HIGHLIGHTS OF JyS CLOUD SEEDING TECHNICAL ADVISORY GROUP
MARCH 22.2004

An email from an out of town member, Don Griffith, President of North American Weather Consultants, Inc. was read by the chair and accepted as an official part of the record. Don expressed two concerns: 1) that my last meeting announcement gave him only a one week notice, which was insufficient time to allow him to make arrangements to attend, and 2) if we are considering proposals, we ought to be announcing these and issuing RFPs. My only excuse for being late is that I just **had** to make that ski trip to Steamboat, but ski season is almost over, and I'll do my best to give all of you more advance notice from now on. Concerning RFPs, the proposals we received (summarized below) were unsolicited proposals. Anyone interested in making such proposals is more than welcome to. Because we have no funds, an RFP is premature; whoever does fund us will make the decision whether or not to issue RFPs. Thanks for your suggestions, Don.

Prior to the TAG meeting, Sig Silber's New Technology Committee discussed means to establish a working relationship with NM Tech. Our efforts so far have been futile, and because they are considered the premier atmospheric science university in NM, we would like to be able to work with them. Bill Woodley, who has known some of the faculty for years suggested that we might propose joint projects, such as engaging their graduate students in precipitation and/or cloud condensation nuclei measurements. Such projects might cost $20,000 to $30,000 each. Bill also volunteered to take the initiative by offering to hold a colloquium in Socorro on modern techniques in cloud seeding. These suggestions were well received and will be discussed further.

Agenda Item 1) Discussion of mission/goals.

Mary Helen Follingstad accepted the task of reviewing and editing contrasting mission/goal statements.

Agenda Item 2) Discussion of evapotranspiration and summer seeding programs.

The chair reported additional anecdotal evidence of high summer ET and low stream runoff in the JyS area. He also relayed a conversation he had with Neil Williams, a consultant hydrologist concerning precipitation and stream flow data on two city-operated 400-acre tracts in the Santa Fe River Basin. It might be helpful to review these data to see the relationship of precipitation and stream flow. Claudia Borchert, hydrologist with the City of Santa Fe approved release of the data and Francis West agreed to review the data. It was generally agreed that, while everyone would like to see more summer precipitation, our current focus should remain on a winter seeding program until we have evidence that summer storms contribute significantly to surface runoff.

Agenda Item 3) Discussion of benefit/cost calculations.

Investment in a cloud seeding program will require calculating the benefit to the communities involved. This will require a stakeholder analysis (an early version done some months ago was distributed) to determine who benefits and to what extent, and rough estimates of cost. Contractors will be asked to assist with cost estimates. John Brown agreed to carry on with this task.

Agenda Item 4) Prioritizing the need for pre-seeding data.

Because of the press of time this item was included in presentations of proposals under Agenda Items 5), 6) and 7). The committee will revisit this topic at the next meeting.

Agenda Item 5) A proposal by Bill Woodley.

Bill offered an unsolicited proposal titled "The Quantification of Winter and Summer Seeding Potential in New Mexico Using Multi-spectral Satellite Imagery." He proposes a one-year study of winter season imagery from the Advanced Very High Resolution Radiometer on NOAA operational weather satellites. He and his partner, Dr. Daniel Rosenfeld, have access to the archived data and have devised a unique method of processing and analyzing the data. For the benefit of those who could not attend, the following is a much abbreviated explanation of the process. The visible wave band (0.65 microns) is used to select the visibly bright clouds for analysis. Cloud top temperatures are determined by

the infrared wave band (0.9 microns). Particle size at cloud top can be calculated because larger particles absorb more light and reflect less, so that clouds with larger droplets are seen darker in the 3.7 micron wave band. These data, and formulae devised by Woodley and Rosenfeld, allow them to identify clouds with supercooled liquid water and to determine which are glaciated (frozen) and therefore not candidates for seeding. Imagery during four winter seasons will be studied over the five major mountain chains in the state (Jemez, Sangre de Cristo, San Juan, Sacramento and Mogollon/Black Range). Knowing the number of seedable storms over a four year period should determine the feasibility of cloud seeding statewide. Total cost is $45,000.

