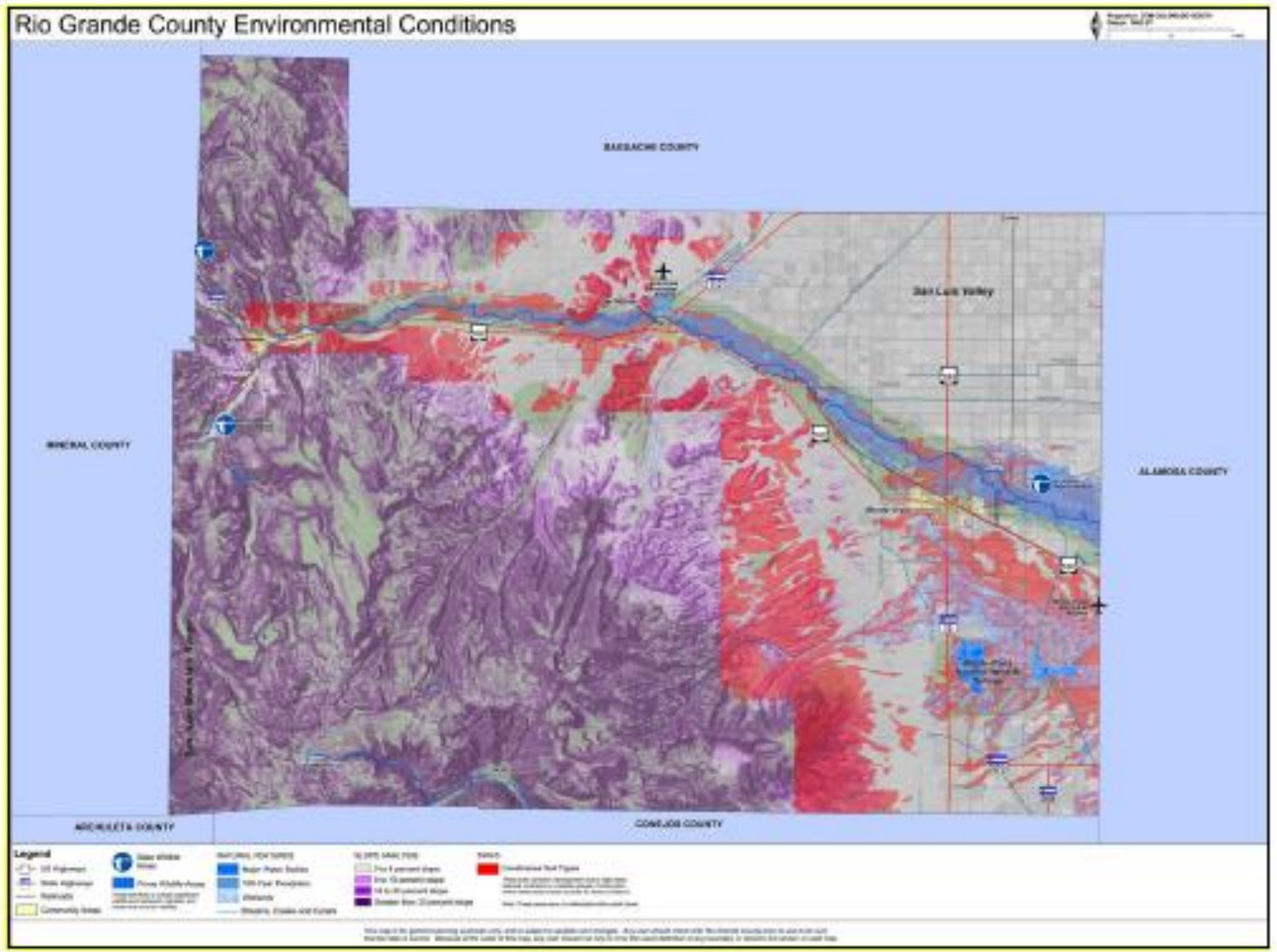

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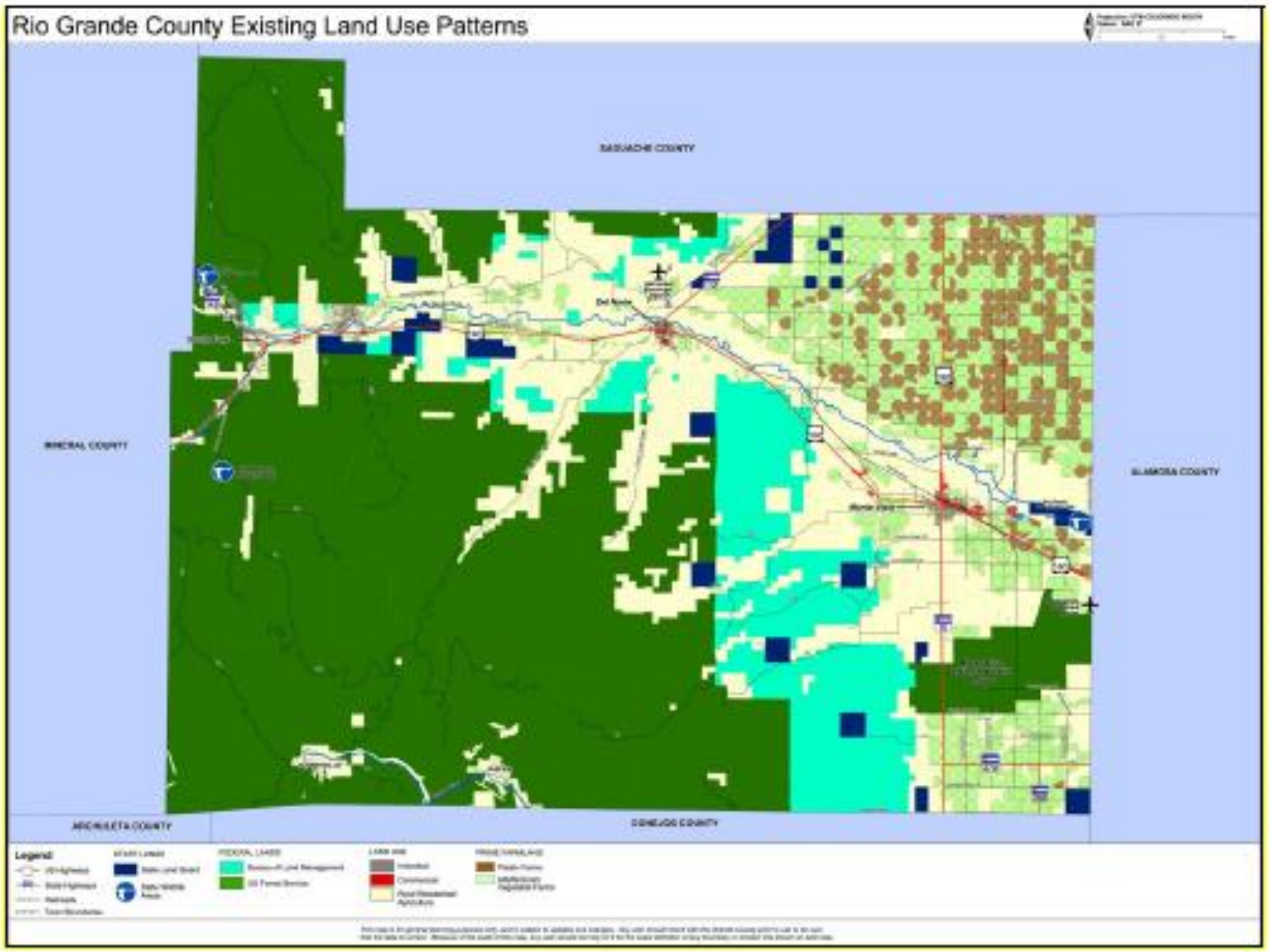

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In the Baca Graben area, which does not have the long basinward stratigraphic continuity to sources of recharge that the Monte Vista Graben has, the primary mechanism for vertical ground water movement in the deep confined aquifer is deep-seated faulting which has enhanced vertical hydraulic conductivity, both for recharge near the mountain front, and apparently also for discharge further away from the mountain front.

