RECLAMATION

Appendix H Hydropower

North-of-the-Delta Offstream Storage Investigation

July 2017

This page intentionally left blank**.**

Appendix H-1
Power Planning Study

This page intentionally left blank**.**

Contents

Tables

Figures

Executive Summary

The Department of Water Resources (DWR) Power and Risk Office (PARO) Power Planning Branch was tasked by the Division of Statewide Integrated Water Management (DSIWM) to conduct a power planning study for the proposed North-of-Delta Offstream Storage (NODOS) Project. NODOS is in the planning phase, at a feasibility-level stage. The objective of the PARO power planning study is to analyze the proposed action alternatives, from a power planning perspective. NODOS's action alternatives were developed pursuant to National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) Notice of Intent and Notice of Preparation (that were filed and published in November 2001 by the Bureau of Reclamation [Reclamation] and DWR, respectively) to investigate surface storage opportunities north of the Delta. The study objective includes optimization of NODOS power operations, and a financial assessment of NODOS obligations and revenues resulting from its exposure to the energy market. Also, the power planning study will provide a roadmap for the transmission interconnection planning process for the proposed project facilities.

The PARO power planning study is being conducted in multiple phases, as NODOS planning and implementation processes evolve with time. A first phase was completed in 2009, in which the designed capacities and the corresponding operational scenarios for the project's components were analyzed, and some design modifications were recommended. The current (second) phase of the study analyzed the three action alternatives identified for NODOS relative to the "No Project" alternative to optimize power operations (with sustained water operations) to better capture power market opportunities and utilize the inherent excess capacities (resulting from hydrology swings) for the different components of the project. Also in this phase of the study, needed design and operational changes that will add valuable operational flexibilities were identified. Operational flexibilities will be crucial for NODOS to be able to participate in a complex and evolving energy market while sustaining intended water diversions and deliveries. A third phase of the power planning study will follow, subject to DSIWM's desire to explore additional market opportunities (such as renewables integration) that may enhance the NODOS project's viability and value.

The NODOS project is an off-stream seasonal storage facility proposed to be built 10 miles west of the town of Maxwell, California. NODOS will be composed of two main reservoirs (Sites and Holthouse/Funks), and a conveyance system that includes a number of physical components (intakes, pumps, canals, pipes, and terminal structures). NODOS is designed to capture the annual seasonal cycle of the Sacramento River, where flood water could be captured, stored, and re-delivered at a later time. The major storage component of NODOS is Sites Reservoir, ranging from a 1.27 (Alternative A) to a 1.81 (Alternatives B and C) million acre-foot (MAF) reservoir. Water would be delivered to and from Sites Reservoir through a network of pumping/generating plants and conveyances. Three diversion points (Alternative B will have two diversion points) along the Sacramento River would be used to capture and divert/pump water to NODOS storage facilities.

DSIWM supplied PARO's Power Planning Branch with the most recent available California Statewide Integrated System (CALSIM) II model runs that describe the intended operations of NODOS, based on the 82 years of historical hydrology record. The CALSIM II results are used

to identify a median case, 30-year time-series for NODOS diversions from the Sacramento River, which is the basis for the study analysis. Project operations, constraints, and assumptions, as envisioned by the NODOS Project team, are maintained and further optimized to maximize the value of the project's assets.

Daily pump-back operations are superimposed (where and when possible) to better utilize excess capacities of project facilities (resulting from hydrology swings) and to capture energy market opportunities. The intent is to generate an additional revenue stream that would enhance the project's viability and value. A dispatch profile for the daily pump-back operations is generated based on market opportunities, efficiency of Sites Reservoir pumping/generating plant, and available storage at Holthouse Reservoir.

NODOS Energy Portfolio Value

Two operational scenarios are used to model each of the three action alternatives considered for the project: Incidental and Optimized. For the Incidental scenario, pumping and generating at the different NODOS facilities are driven by water diversions and releases. For the Optimized scenario, pumping and generating at the Sites Reservoir Pumping/Generating Plant are reshaped to minimize pumping costs obligations (pumping in off-peak hours) and to maximize energy generation revenues (generating in super-peak hours) for the project. Also, optimizing operations allowed for the project's excess capacity to be used to superimpose pump-back operations on NODOS operational modes.

For the 30-year planning period, optimizing NODOS operations resulted in additional revenues for the project in net present value (NPV) totaling $72,503,000 for Alternative A, $76,343,000 for Alternative B, and $77,003,000 for Alternative C. For all three action alternatives considered for NODOS, optimizing operations resulted in changing the net project cash flow from a negative to a positive cash flow – an improvement that would significantly enhance the economics of the project. For NODOS Incidental operations, the net total project's power portfolio value (generation revenues minus pumping costs) (for the median case of project diversions) in NPV is $-50,363,000, $-65,077,000, and $-54,206,000 for Alternatives A, B, and C, respectively. Whereas, for NODOS Optimized operations, the net project's power portfolio value in NPV is $22,140,000, $11,269,000, and $22,797,000 for Alternatives A, B, and C, respectively.

Capacity, Ancillary Services, and Renewable Integration

A crucial element of reliable grid operations, and relevant to NODOS operations, is Resource Adequacy (RA). For NODOS, RA obligations are a pseudo financial obligation in pumping/diversion cycle, and a revenue opportunity in generation/ release cycle. For NODOS, RA obligations for the pumping cycle are met through the "self-provided" provisions of current California Independent System Operator (CAISO) tariff, provided that the project meets CAISO participating load requirements. For a generation asset, there are two different levels of participation in CAISO's capacity market – local RA, and system RA, based on the relative location of that specific asset to pre-identified congested local areas within the CAISO-managed grid. Monetizing potential revenues for NODOS from participation in the capacity market is a

difficult task. The uncertainty in projecting where and when RA products are needed will render any estimate worthless, at this time. So, a range of values is offered to describe potential revenues for NODOS from RA offerings, and was based on a $2/kilowatt (kW)-year (for System RA) to $25.40/kW-year (for local RA products).

CAISO procures ancillary services (AS) to ensure that it has adequate reserve generation capacity to maintain the electric system reliability and system frequency, by matching generation and load at all times under both normal and abnormal operating conditions. For NODOS pumping/generating facilities, if interconnected to CAISO grid, AS would be a significant operations and costs/revenues concern. A preliminary assessment for AS opportunities for NODOS is conducted using the median case CALSIM II deliveries, for the 30-year planning period. For the pumping cycle, NODOS will have the opportunity, as a participating load (meeting CAISO tariff definition), to sell Non-Spin AS into the CAISO market. For the generation cycle, NODOS will have the opportunity to sell Regulation Down AS into the CAISO market. The average values for the off-peak Non-Spin, and on-peak Regulation Down are calculated using, as basis, published clearing prices for the CAISO AS markets. For Alternative CNODOS, the total AS revenues from Non-Spin (the pump mode) for the 30-year planning period in NPV is $4,925,000. The corresponding total AS revenues from Regulation Down (in the generation mode) for the project in NPV is $9,198,000. The total AS revenues from the pump-back operations in NPV is $11,595,000. The NODOS total potential AS revenues in NPV is $25,718,000 for the 30-year planning period. It should be noted that the aforementioned AS revenues are only a measure of potential revenues based on current market trends – granted that the CAISO market will evolve over time to accommodate load growth, renewable integration, regulatory changes, etc.

