Testimony of Robert Almy

I am the Manager of the Santa Barbara County Water Agency, and have held that position since 1991. My experience and qualifications to provide this testimony is attached.

I am a member of the interagency committee (Santa Ynez River Hydrology Committee) which developed the Santa Ynez River Hydrology model (SYRH model). I supervised Jon Ahlroth from 1991 through his retirement in 2002. Mr Ahlroth was the principal author of the computer code which comprises the numerical simulation (computational) element of the SYRH model. Mr Ahlroth also developed the inputs for the model from both actual and synthesized data. As part of the preparation of this declaration, I reviewed results of SYRH model runs performed in 1999 and 2000 by Mr. Ahlroth.

The SYRH model results contained the WRCB DEIR reflect my understanding of the model in its state of development as of 2000. The model run results are similar to results from earlier runs which were produced by Mr Ahlroth under my supervision and which are contained in the files of the Santa Barbara County Water Agency. In addtion to his work on the SYRH model, Mr Ahlroth and I prepared the "Report of Modified Storm Operations, Bradbury Dam, Cachuma Project" which is County Exhibit 8. Modifird storm operations are based on a 72 hour flood routing model "FCRiver" developed and utilized by the County Flood Control District and Water Agency personnel (including Mr Ahlroth and myself) during rain events.

I have been asked to provide testimony that helps understand the implications of the County's request to delay surcharge until the County Park facilities can be modified to accommodate higher reservoir storage ("surcharge") with out damage to facilities or interruption of operations. Based on the SYRH model and other Water Agency records, I will discuss:

- the probability of the Reservoir filling and spilling,
- the probability of reservoir decline and risk of Reservoir water supply shortages due to prolonged drought,
- the decline of reservoir spill rate upon cessation of winter storms, and

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- the basis for delaying reservoir surcharge until the probability of large storms has diminished.

Probability of spills and, thus, the opportunity to establish a surcharge can be determined from existing SYRHM runs.

The model results may be used to estimate the probability of conditions which would allow surcharge of Cachuma Reservoir. Results shown in Figure 4 of Technical Memorandum No. 1 of Appendix E (attached) indicate "spill" conditions in 22 of the 76 years of the model. Inspection of Figures 5A through 5D might lead to a conclusion that spill conditions occur less frequently since Figures 5A through 5D are based on all months (including summer and fall) of the 76 year model run. In 21 of 76 years, the conditions 1) volume of spill (>9,000 AF) and 2) end of spill condition (May or later) are conducive of surcharge. (The winter of 1984-85 is the exception: the reservoir spilled in December 1984 but insufficient rainfall occurred during the rest of the winter to sustain a significant spill to April 15.) Thus, based on the results of the SYRH Model, the potential to surcharge in the spring occurred in 21 years of the 76 year modeling period. This is the probability (21/76) that conditions allowing for a 3-foot surcharge will occur in any given winter-spring. Witnesses from the County Parks Department have identified the consequences to County Park facilities if surcharge occurs.

Although reservoir inflow data from the SYRH model are generated in each run, these data are not presented in the Appendix E Technical Memorandum. However, based on historic flow data (USGS annual reports containing Los Laureles stream gage data and prior SYRH model run in the files of the SBCWA), significant inflow (> 30,000 AF) occurs in 27 of the 76 years of the modeled period, and are reflected in Appendix E, Technical Memorandum 1 Figure 5 as significant increases in reservoir storage.

As was stated in previous testimony, a significant rise in lake level would inundate a work area necessary for completion of changes to the main boat launch facilities. Thus, there is a 27/76 probability that lake level will rise sufficiently to impede modification of the Park boat launching facilities. This is consistent with the DEIR's conclusion regarding the frequency of

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surcharging. (DEIR, pp. 4-16-17, Table 4-4.) Conversely, if the lake level does rise before boat launching facilities are completed, we note that the SYRH Model predicts that the lake level is only low enough to complete the work 18 years (of 76) during the modeling period.

Thus while there is a risk to water supply if the reservoir fills and spills (discussed below), there is also a risk that boat launch facilities may not be completed in a timely manner so as to allow a surchage to 1.8 (or 3.0) feet.