The driving force which allows these water-movement mechanisms to take place is the high piezometric head within the the major recharge areas located in the relatively high-elevation eastern San Juan mountains and Sangre de Cristo mountains, compared to the elevation of the deep confined aquifer hydrostratigraphic units beneath the Valley.

The same driving mechanism for ground water flow is thought to take place from the Sangre de Cristo mountains to the east into the Valley as occurs from the San Juans to the west, but to a much lesser extent due to a smaller recharge area and extensive discontinuities in the bedding planes through which ground water moves. As discussed above, most downward movement into HSU-3 from the Sangre de Cristos appears to occur within a relatively narrow fault zone, rather than through bedding planes as is more commonly the case in the San Juans (Huntley, 1976).

4.4 GROUND WATER RECHARGE TO THE DEEP CONFINED AQUIFERS

4.4.1 Areas of Recharge

In the most general volumetric sense, recharge to the deep confined aquifers of the San Luis Valley appears to occur almost exclusively outside of the Valley floor, near or at the mountain fronts of the ranges which border the Valley on three sides. Interpretation of geologic maps (Figures 2.1 and 3.11) and satellite imagery of the Valley (Figure 3.12) indicates a nearly-ideal combination for ground-water recharge existing in certain areas of the San Juan foothills and mountains: jointed and fractured volcanic rock, stratigraphic continuity downdip into the Valley, and heavy snowpack.

Landsat Thematic Mapper (TM) satellite images of the Valley and the

surrounding mountains were used to identify zones of extensive rock fracture in hard, structurally-competent volcanic rocks. Such areas have enhanced secondary permeability to the flow of ground water. If these areas lie in a zone of relatively heavy average precipitation (primarily snowpack), then there is a high probability of rapid and prolonged ground water recharge. Three such areas have been identified in the San Juan Mountains which are believed to be of primary importance to ground water recharge to the deep confined aquifers (particularly HSU-3) of the Valley.

The most easily apparent of these on the satellite imagery of the study area is identified as feature 7 on Figure 3.12. This area appears as a localized zone of nearly orthogonal-patterned stream downcutting into the fractures and jointing of the Conejos Formation volcanics, as well as the welded tuffs (particularly thick in this area) of the Carpenter Ridge and Fish Canyon Formations. The majority of this feature, which includes headwaters of Saguache Creek and Carnero Creek lies at an average elevation of 9000 to 10,500 feet, and receives substantial precipitation. Stratigraphic continuity of these formations downdip to the east into HSU-3 of the San Luis Valley is inferred from the satellite imagery, from geologic cross-sections, and from maps of the Valley. No direct evidence, such as seismic reflection lines or boreholes, is known to exist which could support or negate this inference of continuity.

The second of the areas of potentially enhanced recharge into HSU-3 of the Valley is indicated as Feature 34 on Figure 3.12, the structural interpretation of the TM imagery of the study area. The lineations mapped on Figure 3.12 are interpreted to be faults and/or fractured zones related to the anticlinal structure called the Del Norte High (Gries, 1985). Faults an fractures near the top of an anticlinal structure generally are tensional i nature, and hydraulic conductivity is expected to be enhanced. From the dat gathered for the Confined Aquifer Study in the San Francisco Creek oil and ga test well, the upper 1700 feet of the Conejos Formation in this area appear to consist primarily of lava flows and well-cemented breccias, both of whic are conducive to enhancement of hydraulic conductivity via fracturing. Thi set of features crosscuts elevations ranging from about 7500 feet in the De

4-9

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Engineer's Office (SEO) Master List of Wells, and the U.S. Geological Survey's Watstore database of wells, was used to identify and locate water wells deeper than 2000 feet for which there exist geologic logs, water-quality information, or other useful data. Following interviews with Valley well owners and officials, on-site checks of selected wells were made, to determine suitability for logging and testing.