The California Renewable Energy Resources Act (CRERA), signed by California Governor Brown on April 12, 2011, significantly increased the State's renewable portfolio standard (RPS) targets from 20 percent to 33 percent by 2020. CRERA also expanded the compliance obligations to include virtually all retail sales of electricity in California. In September 2010, CAISO undertook a multi-phase stakeholder process (Renewable Integration Market and Product Review Initiative [RIMPR]), aimed at identifying changes to the energy market structure and at introducing new market products to reliably mitigate the impact of renewable generation (intermittent generation) as it penetrates the market. Other potential breakthroughs in the power sector include developing energy storage technologies and their potential application to pump-storage hydroelectric facilities. Energy storage in hydroelectric facilities is being integrated with intermittent renewable energy facilities to create dispatchable resources and enhancing grid reliability and power quality. Other forces driving the need for energy storage technologies are climate change policies, smart grid initiatives, and the desire to improve utilization of generation and transmission capacities.

For NODOS, there is great potential for the project's generation and pumping assets to participate in providing renewable integration services as the market needs evolve. Although NODOS' potential in renewable energy integration is certain, it is difficult to monetize that potential at this time because of the absence of a clear tradable market for these services. The CAISO RIMPR may introduce new market products that NODOS can provide, yet sustain its primary water storage and delivery objectives.

Conclusions-Second Phase

Under the median case deliveries of NODOS, the estimated NPV of the project's power portfolio (energy only) for the 30-year planning period in NPV is estimated to be $22,140,000, $11,269,000, and $22,797,000 for Alternatives A, B, and C, respectively. Additional revenues are expected for the project's power portfolio from participation in the Capacity, Resource Adequacy, and Energy Storage markets. However, monetary values for these services are not included in project economics to avoid speculation. More work is needed to improve on the findings of the current phase of the study.

H1.1 Background

This report summarizes the second phase of the Department of Water Resources (DWR) Power and Risk Office (PARO) Power Planning Study (study) for the proposed NODOS Project, and recommends additional analyses that need to be performed in the next phase of the study. This document reports the assumptions, the modeling approach, and the results of the second phase of the study. Additional analyses and modeling will be needed to further explore operational scenarios and design adjustments for the different project components that would enhance its viability and value. Changes in design parameters and optimization of operational scenarios will add valuable operational flexibilities that will be needed for the project to participate in a complex energy market, yet, maintain water, flood, fish, environmental, and power objectives.

NODOS is an off-stream seasonal storage facility proposed to be built 10 miles west of the town of Maxwell, California. The project is in the planning, feasibility-level stage. NODOS is composed of two main reservoirs, Sites (a new offstream reservoir) and Holthouse (an expansion of the existing Funks Reservoir), and a conveyance system that includes a number of physical components (intakes, pumps, canals, pipes, and terminal structures). The project is designed to capture the annual seasonal cycle of the Sacramento River, where flood water could be stored during the high-flow season and would be released during the low-flow season.

Three alternatives are proposed for NODOS in terms of the configurations, size, and operations of the different project components. The alternatives were formulated to satisfy a set of water and environmental objectives. The assumptions for the three NODOS alternatives are summarized in a January 5, 2011, document titled *Definition of Proposed Alternatives for Evaluation in the North-of-the-Delta Off-stream Storage Administrative Draft Environmental Impact Report and Statement*.

The major storage component of NODOS, and common to all three alternatives, is Sites Reservoir, (a 1.27 MAF storage facility for Alternative A, and a 1.8 MAF storage facility for Alternatives B and C) that has up to an approximate 14,000-acre inundation footprint. For example, in Alternatives B and C, Sites Reservoir storage capacity is generated through the construction of two main dams, Golden Gate Dam (310 feet tall) and Sites Dam (290 feet tall), and 9 Saddle Dams (ranging from 40 to 130 feet tall), as shown in Figure H.1-1. Two lower reservoirs (Holthouse and the Terminal Regulating Reservoir [TRR]) are configured to complement the project complex, and to add the needed operational flexibility to the project operations. The existing Funks Reservoir would be enlarged to 6,500 acre-feet (AF) storage capacity by the addition of Holthouse Reservoir and integrated with the rest of the project components. A second reservoir would be a newly constructed, 2,000 AF capacity TRR for the Glenn-Colusa Irrigation District (GCID) canal, to the east of Holthouse Reservoir.

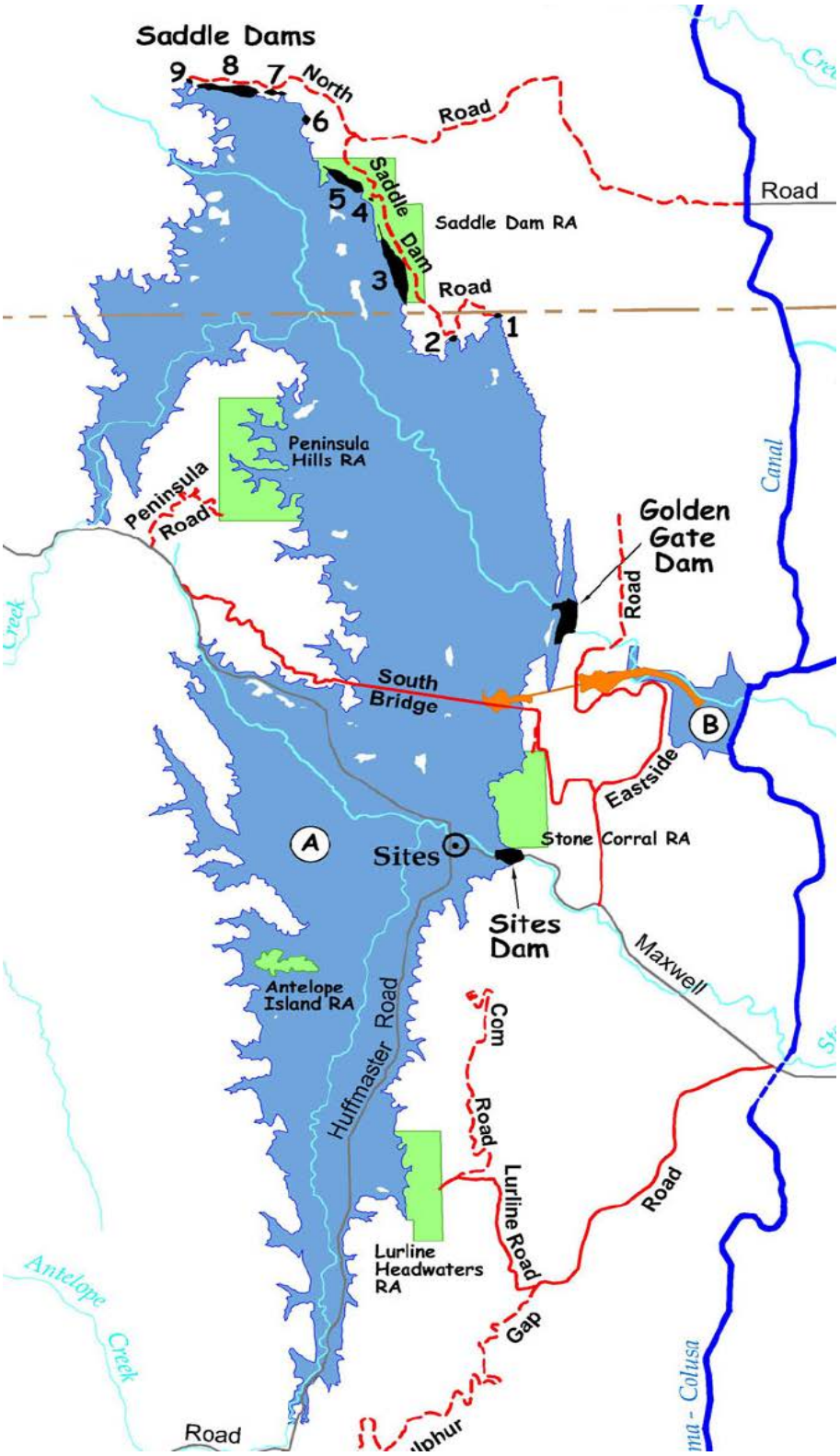


Figure H.1-1. Sites Reservoir Vicinity Map

Water would be delivered to and from Sites Reservoir through a network of pumping/generating plants and conveyances. Under Alternatives A and C, three pumping plants along the Sacramento River would be used to capture and divert water to NODOS. The pumping plants are either existing/modified or new. The Red Bluff Pumping Plant, and Tehama-Colusa (T-C) Canal, a 2,100 cubic feet per second (cfs) capacity plant, would be the project's upper most diversion point on the Sacramento River, near the city of Red Bluff. The project's second diversion point from the Sacramento River would be the GCID Pumping Plant and Canal, a 3,000 cfs capacity plant, and a 3,000 cfs to 1,800 cfs capacity canal. The third diversion point would be a newly constructed Sacramento River Pumping/Generating Plant and Delevan Pipeline, a 2,000 cfs pump, and a 1,500 cfs release capacity plant. Under Alternative B, the Sacramento River diversion pumps are eliminated; however, releases into the Sacramento River would occur with no power generation facilities.

