

# **Aspinall Operations EIS Hydrology Group Meeting February 1, 2006**

## Attendance List

Chris Cutler .....	Bureau of Reclamation, Salt Lake City
David Harpman.....	Bureau of Reclamation, Denver
Michael Dale .....	National Park Service
Wayne Schieldt ....	Colorado Division of Water Resources
Patty Gelatt .....	Fish and Wildlife Service
George Smith .....	Fish and Wildlife Service
Andrea Ray .....	NOAA Climate Diagnostics Center
Donald Phillips .....	Bureau of Reclamation, Montrose
Clayton Palmer ....	Western Area Power
Wayne Cook ....	Western Area Power consultant
Heather Patno ...	Western Area Power
Chuck McAda ....	Fish and Wildlife Service

## By Phone:

Karen Shirley .....	Upper Gunnison Water Conservancy District
Leslie James .....	Colorado River Energy Distributor Association
Dan Lueke ....	Environmental Defense
Kirk Lagory ....	Argonne National Laboratory
Balaji Rajagopalan	University of Colorado at Boulder

Several presentations were made regarding the question posed at the last meeting regarding the period of record.

Andrea Ray and Balaji Rajagopalan presented a method for incorporating climate information into the streamflow data record. This is something they've been working on for Reclamation's Lower Colorado Region involving tree ring paleologic data for western Colorado. This discussion showed the latest century did not contain the long dry periods evident in the past four centuries. They proposed an option whereby the paleologic reconstruction of streamflows from 1569 to 2002 for Western Colorado could be used to establish hydrologic categories or "states". Thirty year sequences in the paleo-record could then be populated by daily data from 1975-2005 by sampling states from 1975-2005 and correlating those with the states from the paleo-record. This transition probability method would provide the sequential variability of the paleo-record by creating hydrologic patterns not seen in the period of record of the daily data.

Dave Harpman presented the summary of his statistical analysis of unregulated inflow to Blue Mesa periods of record: 1906-2005, 1937-1997, and 1975 – 2005. Chris Cutler presented a similar analysis of natural flows at Whitewater. These analyses showed there was no significant statistical difference between the three periods, which was not

surprising since two are subsets of the other and in addition, the maximum and minimum periods were contained in all three periods of record.

Kirk Lagory, Argonne National Laboratory, presented his statistical analysis of two independent (non-overlapping) periods of record (1909-1974 & 1975-2002). [Sidenote – these periods of record split the period of record established in the flow recommendations.] He concluded that one could say there is a statistical difference between those periods.

Clayton Palmer, Western Area Power, said this wasn't exactly his question. He is also interested in knowing if there is a representative sample of daily data that matches the distribution of all the data (1906 – 2005.)

In the hopes of expediting the end of the meeting so they could get back on the road, Western Area Power provided the following three proposals for future work:

1) Completion of an iterative trace model for the Aspinall Units.

*Using the years of record in which daily values are available for the Gunnison River, Reclamation would complete the development of an iterative trace model. Iterative trace hydrology requires that the historical inflow data be used to fashion a probability distribution of inflows with an associated forecast error. A forecast error algorithm is used within the model to guide monthly releases from the Aspinall Units.*

2) Develop a Probability Distribution Function (PDF) Using Long-term Historic and Populate the PDF with Recent Data

*The long-term historic data is the monthly gage data from 1906 – 2005. These years are used to develop the hydrology PDF for natural Blue Mesa inflows and for water flows past the Whitewater gage. The PDF is then populated with data from the years of record in which average daily data is available. This is then used as the hydrological information that forms the basis to evaluate the EIS alternatives.*

*This method is intended to be exactly the method described by Andrea and Balaji Rajagopalan except that the development of the PDF is limited to those years in which monthly gage data is available.*

3) Description of the Development of a PDF Using Paleo-data

*The research team from the NOAA Earth System Research Laboratory will put together a presentation on how the method of developing a PDF using paleo data will proceed. Acknowledging that there are several different variations that can be used to accomplish this, the NOAA team will choose a method of developing a PDF (for illustration purposes). This will be presented to the Hydrology Committee at its next meeting. The steps will be described in detail using actual data so that the committee can understand the process. The possibility and possible consequences of errors will be presented. Also, how the final product will be used by Reclamation and/or the Hydrology Committee in the EIS process will be discussed. Finally, the NOAA team will present a schedule and budget.*

It was agreed that work would continue on solving the leap year problem with the iterative trace data set. In addition, Reclamation committed to work with CU and NOAA on building a PDF with the long-term period of record and populating with the 30 year daily data. These groups will also investigate the feasibility of using paleo data to do the same.

At the Cooperating Agency meeting held February 13, it was decided to hold the next hydrology meeting at 8:00 a.m. on April 21. If significant progress is made in the meantime, an interim meeting will be called.