Technical Information Regarding Pacific Institute Proposal

Introduction

In February, 2000, a consortium of environmental organizations led by the Pacific Institute submitted an interim surplus criteria proposal for consideration by the Secretary. This proposal was further clarified in the Pacific Institute's letter of comment on the Draft Environmental Impact Statement (DEIS), which was submitted to Reclamation on September 8, 2000. As discussed in Section 2.2.3 of the Final EIS (FEIS), this alternative was considered as part of the NEPA analysis but not analyzed as an alternative in either the DEIS or the FEIS. Pursuant to 40 C.F.R. § 1502.14, Section 2.2.3 of the FEIS discusses the reasons why the Pacific Institute proposal was eliminated from detailed study. As presented in Section 2.2.3, this decision is primarily based on the following two reasons: first, the alternative was determined to be beyond the purpose and need for interim surplus criteria due to the proposed delivery of additional water to Mexico; and secondly, the domestic aspects of the alternative (e.g., the surplus triggers and the amounts of water to be delivered within the Lower Division states) were similar to, and within the range of, the aspects of the other alternatives that were already analyzed in the DEIS and the FEIS.

This document summarizes Reclamation's modeling analysis of the Pacific Institute's alternative and presents a comparison to the other alternatives analyzed in the FEIS. As noted in Section 2.2.3 of the FEIS, the domestic effects of the alternative (e.g., effect on the elevations of lakes Powell and Mead) as shown on Figures 3 and 4 are similar to, and within the range of, the effects of the other alternatives analyzed in the FEIS. All information presented in this analysis is based upon information contained in the FEIS, and was presented to the Pacific Institute, along with other non-governmental organizations, on December 14, 2000, immediately prior to the publication of the FEIS.
Colorado River Interim Surplus Criteria
Modeling Analysis of the Alternative Submitted by the Pacific Institute

Background
A set of interim surplus criteria (ISC) was submitted to Reclamation by the Pacific Institute on behalf of several non-governmental organizations (NGO’s) in February 2000. Although the NGO Alternative was determined to be beyond the purpose and need of the action and was not analyzed in the Environmental Impact Statement (EIS), Reclamation agreed to model the alternative for discussion purposes. Reclamation’s initial modeling of the alternative was discussed with some NGO representatives in August 2000 and several modeling assumptions were clarified. These clarifications were also included in public comments on the Draft EIS (DEIS) submitted by the Pacific Institute. This document presents initial results of the modeling study incorporating these comments and clarifications.

Modeling Assumptions
For this study, key modeling assumptions were identical to those used for the Final EIS (FEIS) and are discussed in Section 3.3.3 of that document. Operating policies (with the exception of the ISC) were also identical and are documented in Attachment J of the FEIS. An additional demand point was added to the model to represent water deliveries to the Lower Colorado River delta. The NGO Alternative falls in the category of “multi-tiered trigger strategies”, where various amounts of surplus water are made available depending upon Lake Mead’s elevation at the beginning of each calendar year. The specific criteria modeled are as follows:

- **Baseline Delta Flows**: at elevation 1120.4 feet or greater, an annual flow of 32,000 acre-feet per year (afy) is delivered to the delta (at a constant rate each month).
- **Partial Domestic (M&I) Surplus**: at elevations between 1125 feet and 1145 feet, water is made available for a “partial domestic surplus”.
- **Full Domestic (M&I) Surplus**: at elevations greater than 1145 feet and less than the “70R” elevation, water is made available for a “full domestic surplus”.
- **Delta Flood Flows**: at elevations greater than or equal to the 70A1 elevation, an annual flow of 260,000 afy is delivered to the delta in May, June, and July (35%, 45%, and 20% respectively).
- **Quantified Surplus**: at elevations greater than or equal to the 70R elevation but less than that requiring flood control releases, water is made available for a “quantified surplus”.
- **Flood Control Surplus**: when Lake Mead is high enough to require flood control releases as prescribed by the Army Corps of Engineers procedures, water is made available for a “full surplus”.

The triggers used for this study are shown in Figure 1. It should be noted that both the 70R and Flood Control levels are computed by the model during the model run and therefore, the triggers shown are estimates for comparison only. The deliveries to the Lower Basin under each level are shown in Figure 2 and tabulated in Tables 1 through 4.
Note that the total Lower Basin deliveries represent deliveries within the U.S. plus the delta. Although the model meets the Treaty delivery to Mexico of 1.5 million acre-feet/year (mafy), and up to 1.7 mafy during years of flood control releases, those deliveries are not included in these totals.