Figure H.2-1 depicts the location of the three Sacramento River diversion points to Sites Reservoir. Holthouse Reservoir would be the lower elevation collection point for the project water diversions from the Sacramento River, and a distribution point for water releases from Sites Reservoir. For Alternative C, the hydraulic capacities of Sites Reservoir Pumping/ Generating Plant are 5,900 cfs in pumping mode and 5,100 cfs in generation mode. For Alternative B, the hydraulic capacity for pumping is 3,900 cfs. The TRR would have a 1,800 cfs pump and 1,500 cfs release capacity pumping/generating plant and pipeline to convey flows from the GCID Canal to Holthouse Reservoir.

This page intentionally left blank

H1.2 Study Objective

The objective of the study is to analyze the existing/designed components and operational scenarios of NODOS that resulted from the most recent California Statewide Integrated System (CALSIM) model studies from a power planning perspective. The study is aimed at optimizing NODOS operations to maximize its power portfolio's value (revenues-obligations). Also, the study will provide a transmission planning roadmap for NODOS interconnection with available power grid systems (California Independent System Operator [CAISO], Western Area Power Administration [WAPA], Pacific Gas and Electric (PG&E) and the Sacramento Municipal Utility District [SMUD]) in the area. The study results are meant to complement the work done by the Division of Statewide Integrated Water Management (DSIWM) and their consultants. The study is implemented using 2011 power market information and regulations, and available power portfolio models/tools to better evaluate energy costs and revenues of the project.

In light of the modeling results, the study makes recommendations for modifications in the design parameters and in the operational scenarios/assumptions that may enhance the project's value, and allow for better utilization of the project pumping/generating and storage facilities. Also, the study recommends further analysis needed to study the modified/optimized operational scenarios and design parameters of NODOS.

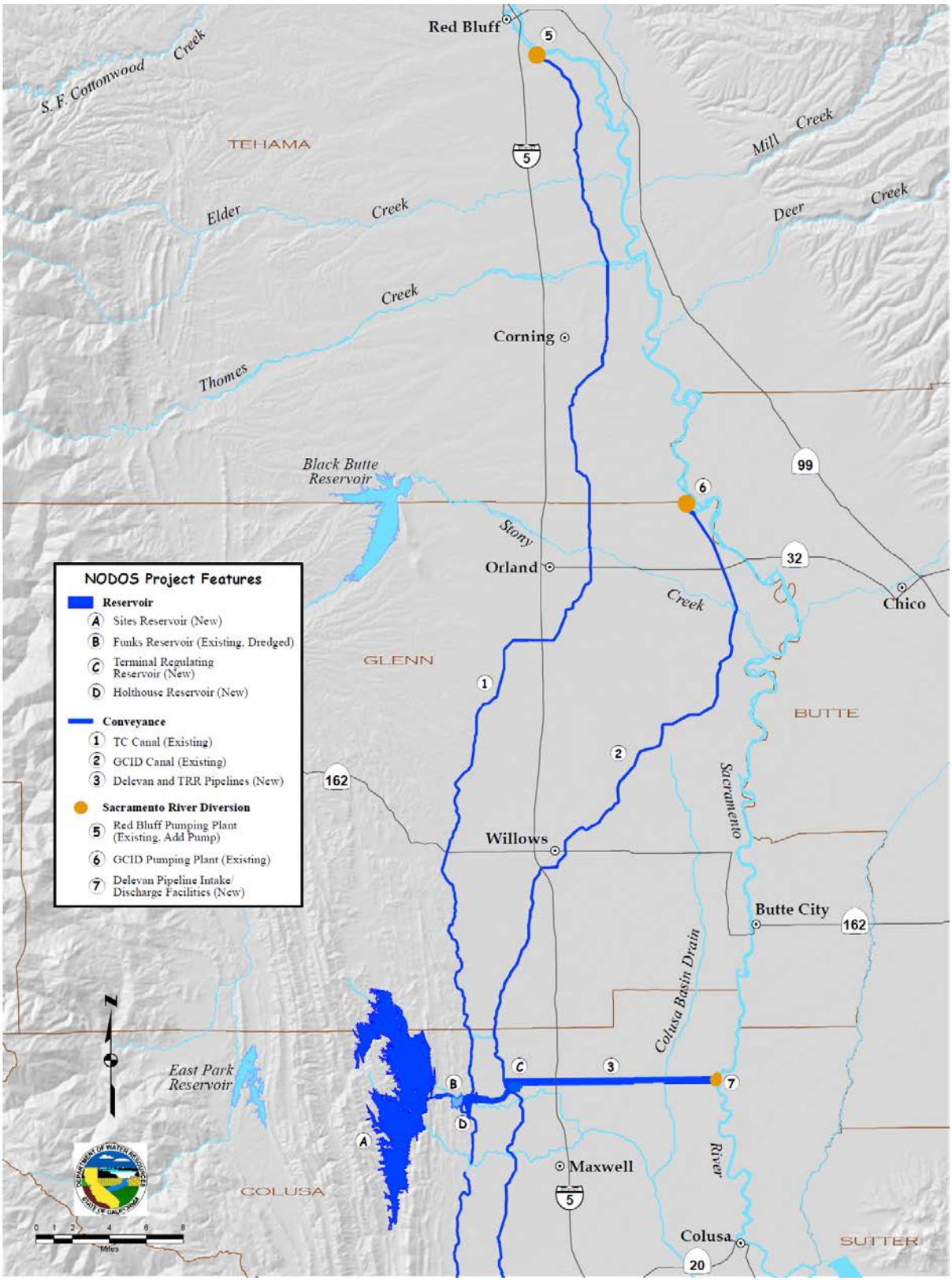


Figure H.2-1. NODOS Components and Interconnection

H1.3 Modeling Approach

DSIWM supplied PARO's Power Planning Branch with the most recent available CALSIM II runs. The CALSIM II model runs include the No Project Alternative and the three NODOS action alternatives. The CALSIM II model for the No Project Alternative is dated July 5, 2010, with assumptions developed on the basis of the April 1, 2010, Bay Delta Conservation Plan (BDCP) No Project Alternative without climate change. CALSIM II runs describe the intended operations of NODOS, based on the 82 years of historical hydrology record, for each of the three action Alternatives contemplated for the project. PARO used the supplied CALSIM II model results to generate a median case 30-year outlook for NODOS operations. The corresponding high and low cases (30-year outlook) for NODOS diversions from the Sacramento River were also developed, to reflect the uncertainty or "bookends" in water deliveries resulting from natural hydrology swings. For each of the three action alternatives considered in this study, the resulting 30-year operational time-series for all project components are the basis for NODOS' power portfolio value and risk.