Risk of reservoir water supply shortage (The SYRH Model forms a basis of determining risk to water supply by delaying surcharge)

Under the Biological Opinion, future target flows to address fish needs in any given year depend on the amount of water stored in Cachuma Reservoir and whether the reservoir spills. However, under current operations (DEIR Alternative 2) fish releases of 1.5 CFS are made to provide for downstream habitat, there is no obligation for increased flows for fish needs until conditions for surcharge occur. Therefore, if Lake Cachuma does not fill and spill in the five years in which the County proposes to relocate critical park facilities, the following risk analysis is not applicable. In other words, if current drought conditions persist, the Cachuma project would continue under current operational requirements. Under these circumstances, because Member Unit water accounts to accommodate fish needs do not change, they incur no new risk of water supply shortages. The following risk analysis assumes that surcharge or other conditions requiring increased releases for fish rearing and passage flows occur.

To understand risk of delaying surcharge, two elements of risk to water supply need to be discussed: consequence and probability.

My testimony is based on review of the most current Urban Water Management Plans submitted by the Member Units to the State of California and the member Units' agreed-upon policy regarding Cachuma Reservoir operation through the "critical period" (which is determined by reservoir size and historical hydrologic records, specifically rainfall and river flow). The "operational yield" of the reservoir was determined during the renegotiation of the Cachuma contract. Operation Yield is based on Reservoir operations through a six-year critical

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period based on 1945-51 hydrology with assumed (and planned) reduced annual supply after the Reservoir falls below a prescribed volume of storage (currently 100,000 acre feet). Only if the surcharge is missed at the beginning of a six-year period of similar hydrology (to 1945-51) and if "normal" diversions and releases (including for fish) occur would a "shortage" occur beyond that assumed in the operational yield determination. (If rain occurs in any year before the end of the critical period, the shortage would not occur, but of course the "critical period" condition would not be met). Based on the SYHM, the probability of a critical period occurrence is 1:76. However, in order to avoid impacts due to inability to meet user needs, it is acknowledged that the Member Units would likely provide for supplemental supplies to make up for potential shortages before the last year of the critical period.

The DEIR generally describes consequences of Reservoir shortages in its discussion of alternatives. We agree that the shortage estimates to water supply in the "worst drought year" (1951, end of the Cachuma critical period) are roughly correct. The effects of these shortages may be described as 1) the cost of purchasing supplemental supplies (e.g. $460/AF for delivery of additional state water project water) or 2) impacts to local water users due to shortages (e.g. effects of mandatory restrictions on landscaping or agricultural production). Given the difficulty in evaluating impacts to Member Unit water users, we provide an example of consequence based on the cost of purchasing additional supplies.

An example of consequence and the potential cost of avoiding shortages.

Based on County water supply/demand projections, Member Units have a short term surplus supply capacity because their current supply is planned to be sufficient to meet "general plan build-out" demand within their individual service areas. Such demand is not projected to occur for 15 to 20 years. (Supply-demand study, Santa Barbara County Water Agency, 2002, County's Exhibit 9). For this reason, I use Member Unit State Water Project "Table A amounts" and delivery costs as the basis of my example.

If the total volume of water to be made up is 9,200 AF (the volume of surcharge at 3 feet) the cost of replacing that water is the cost of delivering surplus supply. Since Member

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Units currently under utilize their State Water ("Table A" amounts), the cost of making up lost supply may be assumed to be equal to the cost of delivering 9,200 AF of additional SWP supply to lake Cachuma. Current estimated cost of delivering water through Cachuma Reservoir is $460/AF (including the "Warren Act" Charge). Thus, the total cost to make up missed surcharge water is estimated to be $ 4.2 Million. The actual cost would depend on the amount of water delivered. For example, half the make up water could be delivered in the 4th year of a drought and abundant rain could occur during the following winter obviating the need to deliver additional makeup water.

Probability of shortages

Probability of shortages involves both the likelihood that the surcharge would be missed (21/76 in any given year) and the probability that the lake will not fill/spill (and afford another surcharge opportunity) before supplemental supplies are purchased or impacts to users occur. If supplemental supplies are purchased in years 4 and 5 of a prolonged drought (so as to have those supplies available during the last year (1951 equivalent), the probability of needing to purchase supplemental supplies may be estimated based on the probability of lake level falling to an equivalent of year 4 or 5 of the "worst drought: (critical period). Based on the modeling results, year 4 conditions would occur 7 times in the 76 year modeling period and year 5 conditions 4 times.

