

HIGHLIGHTS OF THE CLOUD SEEDING TECHNICAL ADVISORY GROUP
MEETING
July 15, 2004

The sixth monthly meeting of the TAG was held July 15 at the Santa Fe Area Home Builders Association offices. Present were Walt Chapman, Gina Deola, Scot Johnson, Sigmund Silber, Bob Vocke, James Stalker, Rick Stone, Bill Sauter, William Woodley, Doug Murray, Mary Helen Follingstad, John Brown, Duncan Axisa, Jim Crain, Wayne Nichols, Bruce Boe, Alan Jager, Claudia Borchert and Roy Stoesz (Chair).

Agenda item 1) Summary of Funding & Operating Committee activities: Sigmund Silber

The F&O Committee has received no word concerning its application to the Governor's Innovation Water Fund, but expects to know within the next few weeks whether they will be asked to prepare a detailed proposal. (As these Highlights were being prepared the F&O Committee received the RFP. A Submission of Proposal is due August 11 and they expect to know by September whether or not it is approved. If so, matching funds should be made available in late September or early October.)

Sig reported on his presentation to the Santa Fe City Council meeting June 30. Following his presentation, the Chairman, Councilor Matthew Ortiz, invited us to a Public Utilities Committee meeting July 6. After limited discussion the PUC passed "A Resolution to Support a Cloud Seeding Feasibility Study and Pilot Project" and to contribute \$20,000, providing other organizations commit \$80,000. Councilor Wurzburger is sponsoring the resolution which will be presented to the City Council for approval. (Shortly before these notes were prepared, the City Council voted unanimously to support our cloud seeding efforts and committed \$20,000 for the feasibility study (our pre-seeding program), provided we raise another \$80,000 elsewhere).

Agenda item 2) Discussion of cloud seeding display at Santa Fe Air Show: Gary Ehlert

Gary led a discussion of our efforts to present material on cloud seeding at the Air Show October 2. We plan to have a video and handout material and Duncan Axisa volunteered SOAR's Piper Cheyenne, fully loaded with its research package. Gary is forming a small subcommittee to handle preparations.

Agenda item 3) Discussion of precipitation & streamflow relationship: John Brown

The relationship between streamflow and precipitation varies from storm to storm, and from season to season. If the ground is very dry, much of the precipitation will be absorbed into the soil and there will be little runoff. If the soil is already saturated, much of the moisture will flow into streams and arroyos. Similarly, an early freeze will result in more surface runoff. Vegetation is also a factor. Some trees allow snow to slide off their branches and add to snowpack, while others hold snow in their branches until it sublimates.

John followed up on a question that arose in our May meeting; a report on the Upper Rio Grande assumed an annual decrease in precipitation of 10% and calculated a decrease in annual runoff of

30%. John turned this around to answer the question posed at the May meeting-what would be the result of an **increase** in precipitation? "If we look at this information in terms of increases and assume an initial 10 units of precipitation and 10 units of streamflow (not the same units), then we go backwards to obtain:

the increase in precipitation is $100 \times 1/(10-1) = 11\%$
and
the increase in streamflow is $100 \times 3/(10-3) = 43\%$ "

John presented this as a preliminary report. More data are needed before we can use this method for projecting streamflow.

Agenda item 4) Presentation: Weather Modification, Inc's winter cloud seeding programs in California, Nevada and Idaho: Bruce Boe and Rick Stone

Bruce took us through the precipitation processes of "cold cloud" (glaciogenic) seeding and "warm cloud" (hygroscopic) seeding with several outstanding graphics. He talked about a subject important to us today, "challenges facing new programs," stressing that we must work very hard to gain public acceptance. Some of the reluctance of the public to accept cloud seeding may be unstated. For instance, some may feel that it is morally wrong to interfere with nature's processes, but may not state their concerns in public meetings. Bruce's approach is to stress at the outset that modern civilization is inadvertently impacting weather every day, and cloud seeding is only using natural processes to mitigate partially that impact. Weather Modification Inc.'s feasibility study in Wyoming was a good example of the hoops we are going to have to jump through and could serve as a model for our planning.

Rick Stone reported on recent operational programs. (At this point the Chair became distracted and was not able to make detailed notes. Those able to keep up with Rick are invited to add their notes here.) Two strong messages came through: 1) contrary to our understanding, aircraft seeding in mountainous regions in winter is feasible and much more effective than ground generators, by as much as a factor of two. The San Joaquin program, a combination ground-based and aircraft program resulted in a \$10 million benefit, a benefit/cost ratio of better than 10/1; 2) chemical tracers were used in all recent projects. Simultaneous dual tracers (for instance, using cesium iodide in ground generators and indium oxide in aircraft) will distinguish between the benefits of ground and aerial seeding. The generator solution is critical. In one case adding 4% cesium iodide made a difference of 80% in seeding effectiveness.

Bill Woodley interjected an intriguing observation. In Israel and in all Western US states, except Oregon, a long-term plot of precipitation decrease coincides with pollution increase. Bill thinks that the polluting aerosols act to prohibit the growth of super cooled liquid water droplets, thus inhibiting precipitation. In Israel, precipitation decline has been partially mitigated by seeding.

Agenda item 5) Discussion of cloud seeding time-line: Roy Stoesz (see attachment)

The Funding and Organizing Committee asked the TAG to draft a time-line for cloud seeding plans which would take into account the proposed ISC Rules. These Rules are to be presented at a public hearing July 20 and, when approved, will guide our planning efforts. (Since then, a public

hearing approved the Rules with only minor changes). The Rules call for License Application 120 days before the commencement of cloud seeding operations, and the designation of an Operations Director **when applying for the License.**

Two plans were presented. The first provides for an Operations Director to be selected as soon as funds are available. This person would report to the Contractor (the operator) and would oversee the Pre-seeding Program, the design and preparation of the RFP for the pilot project and the ISC License Application, selection of a pilot project subcontractor, cloud seeding operations and assessment.

The second calls for the Operations Director to be an employee of the subcontractor in a turnkey contract. This person would be identified when the contract is accepted, and would be named in the ISC License Application. The Operations Director would be responsible for running the pilot project. A consultant would be hired late this year to assist in interpreting results of the Pre-seeding Program, design the pilot project and to prepare the pilot project RFP and ISC License Application. A second consultant would be hired to do the assessment. The intent would be to keep both contractors for the life of the project.

There is something to be said for both plans, but most people generally favored the second. We may refine the time-line as we go along, but in any case, we obviously have our hands full if we wish to begin the pilot project in the winter of 2005/2006. (The time-line was produced for 8 ½" X 14" print out, but I was able to forward only the 8" ½ X 11" portion. The years after Phase 3 are a repeat of Phase 3).

Agenda item 6) Next meeting

We will meet again Thursday, August 19 at 10:00 AM at the same place.