For this study, project operations, constraints, and assumptions, as envisioned by the NODOS team, are maintained and further optimized to maximize the power portfolio's value. Optimizing project operations is done to capture market opportunities and price differentials between on-peak and off-peak energy. Current and future power market structure and opportunities are focused on efficient and reliable market design. Optimization of NODOS operations is important to more efficiently and economically use different project assets. A pump-back operation could only be superimposed on NODOS operational modes (diversion and release modes) if pumping and generation for water delivery purpose are optimized (synced with market on-peak and off-peak cycles). Also, optimization of project operations will translate the inherent excess design capacities of the project's components (resulting from hydrology swings) to operational flexibility, and minimize operations and maintenance net costs of the project.

One of the challenges in modeling a proposed project (i.e., future construction of an energy market participating project) is in choosing an appropriate project operations start date, or when the project's assets will be online. The start date will determine the window of time for a price forecast (power and fuel) and the corresponding volatility term structure that the analysis will be based on. The further out the anticipated project operations start date is, the further the price basis used for the analysis would separate from actual market dynamics and current market trends. An alternative approach to overcome this problem is to assume that the project will be operational in the near future and to accordingly value all assets and power needs. Similarly, operational, maintenance, and construction costs would be valued on the same start date basis. Then, costs and revenues would be discounted to a present value consistent with the analysis date. Planned and anticipated future changes to the regulatory environment, power market structure, and market evolution can be reflected in the analysis, on a potential scenario basis. This approach will provide a good comparative framework, and minimize the inherent forecast errors (i.e., speculation) in both projects' power portfolio value and in its construction costs.

Figure H.3-1 is a flowchart depicting a summary of the different steps/tracks (roadmap) taken in translating CALSIM II model runs to an energy portfolio set of assets and contract instruments (time series of monthly pumping and/or generation for each project component). Figure H.3-1

also describes the general modeling approach that was adapted in performing the study on the three proposed action alternatives for NODOS.

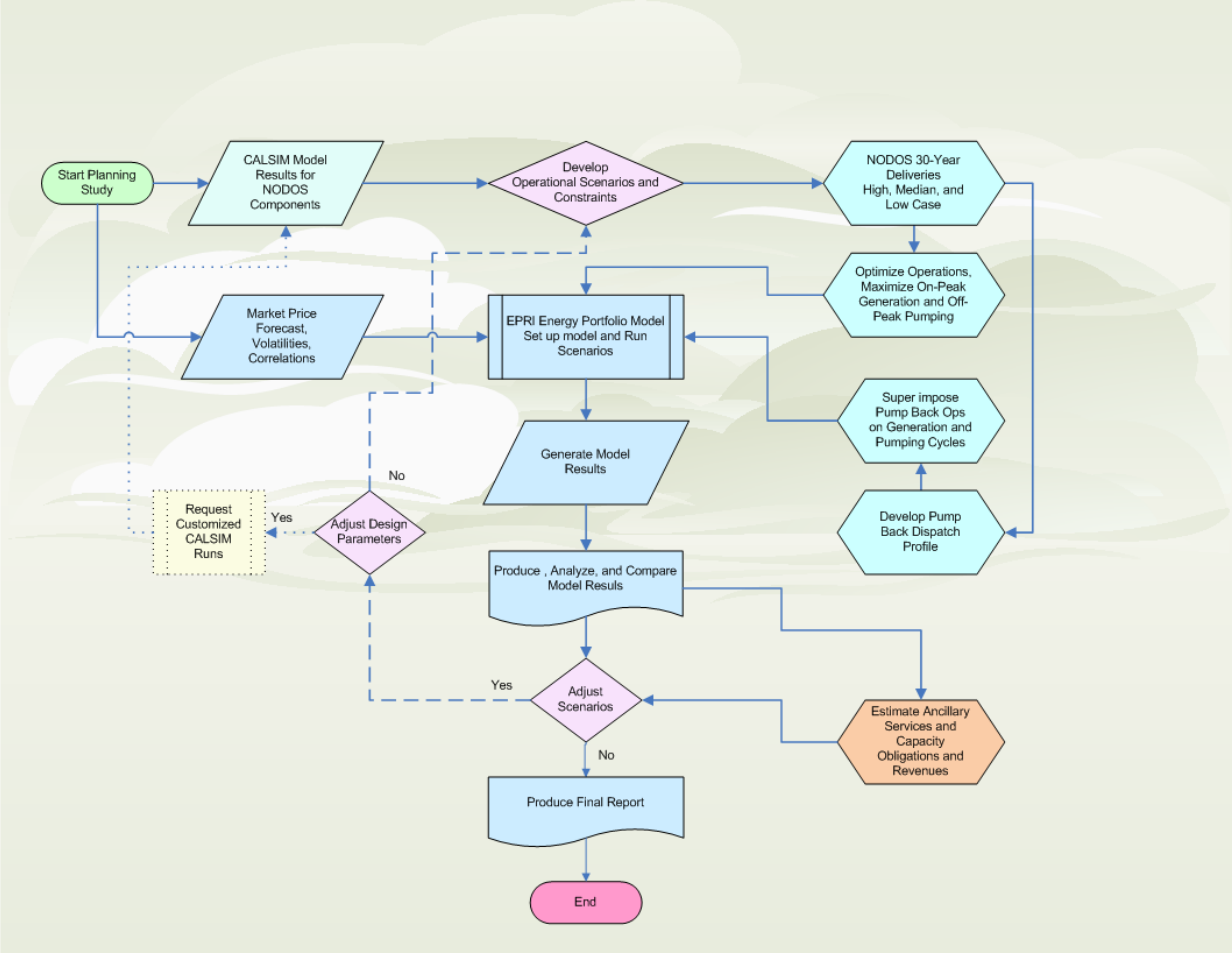


Figure H.3-1. NODOS Project Power Planning Study Flowchart

EPRI Energy Portfolio Model

Current power portfolio models available to PARO are used to execute the analysis for NODOS. The Electric Power Research Institute (EPRI) Energy Portfolio Model (EPM), version 5, is used for this purpose. EPRI Fast Fit model, version 2.5, is used to describe the needed power and fuel price volatilities term structures, and the correlations between the different energy markets the project will be participating in, or exposed to.

The EPM is a computer software/model designed to help businesses manage value and risk in the energy markets. The EPM is used in the current study to value the different NODOS assets and energy needs. The EPM is a module of a larger suite of individual modules, called the Energy Book System (EBS). Other modules within EBS are EPRI Contract Evaluator, EPRI Risk Manager, EPRI Retail Product Mix, and EPRI Fossil Asset & Project Evaluator. These modules were designed to meet the valuation and risk management needs of a targeted segment of the energy industry. Specifically, businesses with exposure to the energy market with corresponding

exposure to a variety of financial risks. Financial risks, among other things, result from the extraordinary volatility in wholesale energy markets, especially price risk and uncertainty in the underlying fuel markets.

The EPM provides a set of templates that facilitates the description and evaluation of common types of power and fuel contracts, including supply contracts, standard and customized forward, and option contracts. It has the capabilities to model a number of physical assets, including full requirements contracts, power and fuel storage facilities, and generation assets. Many other assets can be modeled by combining two or more standard templates. The EPM requires the user to describe prices in the underlying commodity markets. The model characterizes each commodity market by a forward price curve and a term volatility structure. A correlation matrix characterizes the behavior of pairs of commodity markets is also needed by the model. The correlation matrix is an important concept in evaluating portfolio risk, and assets with two underlying markets, such as spread options or generating units. The model can also be used to assess the value and risk implications arising from uncertainty regarding the future level of load and stochastic generation (e.g., "run-of-river" hydroelectric generation).