In conclusion, impacts due to shortage caused by missed surcharge opportunity (modeled frequency 21/76) may be described as a relatively low probability (7/76 or 4/76 frequency) and high consequence event ($2-4Million cost). In contrast, the probability of park facilities inundation (and severe impacts), which would occur if a surcharge were to be established before facilities' modification, is higher (21/76frequency), and the consequence to park facilities and public trust resources certain. The County's testimony urges you to consider phasing, which is an opportunity to avoid consequences to both water supply and public trust resources.

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Duration of surcharge can be estimated by size of spills (from SYRHM) and recession coefficient (from historic recession curves).

In order to provide a basis for planning releases to satisfy downstream users pursuant to past WRCB decisions, the Water Agency has closely tracked the 'recession' (decline) of each spill condition since 1993. Evaluation of these and earlier historical data demonstrates a basic time dependent relationship after the initial 10 days of runoff from a particular storm. Using the numerical relationship established from the historic data, both the remaining volume and duration of the spills predicted from the SYRM may be estimated. As discussed in Exhibit 8.

Timing and rate of surcharges can be managed based on real time hydrologic data and recession coefficient (from historic recession curves).

Once a spill has continued for 10 days or more, estimates of duration and remaining spill volume may be made by projecting the change (decline) of spill rate based on a recession coefficient calculated from historic recession curves. Information about remaining volume and duration of spill may be used to control the rate and timing of surcharge. Specifically, such information may be used to reduce the rate of spill during surcharge in a manner sufficient to complete the full surcharge but not end the spill prematurely. The ability to avoid large or complete cessation of flow would allow avoidance of downstream fish impacts due to surcharging.

Surcharge should not occur before probability of major winter storms has diminished (so as not to interfere with Modified Winter Storm Operations ("precautionary releases"). An evaluation of storm probability has been performed by the Santa Barbara County Water Agency and reviewed by the USBR Technical Services Center.

In order to demonstrate that surcharge could be done without increasing downstream storm flow releases, the Water Agency evaluated statistical probability of significant runoff due to major storms. This analysis, provided to USBR in July 1994, focused on the size and frequency of storms in the upper Santa Ynez River watershed based on the records of the Santa

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Barbara County Flood Control District. That work was performed by Phil Holland (a certified engineering geologist) under my supervision.

That analysis, which was accepted by USBR, indicated that the probability of significant runoff in any given year declined beginning March 15 and became low by April 15. This analysis is the basis of determining surcharge should not occur before April 15.

However, this analysis did not assume the operation of the Bradbury Dam on a "real time" basis. In particular, development and implementation of "modified winter storm operations" in 1997-98 establishes criteria and procedures for responding to storms capable of generating large runoff events. (County Exhibit 8, Report of Modified Storm Operations, Bradbury Dam, Cachuma Project, prepared by Santa Barbara County Public Works Department, Water Agency, December 29, 1998.) This capability suggests that surcharge may occur beginning somewhat earlier than April 15 (between March 15 and April 15) and still maintain the capability to implement appropriate downstream flow reductions through Modified Winter Storm Operations. (We expect the increased operational flexibility afforded by increasing the height of the "splashboards" will contribute to reducing the risk of surcharge between March 15 and April 15 as well.)

As a result of the demonstration of reliable "real time" operation of the reservoir, we suggest that the WRCB not explicitly constrain the timing of surcharge, but rather condition so as to avoid contributing to conditions which would increase lake levels during the "gate holding" phase of winter storm operations so as to minimize threat to park facilities (and thus recreation).

Attachment:

Curriculum Vitae

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CURRICULUM VITAE

Name: **Robert B. Almy**

Education:
M.S. 1977 Western Washington University, Bellingham, WA
B.A. 1973 University of California, Santa Barbara

Academic Appointments:
1990-present Post Six-Year Lecturer, University of California, Santa Barbara
Environmental Studies Program "Environmental Impact Assessment"
- Technical and legal framework of prospective evaluation of impacts.