A second project was proposed to document the feasibility of summer seeding. It was an alternative plan to Axisa's and Stalker's original summer-oriented projects in an effort to reduce the cost of the original three proposals of $225,000 (see attachment). In this "fallback" plan, the modeling was deferred and the program was modified to use two aircraft to conduct a small pilot seeding operation. Measurements of cloud condensation nuclei would be followed by documentation of cloud microphysical structure before and after seeding. No charge was included for data analysis because that would be covered by a parallel program in Texas. Total cost is $36,550. A copy of these proposals is available upon request (williamlwoodley@cs.com).

Agenda Item 6) A proposal by Duncan Axisa.

Axisa's proposal, "Using an Instrumented Cloud Physics Aircraft to Investigate the Opportunities for Summer and Winter Seeding in the Jemez y Sangre Region" would use SOAR aircraft to collect and analyze in-situ climatologic data. These data will validate the seeding potential inferred from satellite imagery and give us actual cloud microphysical data to assist in designing a seeding program. Specifically, in-situ measurements will be made of supercooled liquid water content, cloud droplet size distribution and cloud condensation nuclei. Additionally, and important for ground-based seeding operations, the project will record information on upper air wind speed and direction. Traverses will be flown over the Jemez and Sangre de Cristo Mountains, with total flight time of 20 hours, plus seven hours of ferry time from Plains, Texas to Santa Fe (1 1/2 hours one-way). Cost is $32,000. The 5-day project could start early in the winter season of 2004/2005. A copy of the report is available upon request (soar@sandylandwater.com).

Agenda Item 7) A proposal by James Stalker.

In "RESPR Mesoscale Modeling Capabilities and Others in Support of a New Mexico Cloud Seeding Program," Stalker offered a proposal for mesoscale cloud modeling of winter storms. The proposal provides for eight 24-hour high-resolution simulations, know as case days, to be analyzed using the Regional Atmospheric Modeling System. From the model-predicted wind, trajectory analyses will demonstrate what path a nucleating agent will follow and where it will end up. These analyses will be helpful in designing cloud seeding tests and in designing a ground generator network.

Agenda Item 8) Discussion of pre-seeding budget and time-line.

Because their original proposals were modified before presentation, the attachment shows both proposals. The revised, or "fallback" proposal totals $154,100. There was agreement that, until significant surface runoff from summer storms can be documented, immediate efforts would be focused on winter seeding. Projects involving summer seeding, if justified, will be included in a second funding effort. There was divided opinion on whether the winter season modeling could be deferred until a seeding program is designed. A compromise was suggested that provided for reducing the modeling effort to four case days ($18,000), and reorienting the project to model those flights that Axisa is proposing. The approved total is $95,000, of which $50,000 is earmarked for the JyS project, and $45,000 is for the state-wide project.

Time-lines were not discussed, but obviously are subject to funding. If city, county and state funds are required, our request wil probably be considered in the budget cycle ending about March, 2005. Pre-seeding data acquisition for the Jemez and Sangre de Cristos could start no earlier than early winter of '05/'06, and winter seeding could start no earlier than late winter '06/07, nearly two years from now. Alternatively, if we are able to obtain federal and/or private funding, we could start pre-seeding data collection this year and possibly begin seeding operations (funded by city, county and state) in late winter 2005.

Agenda Item 9) Other.

Sig Silber reported on a suggestion from Bill Woodley that Sig submit an article to the Bulletin of Atmospheric Meteorologists (?) on his ideas concerning risk and assessment of cloud seeding. The committee agreed he should do so if he wished, and suggested he identify himself as a member of the JyS Cloud Seeding Technical Advisory Group.

Everyone likes the Estancia Primera clubhouse as a meeting place. Alan Jager was asked to make reservations for the next meeting.

Agenda Item 10) Next Meeting.

April 26 was agreed on. Since then, several people pointed out that was the week of weather modification association meetings in Fresno, CA, so we are in the process of revising the meeting date to the previous week. Stay tuned.