The EPM calculates the current market value of any number of user specified assets. The EPM can also calculate and report portfolio value, cash flows, and risk exposures. This includes assessing portfolio's exposure to both underlying commodity markets and customer loads. EPM allows users to manage price and load risk by applying methods that reflect the volatility and correlations between load and price. The market value of a resource depends on the cash flows it is expected to generate over its remaining life. Therefore, the market value of a generating unit depends on the difference between the value of the energy it is expected to produce and the value of the resources required for production. Market values fluctuate over time as conditions in the underlying markets fluctuate. EPM reports the market value of a resource or asset as the value of what it is worth today. One of the benefits of the EPM is that it will allow users to "mark-to-market" periodically each position in their book and thereby track gains and losses as they arise. EPM can report value and risk exposures on a weekly, monthly, quarterly, or annual basis over a user-specified time horizon.

Energy Forward and REC Price Curves

Three sources of data are used to generate the energy price forecast that would be the basis for energy values for the study. The three sources are forward energy "broker" quotations provided by Tullet Liberty (Tullet)[1], natural gas futures and natural gas futures basis as reported by the New York Mercantile Exchange (NYMEX), and forecasted spot electricity and natural gas prices as provided by Ventyx semi-annual structural forecast (formerly Global Energy Decisions [GED]).[2]

[1] Tullet is, among other things, an energy brokerage company that matches buyers and sellers.

[2] Ventyx is forecasting the actual day-ahead cash price that will occur in the sport markets in the future, not the price at which futures or forward contracts should be priced.

The derived natural gas price curve is made up of Henry Hub (HH) futures prices, adjusted for a specific local hub through using basis prices (for HH to Southern California (SoCal), or HH to the Pacific, Gas and Electric Company [PG&E] Citygate, in this case). Basis prices represent the mark-up or discount in natural gas prices (due to transmission fees, congestion, etc.) at a specific hub, relative to prices at HH. For HH futures, prices are obtained from the NYMEX website, and are current market closing prices for the date when the forward curve is being generated. There are 12 to 13 years of HH futures prices that are available through the NYMEX. These prices are extrapolated to cover the 25-year period that matches the Ventyx structural forecast period. The extrapolation is done through computing the growth/escalation rate of the last 4 years of the current market price quotations, and using the computed growth/escalation rate to extend the last year's available market prices.

For basis prices, there are two data sources: one is market basis prices, the other, a structural forecast of basis prices provided by Ventyx. Ventyx provides monthly basis prices for 25 years to match its structural forecast period, reflecting potential changes in the energy market and their impacts on a specific local hub prices (relative to HH prices). Market basis are available from the NYMEX website, with basis prices available for three to five years (depending on the hub location, whether it is SoCal or PG&E Citygate). The basis price forward curve is extrapolated to generate prices for a 25-year period by taking the last year's monthly quoted basis prices and repeating those prices for every month out to 25 years.

For SWP natural gas price forecast process, the average of the extended market basis and the structural basis (from Ventyx) is then taken and added to the Henry Hub extrapolated forward curve. The resulting natural gas forward curves for either SoCal or PG&E Citygate hubs will be used in the study, where appropriate. Figure H.3-2 shows the resulting natural gas forward curve for PG&E Citygate, which is used for the NODOS Power Planning Study.

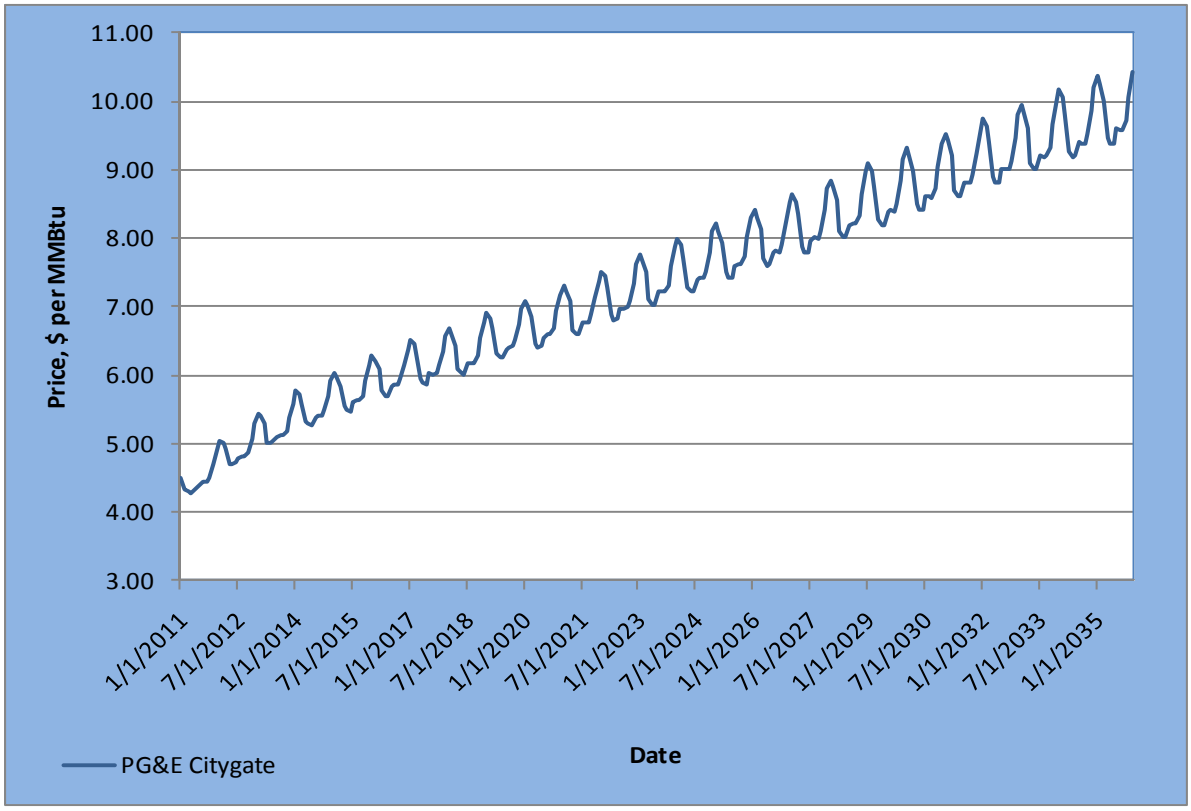


Figure H.3-2. Natural Gas Price Forecast, Forward Curve for 2011 through 2040

For the power price forecast, the derived power forward price curve is comprised of two segments: market forwards, and synthetic forwards. The first segment uses the most current Tullet energy forwards quotations, for NP-15 and SP-15 market's different products (on-peak, off-peak). This segment runs anywhere between 12 to 24 months (data availability is dependent on time of year that the power forecast is generated).

The second segment of the price curve is the "synthetic" portion. The synthetic segment continues where the first segment stops, to complete the 25-year period to match the natural gas forecast period. There are two approaches that are being used to derive the synthetic portion of the forward curve. One approach is to calculate power prices using the natural gas forecasted prices (as described above) multiplied by historical implied heat rates.[3] The other approach is to multiply the forecasted natural gas prices by a forecasted heat rate, reported as part of the structural forecast, by Ventyx. The average of those two generated power forward price curves yields the resulting synthetic forward curve that make up the second segment of the power price forward curve. The same process is repeated for each of the CAISO markets and its specific products (on-peak and off-peak), with the appropriate underlying fuel markets. The resulting

[3] Historical implied heat rates were calculated from 2004 - 2008 historical price data (five years). Daily prices were averaged into monthly prices. The heat rate is calculated as the respective period's power price divided by the respective period's gas price.

power forward curve for NP-15 is shown in Figure H.3-3, and is used for the NODOS Power Planning Study.