The differences between the depletion schedules of the NGO Alternative and those of the Basin States Alternative can be summarized as follows:

- At the Flood Control level, the schedules are identical except for the additional 260 kaf to the delta.
- At the 70R level, the 260 kaf delivery to the delta is more than offset by reduced water made available to the basin states (particularly Arizona), since no water is made available for off-stream storage (including groundwater banking).
- At the Full M&I level, the 32 kaf delivery to the delta is offset by reduced water made available to MWD.
- At the Partial M&I level, the schedules were identical except that MWD was held to a constant 962 kaf for the ISC period under the NGO Alternative, resulting in more water delivered in the early years and less in the later years as compared to the Basin States Alternative.

**Modeling Results**

A total of 85 simulations were made using the NGO alternative. Each simulation represents a different future hydrologic inflow assumption and standard statistical analyses were performed on the output (see Section 3.3.3.5 of the FEIS for a detailed explanation).

Figures 3 and 4 present the 50th percentile values for Lake Mead and Lake Powell elevations for the years 2002 through 2050 for the baseline conditions and all alternatives. The NGO Alternative values are very similar to the values of the Basin States and Six States alternatives since the triggers and total deliveries are very similar for those alternatives. For the 50th percentile Lake Mead elevations, the maximum difference between the NGO and Basin States alternatives is 2.4 feet with an average of 0.71 feet over the ISC period. For the 50th percentile Lake Powell elevations, the maximum difference between the NGO and Basin States alternatives is 0.65 feet with an average of 0.18 feet over the ISC period.

Figures 5 through 7 present the 50th, 75th, and 90th percentile values for the flows to the delta, often termed the “excess flows to Mexico” (see Section 3.16 of the FEIS for a discussion of excess flows to Mexico). At the 50th percentile, only the NGO Alternative produces any flow, owing to the delivery of 32 kaf when Lake Mead is above elevation 1120.4 feet. At the 75th percentile, the NGO Alternative shows some additional flows in the years 2010 through 2016. At the 90th percentile, the NGO Alternative flows are somewhat less than those of the Basin States Alternative, due to the delivery to the delta of 260 kaf when Lake Mead elevation exceeds the 70A1 trigger, which in turn, reduces the frequency and magnitude of flood control releases.
Figures 8 through 10 present the 50th percentile values for the annual deliveries for California, Arizona, and Nevada respectively. For California, the NGO Alternative values at the 50th percentile are 38 kaf less in each year of the ISC due to the reduction at the 70R and Full M&I levels for MWD. The Arizona deliveries at the 50th percentile are identical except for the year 2025 when the Basin States Alternative values reflect a shortage condition. The Nevada deliveries at the 50th percentile are also identical except for the year 2025 when the Basin States Alternative values reflect a shortage condition.

**Future Work**
This study represents an initial step in the modeling and analysis of the NGO Alternative. A complete review of the depletion schedules is warranted to ensure that the alternative has been represented accurately. Additional analyses to quantify the effects of reduced deliveries for M&I and other uses at other percentiles should be performed. Further analyses of the effects on the frequency of occurrence of events of interest (e.g., flood control releases) should also be considered.

**References**
Figure 1. NGO Alternative Lake Mead Triggers

![Lake Mead Trigger Elevations]

Figure 2. NGO Alternative: U.S. Lower Basin Deliveries (incl. Delta flows)

![NGO Alternative Total Deliveries]
Figure 3. Comparison of 50th Percentile Lake Mead Elevation Values

Lake Mead End-of-December Water Elevations
50th Percentile Values

Figure 4. Comparison of 50th Percentile Lake Powell Elevation Values

Lake Powell End-of-July Water Elevations
50th Percentile Values
Figure 5. Comparison of 50th Percentile Flows to the Delta

![Graph showing comparison of 50th Percentile Flows to the Delta.]

Figure 6. Comparison of 75th Percentile Flows to the Delta

![Graph showing comparison of 75th Percentile Flows to the Delta.]

U.S. Bureau of Reclamation, Lower Colorado Region; Last Revision: December 28, 2000
Figure 7. Comparison of 90th Percentile Flows to the Delta

![Graph of Annual Excess Flows to Mexico showing 90th Percentile Values for different alternatives from 2000 to 2050.](image)

Figure 8. Comparison of 50th Percentile California Annual Depletions

![Graph of California Modeled Annual Depletions showing 50th Percentile Values for different alternatives from 2000 to 2050.](image)
### Table 1. NGO Alternative: Full (Flood Control) Surplus Schedules, kaf

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### Table 2. NGO Alternative: Limited (70R) Surplus Schedules, kaf

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