4.1.3 New Data Developed

During August, 1986, three wells deeper than 2000 feet were logged and/or tested to determine aquifer characteristics, water chemistry, and lithologies of the deep confined aquifer units. All three wells were located in the Valley; one was near Hooper, and two were near Alamosa.

Satellite imagery of the Valley was processed specifically for the San Luis Valley Confined Aquifer Study by the Earth Satellite Corp. The imagery used was Landsat Thematic Mapper (TM) false-color digital imagery of the Valley and the surrounding mountain ranges, processed to enhance contrast and color tonal variation in rock types. The imagery was interpreted by the study team for geologic structure which could be of primary importance to recharge, movement, and discharge of ground water in the deep confined aquifers of the Valley.

In November, 1986, the Authority took the opportunity to acquire new and meaningful data on the Conejos Formation (a primary part of the deep confined aquifer of the Valley) in its recharge area near Del Norte. At the Authority's authorization and funding, geologic and geophysical well-log data were acquired from a new oil and gas exploration well approximately five miles south of Del Norte. Under a data-exchange agreement with the owner of the well, HRS Water Consultants, Inc., acquired and interpreted data which enhanced the study team's knowledge of the deep confined aquifer in its primary recharge area (Figure 4.1).

4.2 HYDROSTRATIGRAPHIC CHARACTERIZATION OF THE DEEP CONFINED AQUIFERS

The delineation of two major aquifer systems in the San Luis Valley, the confined and the unconfined, has long been accepted. The material types and

Exhibit C

Documentation and Communication

1. County communication to COGCCO re First Liberty Energy Inc.
2. COGCC Form 2 – First Liberty Energy Inc.
3. COGCC Form 2A – First Liberty Energy Inc.
4. Rio Grande County Well Location Certificate: Basin #1
5. Map showing Basin #1 – Note: "Several owners have artesian wells"
6. Detail showing Old Woman Creek and Rio Grande NF
7. County communication to COGCC re Dan A. Hughes – Objections

    a) Public Forum 1/26/11 - Allen Davie – Unique hydrology, Conejos Formation, San Francisco Creek being a significant recharge area and tributary to the Rio Grande.
    b) Location of natural year-round spring-fed ponds on lots 44 and 46
    c) Division 3 Engineer Craig Cotton re over appropriated water and therefore question re water supply
    d) Errors and omissions in COGCC data on their forms
    e) Riparian corridor along San Francisco Creek 1,750 yards from drill site
    f) Summer and winter range of pronghorn antelope and winter range for significant herds of deer and elk.
    g) Sensitivities re air quality monitoring; prevailing winds in San Francisco Creek Valley; potential downwind effects on Del Norte, residential areas, schools; potential threat to safety and health.
    h) Errors and omissions by COGCC on existing roads; details on conditions of county roads and potential effects of heavy industrial traffic.
    i) COGCC pad construction does not comply with Rio Grande County Oil and Gas Regulations especially relating to closed looped systems.
    j) Methods of handling waste disposal and waste water are inadequate or unclear
    k) <u>Summary of Recommendations</u>

8. Polite request from County to COGCC to take responsible action on above items
9. COGCC Form 2 – Dan A. Hughes Company LP – San Francisco Creek #1 Well
10. COGCC Form 2a – Dan A. Hughes Company LP – San Francisco Creek #1 Well
11. Map of well location and distances from San Francisco Creek & Spring Branch
12. Detail showing Wagon Wheel Road, creeks and topography
13. Pad Construction Drawing as staked 05-05-2010