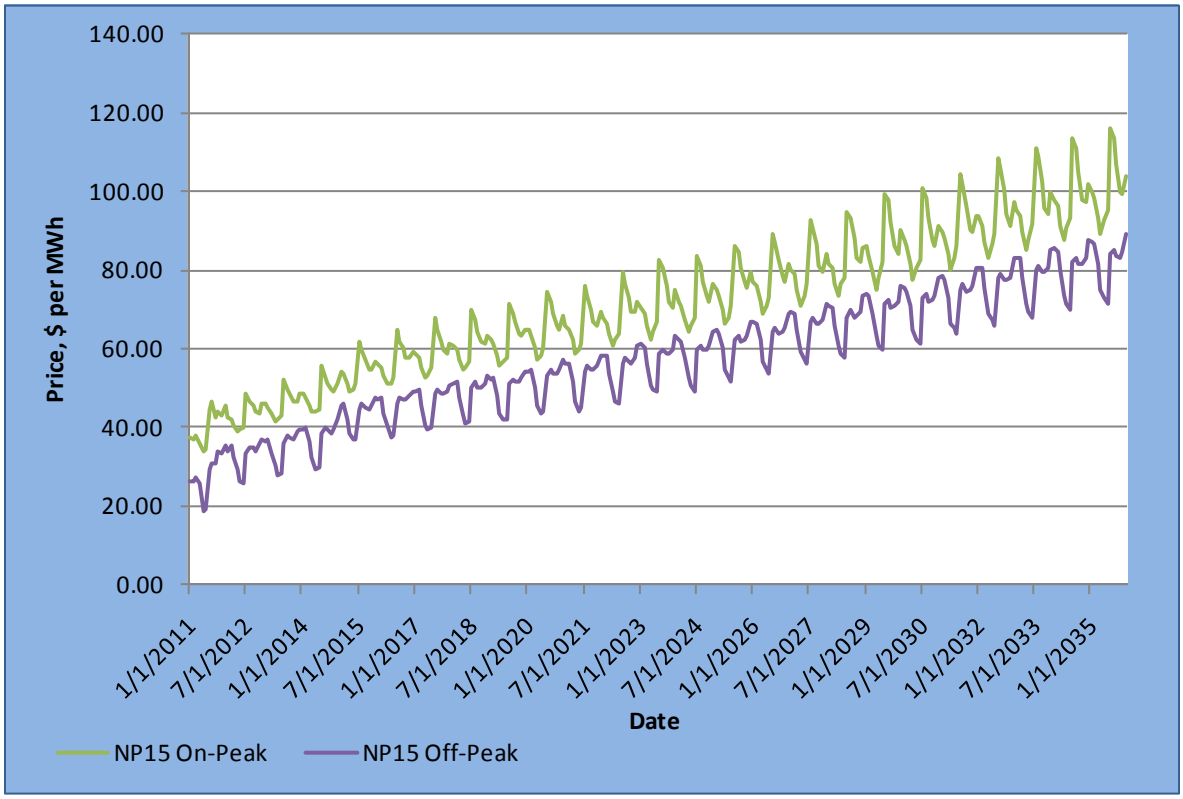


Figure H.3-3. Power Price Forecast, Forward Curve for 2010 through 2039

For the Sacramento River (Alternatives A and C) and TRR generating plants future planned capacity (less than 30 megawatts [MW]) qualify both plants to meet the RPS certification requirements, and allow both plants to participate in the Renewable Energy Credit market (REC), a product of the RPS and the Assemble Bill (AB) 32 greenhouse gas (GHG) mandates. For the purpose of this study, power generation for these two plants was valued based on the forecasted energy prices for the CAISO markets that the plants would participate in or have indirect exposure to (NP-15 market for power and PG&E Citygate market for natural gas), and the additional value that would be realized from the RECs that the two plants will produce. Hence, the power price forecast was adjusted to reflect the forecasted value of the RECs in Western Electricity Coordinating Council (WECC) region as reported by Ventyx Spring 2011 forecast. The reported REC values are used to generate a power curve adjusted to reflect the total value of a megawatt hour (MWh) (energy+REC) generated at the TRR and Sacramento River generating plants. Figure H.3-4 shows the REC values as reported in the Ventyx Spring 2011 forecast, and compared to the forecasted values from two previous Ventyx forecasts.

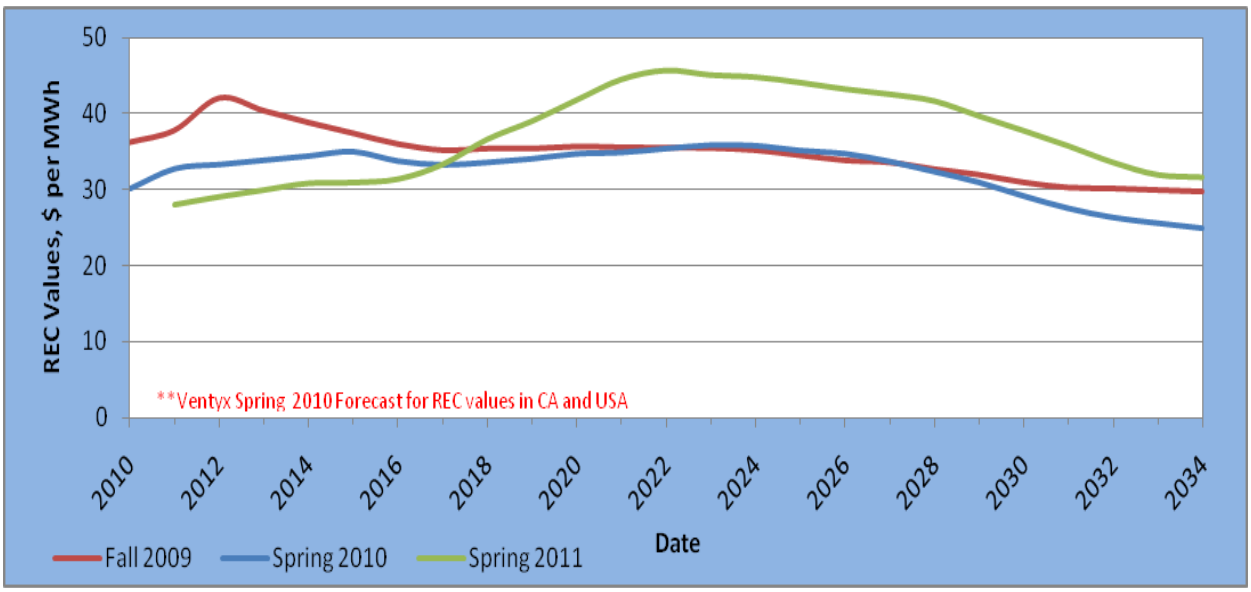


Figure H.3-4. Renewable Energy Credit Forecast for the WECC Region for 2011 through 2034

This page intentionally left blank

H1.4 NODOS Project Formulation, Alternatives, and Operations

NODOS Project Alternatives

This section is a synopsis describing the NODOS development process, and is extracted from the main report titled *Definition of Proposed Alternatives for Evaluation in the North-of-the-Delta Offstream Storage Administrative Draft Environmental Impact Report and Statement*. More details on the evolution of NODOS are discussed in the aforementioned report.

Pursuant to NEPA and CEQA, a Notice of Intent and Notice of Preparation were filed and published in November 2001 by Reclamation and DWR respectively, to investigate surface storage opportunities north of the Delta. The purpose of including a reasonable range of alternatives in the environmental impact report (EIR) and or environmental impact statement (EIS) is to offer a clear basis for choice by the decision makers and the public as to whether to proceed with a proposed action or project. NEPA and CEQA require that EIS and EIRs consider a reasonable range of feasible alternatives that could meet the project objectives and accomplish the project purpose and need while avoiding or minimizing environmental impacts. NEPA and CEQA also require that a No Project (NEPA) and No Project (CEQA) Alternative be analyzed. NEPA and CEQA requirements are discussed in greater detail in Chapter 1 of the NODOS EIR/EIS.

