

Highlights of TAG Meeting April 23, 2004
HIGHLIGHTS OF JyS CLOUD SEEDING TECHNICAL ADVISORY GROUP
APRIL 23, 2004

Emails from an out-of-town member, Dr. Conrad Keyes, a retired NM State University Professor and Consultant, were read by the Chair and recorded as part of the official record. Conrad pointed out the value of historical climatologic data that was collected in the late 1960s for the US Bureau of Reclamation in all mountain ranges in New Mexico. After review of the data, the Jemez Mountains were selected for a randomized four-year cloud seeding project which Conrad operated from 1968-1972. After an exchange of emails, Conrad offered to search his files and make the data available to us under his current contract with the Interstate Stream Commission. This was discussed under Agenda Item 6 (see below). Thanks for bringing this to our attention, Conrad.

Agenda Item 1) Discussion of Mission/goals: Bill LeMay

Bill presented a draft TAG Mission Statement that was designed to bridge contrasting Mission Statements prepared previously. Several suggestions were made. Bill will get together with Mary Helen Follingstad and they will report back next month with a revised draft.

Agenda Item 2) Summary of Funding and Operating Committee activities: Sig Silber

The F&O Committee has organized into four teams: a Private Sector Team, a City/County Team, a NM State Team, and a Federal Team, each to be headed by co-captains. Meetings have been held with the staffs of Senator Domenici and Senator Bingamen and with several organizations in the private sector. Meetings are scheduled with the Espanola City Council and Rio Arriba County Commissioners and staff. The Committee goal is to raise a minimum of \$92,000 by mid July, 2004. A Power Point slide presentation has been developed for use by J&O Committee Members. It is available for use by the TAG as well.

Agenda Item 3) Discussion of benefit/cost calculations: John Brown

John is in the early phases of the study, calculating the cost of San Juan Chama water. The initial capital cost for the project has been quoted at \$100 million and is designed to deliver 5000 acre feet per year. When amortized over a 40-year period, the cost per acre foot per year is about \$1200. However, his sources indicate that operating and maintenance costs were estimated at three times that amount. In the following discussion it was decided that the estimate for O&M may be high, and actual O&M costs for other projects to be analyzed will be very difficult to obtain, so future cost estimates may be limited to capital costs. We will have to investigate the options. It is important that we are consistent in our comparisons, and that we are able to explain how we derived the numbers. John will report further at our next meeting.

Agenda Item 4) Review of pre-seeding program: Dr. Bill Woodley and Dr. Roelof Brintjes

The Chair prefaced the discussion with a handout summarizing the pre-seeding data acquisition program the TAG agreed on at our last meeting. Since then, discussions with Dr. Woodley and Dr. Brintjes indicated the need to review certain aspects of the program. Each was asked to present his opinion of the program as a whole and each of the three elements.

Bill Woodley started by declaring he would play the Devil's Advocate and proceeded to challenge the TAG to counter his argument (which he made clear was not his view, but one which we could definitely expect to hear)-- that it has been shown that cloud seeding works, that we are wasting money and valuable time by reinventing the wheel, and that we should start a seeding program immediately. The ensuing discussion was lively; the unanimous reply was that we really do believe in the need to demonstrate the feasibility of cloud seeding state-wide, we do need certain climatologic data to design a scientifically acceptable program for the JyS area, and the cost to do this (perhaps as much as \$150,000) is small compared to the cost of a four to five year pilot project of \$1.5 to \$2.0 million.

Bill then went on to discuss his proposed state-wide satellite imagery project. He noted that Dr. Brintjes called to his attention satellite imagery (GOES imagery) on a NASA website, which shows cloud water and ice. The product was designed to show risk of icing for aviation interests. Icing correlates with super cooled liquid water, which, under the right conditions, may indicate seedable clouds. Bill showed an example which covered winter storms over a large part of the Southwest. He compared that image with one of the same storm system in NM, processed by the techniques he

and his partner, Dr. Rosenfeld devised using NOAA satellites imagery, and pointed out the much higher resolution in their product. The advantage in the GOES product is that the NASA satellite is stationary relative to the earth, so that it is possible to monitor continuously an area on earth within its view, while NOAA satellites overpass only once or twice per day. Bill plans to review imagery on NASA's web site for the four-year period planned and will try to devise a method of incorporating the advantages of each in one interpretation. He anticipates no increase in the cost of the project, but if the interpretation of additional data is very time consuming, he may not be able to interpret as many case-years as planned. He will be able to complete the work by January 2005.

Dr. Roelof Bruintjes, meteorologist with the National Center for Atmospheric Research (NCAR) in Boulder, Colorado, has been following our efforts from the beginning and agreed to comment on our pre-seeding program. In his view, a very important component will be obtaining regional climatologic data, such as precipitation from imaged storms, to help calibrate the satellite imagery. Several sources of data were mentioned, including a substantial amount of information on the Jemez Mts. at LANL (see also discussion of data in Dr. Keyes's files, Agenda Item 6, below). Bill Woodley agreed that this would be part of his project. Roelof believes modeling should be used as a predictive tool in advance of in-cloud data measurements. We should be able to simulate climatologic phenomena such as mountain (gravity) waves between the Jemez and Sangre de Cristo Mountains. In -cloud measurements then can confirm the computer model, as well as the remote imagery interpretation. His priority would be to invest in more modeling.

Agenda Item 5): comments by Dr. Roelof Bruintjes

A comprehensive hydrological research program for the Upper Rio Grande, including the JyS area, is planned by SAHRA (Sustainability of semi-Arid Hydrologic and Riparian Areas). SAHRA is a consortium of 17 universities, laboratories and government agencies, including NM Tech, UNM and Los Alamos and Sandia National Laboratories. Roelof plans to propose that NCAR initiate a hygroscopic (using powdered salts rather than AgI) seeding program in the same area during summer '06 or summer '07. These developments are exciting because the hydrologic study could erase our concerns about the amount of runoff from summer storms, and the hygroscopic seeding program, if successful, could prove the feasibility of summer seeding in the JyS area. Of course, our pre-seeding program in '04/'05 and the projected pilot cloud seeding project in winter 05/06 will be of interest to them, and we expect to work closely with them.

Roelof was asked about the Jemez cloud seeding project done by Dr. Keyes in '68 to '72, which we consider to be an important pioneering effort in this area. He said he finds the project interesting and that he would like to see some of the background data not included in Dr. Keyes's Bureau of Reclamation report. This led to discussion of acquiring the data offered by Dr. Keyes (see Agenda Item 6 below).

Agenda Item 6): Other

It was the feeling of the group that Dr. Keyes's data would be a very important part of our pre-seeding data acquisition program. A motion was made and, by unanimous vote, the Chair was instructed to contact the Interstate Stream Commission and request they acquire the data.

Agenda Item 7): Next Meeting

We will meet again May 21st at 10:00 AM in the new offices of the Santa Fe Homebuilders Association at 1409 Luisa, Suite A.