14. E&P Waste Management Section 901 re Rules and Regulations to establish permitting, construction, operating and closure requirements for pits, methods of E&P waste management, procedures for spill/release response and reporting, and sampling and analysis for remediation activities. Reference to 34-60-103(4.5)

a) General
b) COGCC reporting forms
c) Additional Requirements
d) Alternative compliance methods
e) Sensitive Area Determination

*"When the operator or Director **has data** that indicate an impact or threat of impact to ground water or surface water, the Director may require the operator to make a sensitive area determination and that determination shall be subject to the Director's approval. The sensitive area determination shall be made using appropriate geologic and hydrogeologic data to evaluate the potential for impact to ground water and surface water, such as appropriate percolation tests that demonstrate that seepage will not reach underlying ground water or waters of the State and impact current or future uses of these waters. Operators shall submit data evaluated and analysis used in the determination to the Director."*

f) Sensitive area operations

(The Exhibit C documents are a huge file, so they are only in the hard-copy paper version, or by request from Rose Vanderpool, Rio Grande County Land Use Administrator.)

Appendix 1

Reference Information

The following information is available via the internet. The reference information provides additional detail and background information.

- Water Supply Reserve Account main webpage:
  - http://cwcb.state.co.us/LoansGrants/water-supply-reserve-account-grants/Pages/main.aspx
- Water Supply Reserve Account – Basin Fund Application Details:
  - http://cwcb.state.co.us/LoansGrants/water-supply-reserve-account-grants/Pages/BasinWaterSupplyReserveAccountGrants.aspx
- Water Supply Reserve Account – Statewide Fund Application Details:
  - http://cwcb.state.co.us/LoansGrants/water-supply-reserve-account-grants/Pages/StatewideWaterSupplyReserveAccountGrants.aspx
- Colorado Water Conservation Board main website:
  - http://cwcb.state.co.us/
- Interbasin Compact Committee and Basin Roundtables:
  - http://cwcb.state.co.us/about-us/about-the-ibcc-brts/Pages/main.aspx/Templates/BasinHome.aspx
- House Bill 05-1177 – (Also known as the Water for the 21st Century Act):
  - http://cwcbweblink.state.co.us/DocView.aspx?id=105662&searchhandle=28318
- House Bill 06-1400 – (Adopted the Interbasin Compact Committee Charter):
  - http://cwcbweblink.state.co.us/DocView.aspx?id=21291&searchhandle=12911
- Senate Bill 06-179 – (Created the Water Supply Reserve Account):
  - http://cwcbweblink.state.co.us/DocView.aspx?id=21379&searchhandle=12911
- Statewide Water Supply Initiative 2010:
  - http://cwcb.state.co.us/water-management/water-supply-planning/Pages/SWSI2010.aspx

Appendix 2
Insurance Requirements

NOTE: The following insurance requirements taken from the standard contract apply to WSRA projects that exceed $25,000 in accordance with the policies of the State Controller's Office. Proof of insurance as stated below is necessary prior to the execution of a contract.

Grantee and its Sub-grantees shall obtain and maintain insurance as specified in this section at all times during the term of this Grant: All policies evidencing the insurance coverage required hereunder shall be issued by insurance companies satisfactory to Grantee and the State.

i. Public Entities

If Grantee is a "public entity" within the meaning of the Colorado Governmental Immunity Act, CRS §24-10-101, et seq., as amended (the "GIA"), then Grantee shall maintain at all times during the term of this Grant such liability insurance, by commercial policy or self-insurance, as is necessary to meet its liabilities under the GIA. Grantee shall show proof of such insurance satisfactory to the State, if requested by the State. Grantee shall require each Grant with Sub-grantees that are public entities, providing Goods or Services hereunder, to include the insurance requirements necessary to meet Sub-grantee's liabilities under the GIA.

ii. Non-Public Entities

If Grantee is not a "public entity" within the meaning of the GIA, Grantee shall obtain and maintain during the term of this Grant insurance coverage and policies meeting the same requirements set forth in **§13(B)** with respect to sub-Grantees that are not "public entities".

