

November 12, 1996

**Mr. William Bettenberg
Department of the Interior
Office of Policy and Analysis
1849 C St. NW, Mail Stop 4412
Washington, DC 20240**

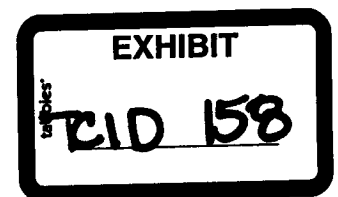
Dear Bill:

Bill Sikonia with the US Geological Survey has contacted me regarding the current modeling efforts for the Truckee River system and asked that I send a few comments based on my experience with the TROA model. As you know, I worked with Dave Robertson of Boulder, Colorado for over a year towards documenting and reviewing the TROA model while employed by the Geological Survey in Nevada.

Although we began this work with high expectations, the effort was continually slowed by logistical problems and the unfolding enormity of the task. The work was considerably hampered by the on-going development of the model by the TROA committee and the need to merge our modifications with newly written code. But more significantly, we came to realize that the existing code has large sections which are virtually indecipherable and could not be understood without a major re-write and extensive consultation with the program's principal author.

Based on my experience, the TROA model is such a patchwork of assumptions, physical and political simplifications, and convoluted code that it is difficult to say what the output results might represent or whether they approach a realistic representation of the water system. I certainly have not and could not rigorously evaluate the results and I base my opinion on only a very limited understanding of the functioning of the program. Nevertheless, I certainly would never have wanted to explain it in court or believe anyone could honestly do so without a major, multi-year re-write.

I must state that I do not believe the program authors have intentionally written obscure, convoluted computer code. The model is instead an example of the tendency for systems to head towards a state of disorder through time. I believe that the work was carried on diligently and with correct intentions, but there never was time to step back and rework it.



The following section describes the approach which I strongly advocated for developing a Truckee model. It is based on my experience with Truckee River modeling and computer programming in general. I speak for myself only, but believe that it coincides with some of the intentions of the USGS:

1) Abandon the existing TROA model, since no-one truly understands how it works and it would not be cost effective to unravel it.

2) Define whether the TROA model is to be used for negotiation purposes or for actual operation of the system. (This will determine the required time step for modeling, as well as the modeling complexity. Monthly or seasonal time steps are probably adequate for negotiation modeling, whereas something shorter is probably required for actual operation.)

3) Thoroughly investigate and document the existing operation of the system by the Federal Watermaster and others. (The system is currently operated without benefit of computer models. I think any prospective modeler should have a thorough understanding of how this is accomplished and should spend a considerable amount of time in the field learning the ropes.)

4) Describe all of the details of the current operation in a process flowchart. (The flowchart should be thoroughly studied and reviewed by the Federal Watermaster, hydrologists, and engineers until all agree that it accurately portrays the system. This should be viewed as the core of the modeling effort and no expense should be spared on this effort!)

5) Pick an appropriate existing model based on the intended use of the model and model the existing system.

6) Investigate the concerns and goals of the TROA committee. (The members of the TROA Committee should serve as mentors in this process.)

7) Modify the process flowchart to satisfy the new TROA requirements.

8) Either adjust the model or re-model the system including TROA requirements.

I hope my comments are of some use to you.

Finally, I hope you are well and wish you the best towards completing your work on these difficult tasks. I have asked Mr. Sikonia to please distribute this letter through e-mail.

NOVEMBER 12, 1996

Sincerely,

Kenn D. Cartier
4505 148th Ave. NE, KK303
Bellevue, Wa 98007
(206) 869-9181

cc: Bill Sikonia
Bill Greer
Fred Disheroon
Jeff Zippin
Larry Bohman
Jon Nowlin
Dave Robertson