WATER CONSERVATION BOARD
1313 SHERMAN STREET, ROOM 721
DENVER, CO 80203

Buyer: MAGGIE VAN CLEEF
Phone Number: 303-866-3292
Agency Contact: STEVEN SHULL
Phone Number: 303 866 3441

DATE: 09-03-09

IMPORTANT
The PO# and Line # must appear on all invoices, packing slips, cartons and correspondence

ACC: 09-02-09

PURCHASE ORDER
STATE OF COLORADO

P.O. # OE PDA 10000000032 Page# 01

State Award #

BID #

FEIN 886000024 A **Phone:** - -
Vendor Contact:
Purchase Requisition #:

VENDOR
BOARD OF REGENTS UNIVERSITY NEVADA
DESERT RESEARCH INSTITUTE
2215 RAGGIO PARKWAY
RENO NV 89512

Invoice in Triplicate
To: DIVISION OF WATER CONSERVATION
1313 SHERMAN STREET, ROOM 721
DENVER, CO 80203

Payment will be made by this agency

Ship To: DIVISION OF WATER CONSERVATION
1313 SHERMAN STREET, ROOM 721
DENVER, CO 80203

Delivery/Installation Date: 06-30-10
F.O.B. DESTINATION STATE PAYS NO FREIGHT

INSTRUCTIONS TO VENDOR:

1. If for any reason, delivery of this order is delayed beyond the delivery/installation date shown, please notify the agency contact named at the top left. (Right of cancellation is reserved in instances in which timely delivery is not made.)
2. All chemicals, equipment and materials must conform to the standards required by OSHA.
3. NOTE: Additional terms and conditions on reverse side.

SPECIAL INSTRUCTIONS:

LINE ITEM	COMMODITY/ITEM CODE	UNIT OF MEASUREMENT	QUANTITY	UNIT COST	TOTAL ITEM COST
001	91843000000				$62,300.00

INSTALL, OPERATE & MAINTAIN 2 REMOTELY CONTROLLED SILVER IOD IDE CLOUD SEEDING GENERATORS FOR WINTER PARK-DENVER WATER.

DOCUMENT TOTAL = $62,300.00

THIS PO IS ISSUED IN ACCORDANCE WITH STATE AND FEDERAL REGULATIONS
This PO is effective on the date signed by the authorized individual.
EPSPO PAA

FOR THE STATE OF COLORADO

Authorized Signature

9/3/09
Date

DP-01 (R-02/06)

August 24, 2009

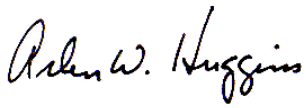
Mr. Joe Busto
CWCB Flood Protection Program
1313 Sherman St., Room 721
Denver, CO 80203

Dear Mr. Busto:

Attached are the proposal and budget for the installation, operation and maintenance of two remotely controlled silver iodide cloud seeding generator intended for use on the Winter Park - Denver Water (WP-DW) cloud seeding project in Colorado during the winter of 2009-10 (WY2010). As noted in the proposal one new generator will be transported to Colorado from DRI in Reno, and a second generator will be moved from the WEA project on Grand Mesa to one of the proposed WP-DW site locations. Successful operation of both units in WY2010 depends on acquiring the necessary site permits, and verifying that wireless digital communication is available from both sites.

If the revised proposal and budget are found to be satisfactory we request a purchase order be drafted in the amount of the proposed budget in order for DRI to be able to initiate and complete the work in a timely manner.