Three different configurations for NODOS were combined with the anadromous fish measures and new hydropower facilities to develop the action alternatives summarized in Table H.4-1 (Table 2-8). The alternatives include a No Project Alternative plan and three Action Alternative plans. It was anticipated that these alternative plans and the No Project Alternative would provide a reasonable range of alternatives for further refinement and detailed analysis in the Feasibility Report and EIR/EIS, to meet the requirements of NEPA, CEQA, other pertinent Federal, State, and local laws, regulations, and policies; and the Principles and Guidelines (P&Gs) presented in the U.S. Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (U.S. Water Resources Council [WRC],1983).

The following sections provide further details on the components of the alternatives:

- No Project Alternative—The No Project Alternative assumes that no actions would be taken to provide storage north-of-the-Delta to improve water supply reliability, to enhance the survivability of anadromous fish or drinking water quality in the Delta, or to improve flexible generation.
- Alternative A: 1.27 MAF Sites Reservoir with Delevan Pipeline – Alternative A includes a 1.27 MAF Sites Reservoir with conveyance to and from the reservoir provided by the existing T-C and GCID canals and a new Delevan Pipeline (2,000 cfs diversion/1,500 cfs release). This alternative also includes new hydropower facilities and a program to address the three anadromous fish measures.

- Alternative B: 1.81 MAF Sites Reservoir with Release-only Delevan Pipeline – Alternative B includes a 1.81 MAF Sites Reservoir with conveyance to and from the reservoir provided by the existing T-C and GCID canals, and a new release-only Delevan Pipeline (1,500 cfs release). This alternative also includes new hydropower facilities and a program to address the three anadromous fish measures.
- Alternative C: 1.81 MAF Sites Reservoir with Delevan Pipeline – Alternative C includes a 1.81 MAF Sites Reservoir with conveyance to and from the reservoir provided by the existing T-C and GCID canals and a new Delevan Pipeline (2,000 cfs diversion/1,500 cfs release). This alternative also includes new hydropower facilities and a program to address the three anadromous fish measures.

Table H.4-1. NODOS Project Action Alternatives, Priorities, and Objectives

Alternative	A	B	C
Storage Capacity			
Site Reservoir	1.27 MAF	1.81 MAF	1.81 MAF
Conveyance Capacities *(to Site Reservoir)* [1]			
Tehama-Colusa Canal	2,100 cfs	2,100 cfs	2,100 cfs
Glenn-Colusa Irrigation District Canal	1,800 cfs	1,800 cfs	1,800 cfs
New Delevan Pipeline [2]			
Diversion	2,000 cfs	0 cfs [3]	2,000 cfs
Release	1,500 cfs	1,500 cfs	1,500 cfs
Operations Priorities *(Primary Planning Objectives)*			
Long Term *(All years)*	EESA [4] Power [5]	EESA [4] Power [5]	EESA [4] Power [5]
Driest periods *(drought years)*	M&I	M&I	M&I
Average to Wet Periods *(non-drought years)*	Water Quality Level 4 Refuge Agricultural	Water Quality Level 4 Refuge Agricultural	Water Quality Level 4 Refuge Agricultural
Nonoperational Actions			
Ecosystem Enhancement Fund	✓	✓	✓
Physical Features			
Golden Gate and Sites Dams	✓	✓	✓
Number of Saddles Dams	6	9	9
Recreational Areas	Up to 5	Up to 5	Up to 5
Road Relocations and South Bridge	✓	✓	✓
Sites PG Plant Capacities	5,900 cfs pumping capacity 5,100 cfs generating capacity	3,900 cfs pumping capacity 5,100 cfs generating capacity	5,900 cfs pumping capacity 5,100 cfs generating capacity
Sites Electrical Switchyard	✓	✓	✓
Tunnel from Sites PG Plant to Sites Inlet/Outlet Structure	✓	✓	✓
Sites Reservoir Inlet/Outlet Structure	✓	✓	✓
Field Office Maintenance Yard	✓	✓	✓
Holthouse Reservoir Complex	✓	✓	✓
Pump Installation at the Red Bluff Pumping Plant	✓	✓	✓
GCID Canal Facilities Modifications	✓	✓	✓
GCID Connection to the TRR	✓	✓	✓
TRR	✓	✓	✓
TRR PG Plant	✓	✓	✓
TRR Pipeline	✓	✓	✓
Delevan Transmission Line	Sites Power Plant to PG&E line plus PG&E line to Sacramento River	Sites Power Plant to PG&E line	Sites Power Plant to PG&E line plus PG&E line to Sacramento River
Delevan Pipeline	✓	✓	✓
Delevan Pipeline Intake Facilities (Fish Screen and PG Plant)	2,000 cfs diversion capacity; 1,500 cfs release capacity		2,000 cfs diversion capacity; 1,500 cfs release capacity
Delevan Pipeline Discharge Facility		1,500 cfs release capacity	

Notes for Table H.4-1

[1] Diversions through the TC Canal, GCID Canal, and Delevan Pipeline area allowed in any month of the year, however, November through March is generally the season that Sites Reservoir will be filled.
[2] New Delevan Pipeline can be operated June through March (April and May are reserved for maintenance).
[3] A pump station, intake, and fish screens are not included for the Delevan Pipeline for Alternative B. For Alternative B, the Delevan Pipeline will be operated for releases only from Sites Reservoir to the Sacramento River year around.
[4] Ecosystem Enhancement Storage Account (EESA) related operations area a function of specific conditions, and operating criteria that are defined uniquely for each action.
[5] Includes dedicated pump/generation facilities with an additional dedicated after-bay/before-bay of 65 TAF in Holthouse Reservoir (enlarged Funks Reservoir) used for managing conveyance of water between Sites Reservoir and river diversion locations.

cfs = cubic feet per second
EESA = ecosystem enhancement storage account
GCID = Glenn-Colusa Irrigation District
M&I = municipal and industrial
MAF = million acre feet
PG Plant = pumping and generation plant
Power = Power Plant
TAF = thousand acre feet
TC Canal = Tehama-Colusa Canal
TRR = Terminal Regulating Reservoir

Figure H.4-1 illustrates the major features of the various action alternatives.

NODOS Project Operations – Water Operations

For evaluation of the NODOS project action alternatives, the project team used a generally consistent operations strategy for each alternative. The operations strategy is reflected in the operations simulation modeling that is the primary planning tool to determine many of the project benefits and impacts. The ability of each action alternative to implement the strategy effectively is subject to the conveyance options included and the coordinated operation of Sites Reservoir with other existing facilities.

The strategy has four components: (1) operating criteria for diversion of flows from the Sacramento River to fill Sites Reservoir; (2) operating criteria to achieve benefits associated with the primary objectives in drought (driest periods) and other hydrologic conditions; (3) integration and (4) coordination of Sites Reservoir releases with releases from Trinity Lake, Shasta Lake, Lake Oroville, and Folsom Lake.