Honors and Awards:
1989 Planner of the Year, Santa Barbara County Citizen's Planning Association
1990 Santa Barbara Independent, "Local Hero"

Professional Activities:
Manager, Santa Barbara County Water Agency
Director, County "Project Clean Water" (storm-water quality program)

Professional Certifications
Registered Professional Geologist, California and Oregon
Certified USILA Lacrosse Referee
Center for Dispute Resolution, "Advanced natural resource decision conflict resolution"

Professional History
1990–Present Santa Barbara County Water Agency, Santa Barbara, CA
Water Agency Manager; Project Clean Water Director
- Water Agency programs: hydrologic modeling, data collection/analysis, weather modification, Regional water supply adequacy, water efficiency, non-point source pollution control, Tri-county F.I.S.H. Team.

  Contract management and budget preparation ($2.2 MM/year).

  Established Project Clean Water (surface-water quality) program (1998).

  Established reservoir sediment management program (1996).

  Expansion of agency cloudseeding program (1993).

1990-present University of California, Santa Barbara, CA
Lecturer: Environmental Studies Program "Environmental Impact Assessment"
- Technical and legal framework of prospective evaluation of impacts and public risk.
- 2 Quarters: Survey class and "EIS/R" preparation

1987–1990 County Planning and Department. Santa Barbara, CA
Deputy Director, Energy Division
- Management and supervision of staff.
- Permit processing, environmental review and permit enforcement.
- Hiring, evaluation and professional development of staff
- Contract management and budget preparation ($3.5 MM/year).

10/1983-8/1987 County Planning Department. Santa Barbara, CA

Permit Section Manager, Energy Division

- Developed permit compliance program (1986), "Three-party" operating agreement (1988)
- Staff supervision: Permit processing, environmental review, mitigation of environmental impacts and public risk, and permit compliance associated with major offshore petroleum project applications.
- Management and supervision of contractors
- Coordination among applicants, agencies, multi agency review panels and special interest groups
- Contract management and budget preparation ($2.5MM/year)

1/1982-10/1983 Dames & Moore Geosciences Group, Santa Barbara, CA

Project Hydrogeologist

Overall project supervision (logistics, field work, report preparation)

Proposal preparation and client contact

Subsurface contamination, dewatering, water supply development, environmental assessment

10/1977-12/1981 Oregon Water Resources Department, Salem, OR

Hydrogeologist II/III (promoted 12/80)

Comprehensive ground-water basin investigations

Water supply risk associated with groundwater overdraft

Site specific ground-water contamination studies

Enforcement of groundwater law and policies

Numerical simulation of hydrological systems

3/1977-10/1977 Cominco American, Spokane, WA

Assistant Geologist Pacific Northwest Exploration Division

Implementation of large-scale geochemical exploration survey, follow-up of geochemical anomalies

Detailed geologic mapping of selected properties

Research of available information to define target areas

Five Most Significant Publications:

Almy, R. B., Scott, M. A. and Strachan, S. (1987) Mitigation of Impacts and Reduction of Hazards Associated with Specific Coastal Petroleum Development Projects, in Proceedings, Coastal Zone 87, The Fifth Symposium on Coastal and Ocean Management.

Almy, R. B., Johnson, D. N. and Vrat, D. (1991) Changing Role of Local Government in the Development of Outer Continental Shelf Resources, in Proceedings, Coastal Zone 91, The Seventh Symposium on Coastal and Ocean Management.

Almy, R. B. and Gibbs, D. (1998) Santa Barbara County 1998 Groundwater Resources Report, Santa Barbara County Water Agency.

Ahlroth, J. A. and Almy R. B. (1998) Report on Modified Storm Operations, Bradbury Dam, Cachuma Project, Santa Barbara County, California.

Lyndon C. Lee, Peggy L. Fiedler, Scott R. Stewart, Robert R. Curry, Douglas Partridge, Jeffrey A. Mason, Robert B. Almy, Darcy L. Aston, Maureen E. Spencer, and Ethan M. Inlander (2001) Reference-based assessment of the functions of riverine waters/wetlands in the south coast of Santa Barbara County, California