Respectively yours,



Arlen W. Huggins
Project Manager
huggins@dri.edu
775-674-7140

Attachments: Proposal and Budget
Cc: Maria Garretson (DRI)

Install, operate and maintain two remotely controlled seeding generators for the Winter Park – Denver Water cloud seeding project

A Proposal Submitted to

Colorado Water Conservation Board
Mr. Joe Busto
CWCB Flood Protection Program
1313 Sherman St., Room 721
Denver, CO 80203

By
Desert Research Institute
Division of Atmospheric Sciences
2215 Raggio Parkway
Reno, NV 89512-1095

August 2009

Project Manager: Mr. Arlen W. Huggins
Phone: (775) 674-7140
Fax: (775) 674-7007
E-mail:arlen.huggins@dri.edu

Project to install, operate and maintain two remotely controlled seeding generators for the Winter Park – Denver Water cloud seeding project

Statement of Work

The Desert Research Institute (DRI) fabricates remotely controlled cloud seeding generators for its own projects and has also fabricated units for two Colorado wintertime seeding projects. In two winters of operation in Colorado these units have proved to be reliable and quite effective in operating remotely at high altitude. The operation of these remote generators provides one means of improving the operational capabilities of wintertime cloud seeding programs by eliminating some of the uncertainty in targeting seeding material and introducing the seeding material directly into supercooled cloud regions. The DRI proposes to introduce this technology into the WP-DW seeding project for WY2010.

Remote generator installation

The installations of the silver iodide (AgI) generators will be completed on two trips to Colorado in September and/or October 2009. In order for this to be accomplished, suitable sites for both instruments need to be located. The contractor (Western Weather Consultants, WWC) conducting the seeding with manual generators for the WP-DW project has suggested two possible sites. These are shown on the map in Figure 1. The suitability of these sites needs to be verified prior to the DRI installation trips. Requirements for the remote generators include: 1) high altitude, windward slope locations with airflow unblocked by terrain or vegetation; 2) a relatively level space with room for the generator and a propane tank; 3) access to the site by 4WD vehicle towing the seeding generator trailer (see Fig. 3); 4) permission to use the site by the land owner – special use permit acquired if a site is on National Forest land; and 5) verification of digital data wireless communication (CDMA), or other suitable communication link, at the sites. Mr. Tom Swafford of DRI will work with Winter Park and WWC staff to assess the suitability of the two sites and acquire the necessary permits.

Once two suitable remote generator sites are secured, DRI staff will schedule installation trips for the two generators. One new generator will be transported from Reno, and the second generator will be moved from the Water Enhancement Authority (WEA) Grand Mesa seeding project to the WP-DW project area. The Grand Mesa generator is shown in the top panel of Fig. 3 during its installation in 2007. The second generator installed for Grand Mesa in 2008 is shown in the bottom panel of Fig. 3. Winter Park, Denver Water or WWC staff will need to arrange for the installation of propane tanks and for delivery of propane prior to DRI's arrival for installation. The tank installation ensures that the entire generator system can be checked while the DRI technicians are onsite. Each installation will require one full day. DRI technicians can explain the operation of the generator to Winter Park and Denver Water representatives as the installations are being completed. Wireless contracts for both generators will be established prior to the installation trip, so a full test of the remote operation should be possible once an installation is complete. Each generator is equipped with a weather station and the data from the

2215 Raggio Parkway, Reno, Nevada 89512-1095
Phone (775) 673-7300 Fax (775) 673-7397

weather stations will be downloaded via the communications link at least once an hour. DRI will capture the data and post it in near real time in a graphical format on a DRI website. An example plot from one of the WEA Grand Mesa generators is shown in Fig. 2. These data are very useful in determining when suitable weather conditions exist for cloud seeding.

Generator operation

Once installed with CDMA wireless communication units, the generators can be operated from any computer with an internet connection. The internet-CDMA link provides access to the seeding generator using a Campbell Scientific data logger program. The data logger program (*LoggerNet*) is set up so the command prompts for operation are visible on a graphic interface. DRI will be happy to demonstrate the program for Winter Park or Denver Water staff, and DRI staff will be available by phone throughout the winter of 2009-10 to answer any questions about generator operation and to resolve problems that arise.

DRI staff will be responsible for monitoring weather conditions, conducting seeding operations when appropriate conditions exist, and maintaining the AgI generators during the operational cloud seeding period for the WP-DW seeding project. Operations will be focused on the period from November 2009 through March 2010, but operations can be extended into April if seeding solution remains and no suspension criteria have been invoked.

