

COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT

Project No. 2105-089

APPENDIX E

BASIS FOR FURTHER ANALYSIS OF THE EFFECTS OF
POTENTIAL MEASURES ON WATER TEMPERATURE IN THE
NORTH FORK FEATHER RIVER BASIN

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FEIS

APPENDIX E

**BASIS FOR FURTHER EVALUATION OF THE EFFECTS OF POTENTIAL
CONTROL MEASURES ON WATER TEMPERATURE
IN THE NORTH FORK FEATHER RIVER BASIN**

As discussed in section 3.3.1.2 of this final EIS, we selected the five following temperature control measures to further evaluate:

- Proposed MIF
- Modified MIF
- Proposed MIF with Curtain 4
- Proposed MIF with Curtain 4 and removal of levees
- Proposed MIF with Curtain 4 and Canyon dam blending

Our analysis of the potential effects of these five measures on water temperatures is primarily based on results of PG&E's use of a modified version of MITEMP3 (a one-dimensional lake temperature model developed by Massachusetts Institute of Technology) to model the water temperature in Lake Almanor, Butt Valley reservoir, and their outflows; and SNTEMP (a steady-state stream temperature model developed by the FWS) to model temperatures in the Seneca, Belden, Rock Creek, Cresta, and Poe reaches. We used the best available data to further evaluate the effects that these measures are likely to have on water temperatures during normal, reasonable extreme, and extreme hydrological and meteorological conditions. Since PG&E did not provide model results for the Modified MIF in a way that allows determining effects under each of these hydrological and meteorological conditions, we do not include it in the following discussion. However, we do discuss the effects that this measure would have on water temperatures in section 3.3.1.2 of this final EIS.

Table E-1 summarizes the modeling approaches that we used to characterize each of the other four potential measures we evaluated further. Most of PG&E's evaluations compared the effects of potential temperature control measures to modeled conditions for its proposed MIFs and not existing conditions, which led to the best representation of "existing" conditions being based on one year of data. In contrast, the four potential measures further evaluated are based on 33 years of inflows. However, it is important to note that the model results for the 33-year period are based on a single season of meteorological data. Although these factors limit how representative modeled temperatures are of the actual temperatures that would occur and the comparability of model results, we conclude that they provide valuable information to indicate or suggest the effects of each potential temperature control measure further evaluated.

Table E-1. Summary of data sources and statistical procedures used to characterize normal, reasonable extreme, and extreme hydrological conditions.^a (Sources: PG&E, 2003c; Bechtel and TRPA, 2004, as modified by staff)

Potential Measure	Normal	Reasonable Extreme	Extreme
Existing conditions	<p>Used ANEA21A model results, which had:</p> <p>Inflows based on 1980 (50%) and groundwater accretion based on conditions in 2000 (255 cfs in Lake Almanor).</p> <p>Inflow water temperatures were based on monthly median and ranges of monthly variation in monitored temperatures for the period of record.</p> <p>Meteorological conditions based on monthly median and range of monthly variation of long-term data from Chester, Canyon dam, and McArthur.</p> <p>Storage in reservoirs based on 2000.</p> <p>Canyon dam releases of 35 cfs from low-level gate, preferential use of Caribou No. 2 powerhouse, and Belden dam releases of 140 cfs.</p>	<p>Used DNEA21A model results, which had:</p> <p>Inflows based on 1976 (12%) and groundwater accretion based on conditions in 2001 (200 cfs in Lake Almanor).</p> <p>Meteorological conditions based on months with 10% exceedance monthly values and monthly variation of long-term data from Chester, Canyon dam, and McArthur.</p> <p>Storage in reservoirs based on 1994.</p>	<p>Used DWEA21A model results, which had:</p>

Potential Measure	Normal	Reasonable Extreme	Extreme
Project 2105 SA proposed MIFs	Used 50% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 25% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 10% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.
	Inflows consisted of 33 years based on historical records. Groundwater accretion in Lake Almanor was set at 430 cfs for normal years and 375 cfs for dry years.		
	A single season of inflow water temperatures was developed based on monthly median and ranges of monthly variation in monitored temperatures for the period of record and used for all years.		
	Storage in reservoirs was set equal to historical conditions.		
	MITEMP3 meteorological data were developed based on monthly median and range of monthly variation of long-term data from Chester, Canyon dam, and McArthur and used for each modeled year.		
	SNTEMP meteorological data were developed based on monthly median and range of monthly variation of long-term data from Chester, Canyon dam, and McArthur and used for each modeled year.	SNTEMP meteorological data were developed based on monthly 10% exceedance values and range of monthly variation of long-term data from Chester, Canyon dam, and McArthur and used for each modeled year.	

Potential Measure	Normal	Reasonable Extreme	Extreme
Project 2105 SA proposed MIFs with Curtain 4	Canyon dam and Belden dam instream flow releases were set at Project 2105 SA proposed MIFs, and all Canyon dam releases were assumed to be routed through the low-level gates. Used 50% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 25% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 10% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.
Project 2105 SA proposed MIFs with Curtain 4 and removal of levees	Used same inflows, inflow water temperatures, meteorology, storage in reservoirs, instream flows and their release points as “Project 2105 SA proposed MIFs.” Assumed modification of Prattville intake with a floating curtain (PG&E datum). Used 50% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 25% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.	Used 10% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.
	Used same inflows, inflow water temperatures, meteorology, storage in reservoirs, instream flows and their release points as “Project 2105 SA proposed MIFs.”		

Potential Measure	Normal	Reasonable Extreme	Extreme
Project 2105 SA proposed MIFs with Curtain 4, removal of levees, and Canyon dam blending	<p>Assumed modification of Prattville intake with a floating curtain and removal of levees along submerged channel (PG&E datum).</p> <p>Used 50% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.</p>	<p>Used 25% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.</p>	<p>Used 10% exceedance modeled water temperatures for the Prattville intake and discharge-blended Caribou powerhouse discharges, along with stream temperatures based on these values and following conditions.</p>
	<p>Used same inflows, inflow water temperatures, meteorology, storage in reservoirs, instream flows and their release points as “Project 2105 SA proposed MIFs”.</p>		
	<p>Assumed modification of Prattville intake with a floating curtain and removal of levees along submerged channel (PG&E datum).</p>		
	<p>Assumed Canyon dam releases consisted of 60 cfs from low-level gates and the remainder from the upper gates.</p>		

^a All model simulations assumed unaltered Lake Almanor water surface elevations even though the Project 2105 SA includes a measure for higher lake levels. Thus modeled temperatures for the Prattville intake, Caribou powerhouses, and NFFR are warmer than would occur if the project were operated to meet the higher lake levels.