A. Sub-Grantees

Grantee shall require each Grant with Sub-grantees, other than those that are public entities, providing Goods or Services in connection with this Grant, to include insurance requirements substantially similar to the following:

i. Worker's Compensation

Worker's Compensation Insurance as required by State statute, and Employer's Liability Insurance covering all of Grantee and Sub-grantee employees acting within the course and scope of their employment.

ii. General Liability

Commercial General Liability Insurance written on ISO occurrence form CG 00 01 10/93 or equivalent, covering premises operations, fire damage, independent Grantees, products and completed operations, blanket Grantual liability, personal injury, and advertising liability with minimum limits as follows: **(a)**$1,000,000 each occurrence; **(b)** $1,000,000 general aggregate; **(c)** $1,000,000 products and completed operations aggregate; and **(d)** $50,000 any one fire. If any aggregate limit is reduced below $1,000,000 because of claims made or paid, Sub-grantee shall immediately obtain additional insurance to restore the full aggregate limit and furnish to Grantee a certificate or other document satisfactory to Grantee showing compliance with this provision.

iii. Automobile Liability

Automobile Liability Insurance covering any auto (including owned, hired and non-owned autos) with a minimum limit of $1,000,000 each accident combined single limit.

iv. Additional Insured

Grantee and the State shall be named as additional insured on the Commercial General Liability and Automobile Liability Insurance policies (leases and construction Grants require additional insured coverage for completed operations on endorsements CG 2010 11/85, CG 2037, or equivalent).

v. Primacy of Coverage

Coverage required of Grantee and Sub-grantees shall be primary over any insurance or self-insurance program carried by Grantee or the State.

vi. Cancellation

The above insurance policies shall include provisions preventing cancellation or non-renewal without at least 45 days prior notice to the Grantee and the State by certified mail.

vii. Subrogation Waiver

All insurance policies in any way related to this Grant and secured and maintained by Grantee or its Sub-grantees as required herein shall include clauses stating that each carrier shall waive all rights of recovery, under subrogation or otherwise, against Grantee or the State, its agencies, institutions, organizations, officers, agents, employees, and volunteers.

B. Certificates

Grantee and all Sub-grantees shall provide certificates showing insurance coverage required hereunder to the State within seven business days of the Effective Date of this Grant. No later than 15 days prior to the expiration date of any such coverage, Grantee and each Sub-grantee shall deliver to the State or Grantee certificates of insurance evidencing renewals thereof. In addition, upon request by the State at any other time during the term of this Grant or any sub-grant, Grantee and each Sub-grantee shall, within 10 days of such request, supply to the State evidence satisfactory to the State of compliance with the provisions of this **§13**.

Appendix 3
Water Supply Reserve Account Standard Contract Information

NOTE: The standard contract is required for WSRA projects that exceed $100,000. (Projects under this amount will normally be funded through a purchase order process.) Applicants are encouraged to review the standard contract to understand the terms and conditions required by the State in the event a WSRA grant is awarded. Significant changes to the standard contract require approval of the State Controller's Office and often prolong the contracting process.

It should also be noted that grant funds to be used for the purchase of real property (e.g. water rights, land, conservation easements, etc.) will require additional review and approval. In such cases applicants should expect the grant contracting process to take approximately 3 to 6 months from the date of CWCB approval.

The standard contract is available here under the header "Additional Resources" on the right side:
http://cwcb.state.co.us/LoansGrants/water-supply-reserve-account-grants/Pages/BasinWaterSupplyReserveAccountGrants.aspx

Appendix 4
W-9 Form

NOTE: A completed W-9 form is required for all WSRA projects prior execution of a contract or purchase order. Please submit this form with the completed application.