The wireless communications costs for the months that overlap the operational seeding period are included in the budget estimates. Regarding the budget, note that seeding solution costs are included in this budget, but the propane costs are not. The solution is being supplied with the generator transported from Reno, and solution for the former WEA generator will be transferred from an auxiliary drum. The typical expendable costs, including solution, amount to about $4000 per generator per season.

Seeding generator maintenance

Two separate maintenance trips to the WP-DW project in Colorado have been budgeted. This should be sufficient to account for solution tank refills, if needed and any repairs or parts replacements to the generators that are required. Because data regarding flame temperature, solution flow rates and other parameters from the generators can be accessed via the datalogger and wireless connection, DRI staff can typically diagnose problems remotely and determine if a maintenance trip is required.

Project Budget (see attached detailed budget)

The installation, operation and maintenance costs are:

Salaries and Fringe Benefits: $21,861

Operating Costs: $8,691

Travel: $5,894 Other supplies: $419

ICR (Overhead): $25,436

Total Cost: $62,300

2215 Raggio Parkway, Reno, Nevada 89512-1095
Phone (775) 673-7300 Fax (775) 673-7397

Desert Research Institute Proposal
Winter Park - Denver Water seeding project
Title: Install and maintain 2 AgI generators for Winterpark-Denver Water Project
Sponsor: Colorado Water Conservation Board

Period: 15 September 2009 - 30 June 2010

		Rate	Units	Amount
Salaries and Wages				
	Huggins, A.	$ 9,903	0.50	$4,952
	Swafford, T.	$ 5,775	0.90	$5,198
	Loss, B.	$ 5,635	0.50	$2,818
	Dean, J.	$ 4,377	0.50	$2,189
Total Salaries and Wages				**$15,157**
Fringe Benefits				
	Professional	41.40%		$2,050
	Technologist	45.60%		$4,653
Total Fringe				**$6,704**
Total Salary and Fringe				**$21,861**
Operating Costs				
	Generator-Wx Sta parts	$ 226	2	$451
	CDMA contracts (mo)	$ 35	14	$490
	Generator expendables	$ 3,875	2	$7,750
Total Operating				**$8,691**
Travel (2 people x 5 trips)				
Installations	DRI truck usage (miles)	$ 0.55	3750	$2,063
	Fuel (gal)	$ 3.00	375	$1,125
	Per Diem (install)	$ 118	8	$944
Maintenance	Reno-Denver R/T Airfare	$ 450	2	$900
	Per Diem (maintenance)	$ 118	4	$472
	Rental Car (days)	$ 70	4	$280
	Fuel (gal)	$ 2.75	40	$110
Total Travel				**$5,894**
Other Direct Costs				
	Supplies			$200
	Copying/Communications			$219
Total Other Direct Costs				**$419**
Total Direct Cost				**$36,864**
Indirect Cost		**69.00%**		**$25,436**
TOTAL COST				**$62,300**

2215 Raggio Parkway, Reno, Nevada 89512-1095
Phone (775) 673-7300 Fax (775) 673-7397

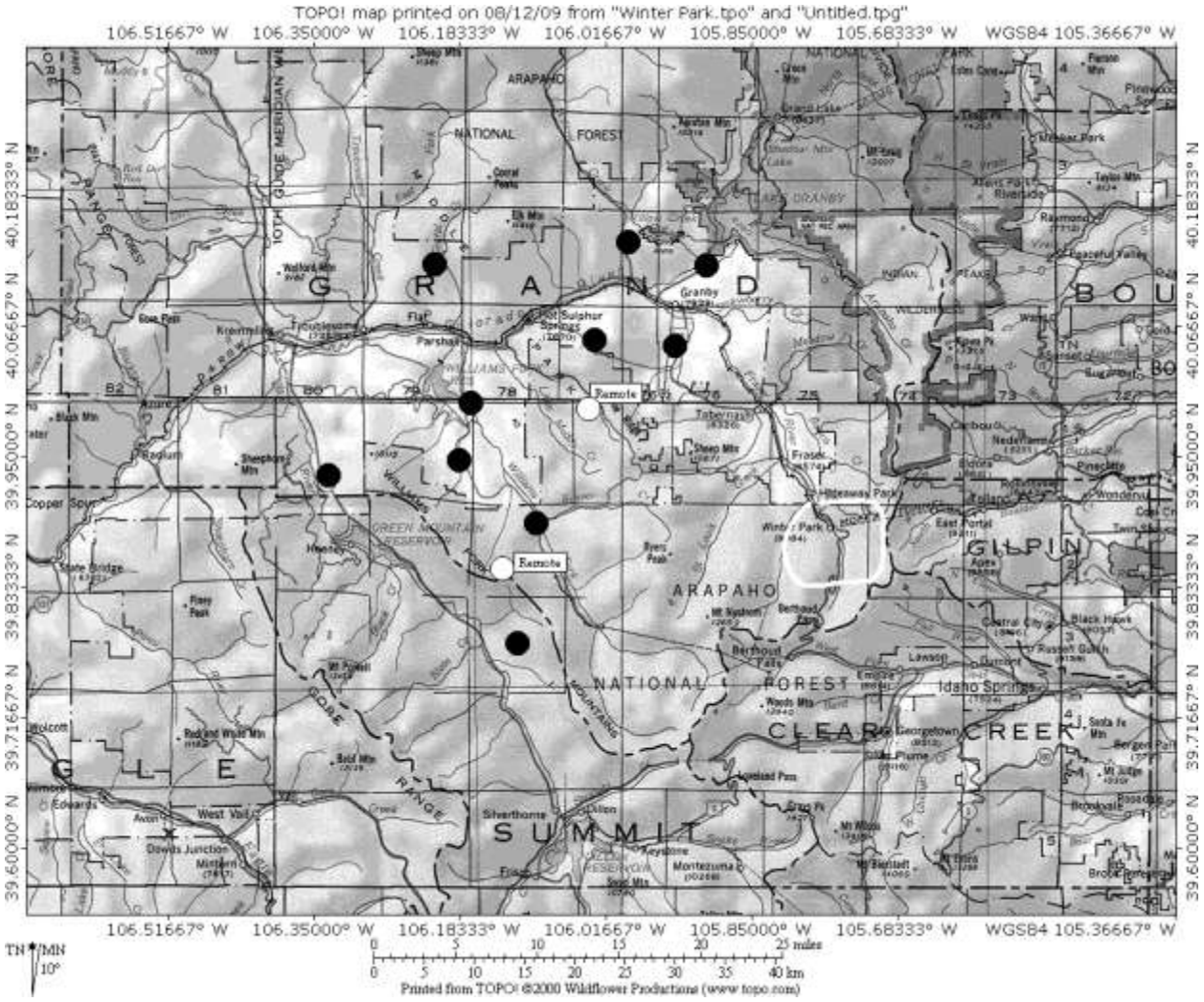


Figure 1. Map of a portion of central Colorado showing cloud seeding generator sites for the Winter Park – Denver Water cloud seeding project. The specific Winter Park target area is outlined in white in the right center portion of the map. Black circles represent manually operated generators and the two white circles represent the proposed sites (Ute Pass and Beaver Creek) for DRI remotely operated generators.

2215 Raggio Parkway, Reno, Nevada 89512-1095
Phone (775) 673-7300 Fax (775) 673-7397

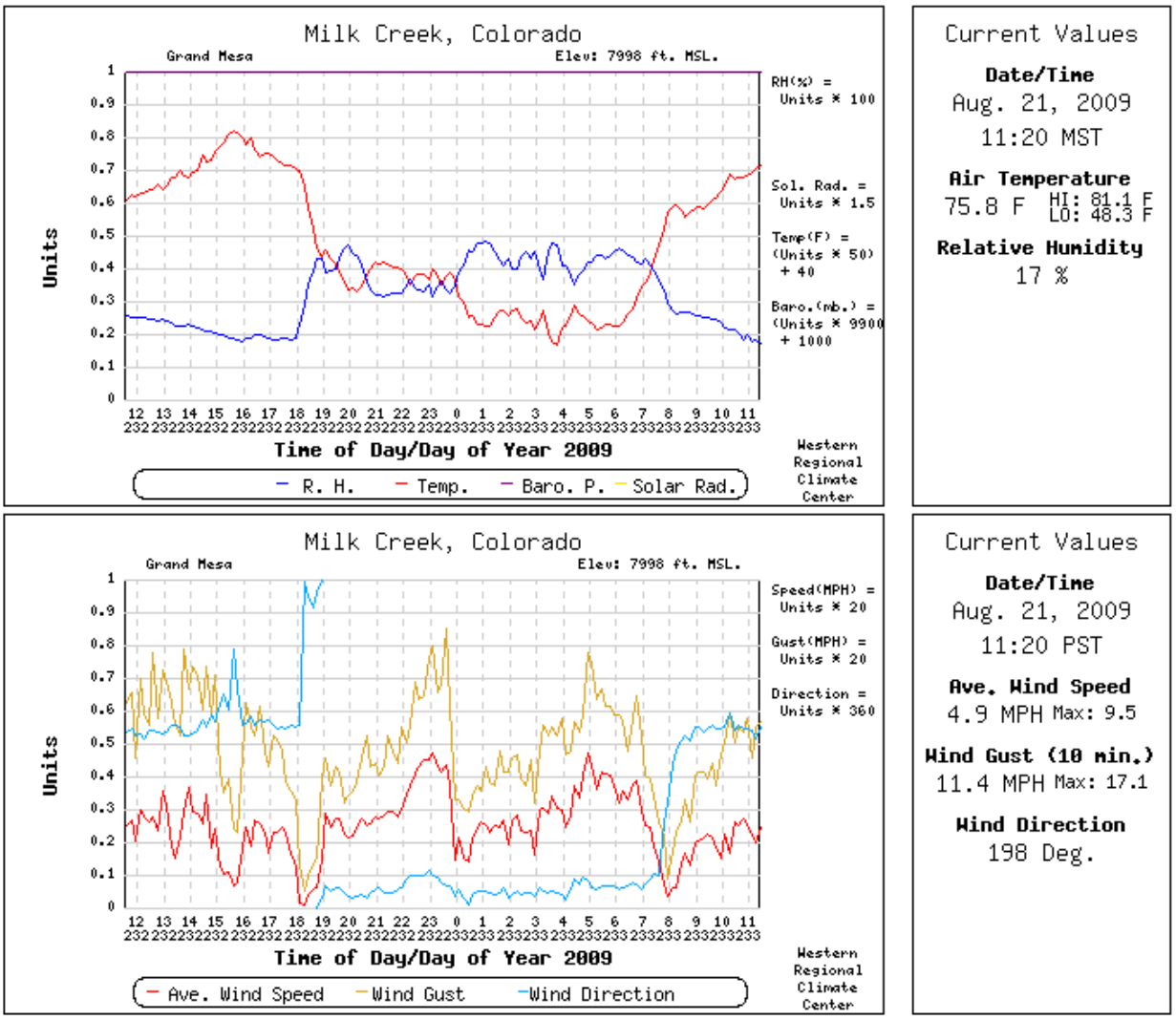


Figure 2. Graphs of weather data from the Milk Creek cloud seeding generator located on the south side of the Grand Mesa. Top panel shows temperature and relative humidity. Bottom panel shows wind speed and direction. The data for this site and many others in the western U.S. can be found on the DRI website: http://www.wrcc.dri.edu/weather/

2215 Raggio Parkway, Reno, Nevada 89512-1095
Phone (775) 673-7300 Fax (775) 673-7397

Figure 3. Top image shows a DRI remotely controlled generator being installed for a Grand Mesa cloud seeding program in 2007. This is the unit that will be brought to the WP-DW project in 2009. Bottom image shows a second DRI remote generator as it was operated in 2008-09 for the Grand Mesa project.

2215 Raggio Parkway, Reno, Nevada 89512-1095
Phone (775) 673-7300 Fax (775) 673-7397