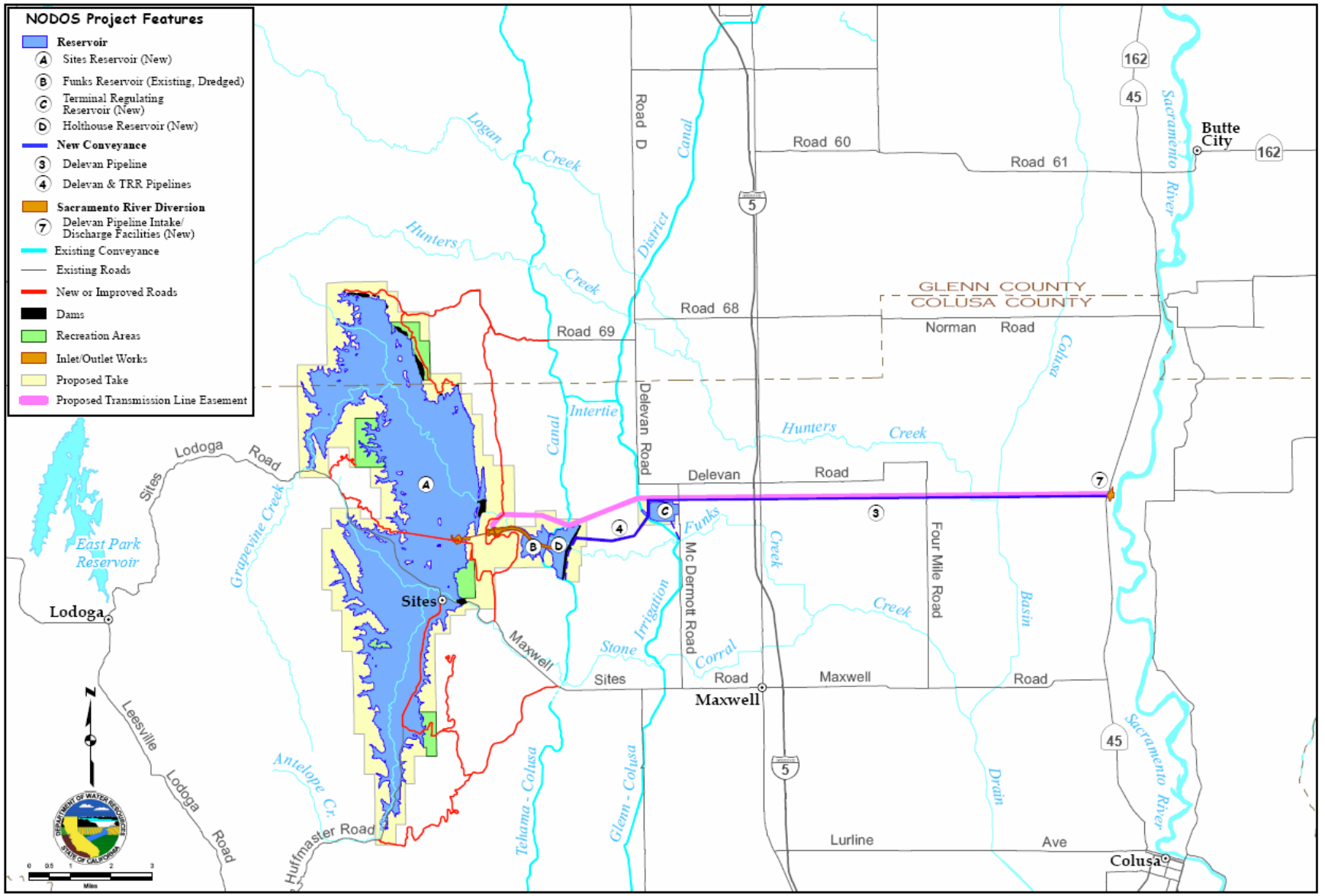


Figure H.4-1. Major Features of the Actions Alternatives

Each action alternative would be operated to divert Sacramento River flows to maximize the filling of Sites Reservoir as long as those flows were not needed to meet (1) existing Central Valley Project (CVP) and State Water Project (SWP) and other water rights diversions; (2) existing regulatory requirements including State Water Resources Control Board (SWRCB) Water Rights Decision 1641 (D-1641), Central Valley Project Improvement Act (CVPIA) 3406(b)(2), 2008 U.S. Fish and Wildlife Service (USFWS) Biological Opinion (BiOp) and 2009 National Marine Fisheries Service (NMFS) BiOp and other instream flow requirements; and (3) flow conditions to minimize the impact of diversion operations on achieving the primary objectives for anadromous fish survival and Delta water quality. A schedule of flow criteria for Sacramento River flows at Red Bluff, Hamilton City, Wilkens Slough, and Freeport are used to limit the impact of diversion operations. An additional set of criteria are used to identify and restrict diversions during potential pulse flow conditions to protect out-migrating anadromous fish.

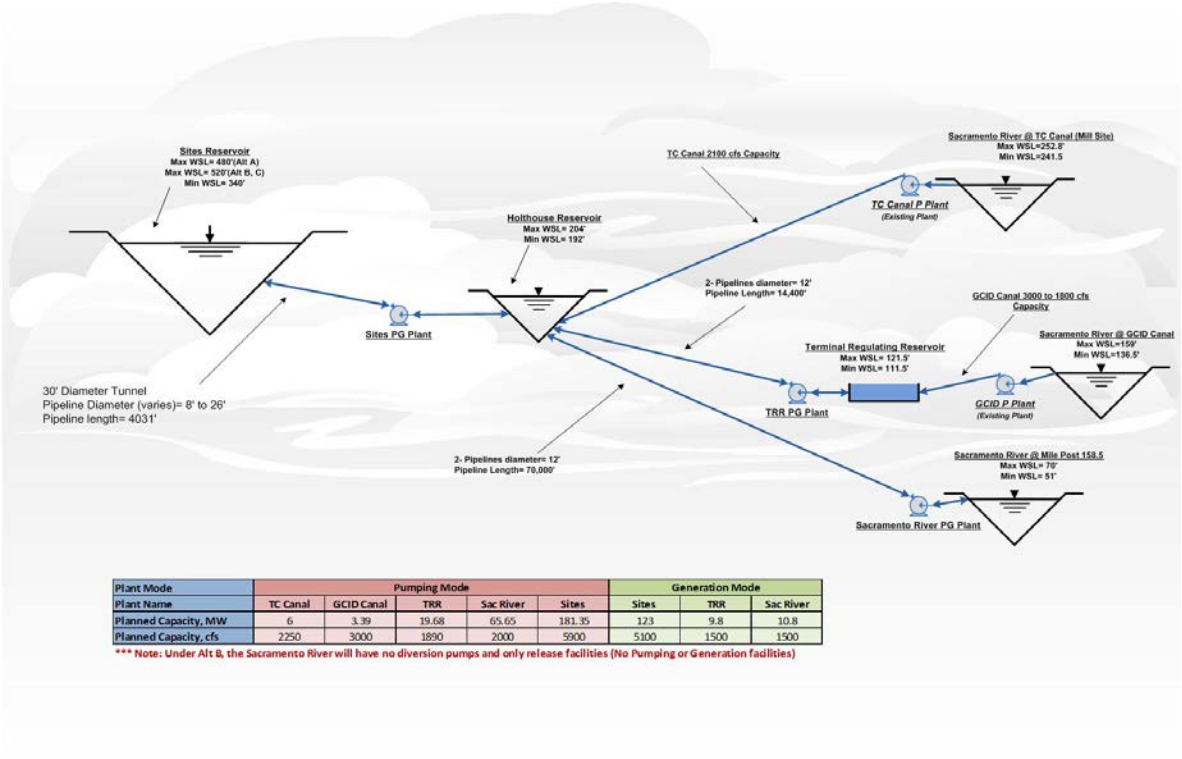
Each action alternative would be operated to achieve benefits associated with the primary objectives in drought (driest periods) and other hydrologic conditions. For purposes of Sites Reservoir operation, drought (driest periods) hydrologic conditions are identified as the sequence of years in which the Sacramento River 40-30-30 year type classification (SWRCB D-1641) in two consecutive years is Critical following Critical, Dry or Above Normal, or Dry following Critical or Dry, or Above Normal following Critical year types. In drought (driest periods) hydrologic conditions, the priority operation is coldwater pool conservation in Trinity Lake, Shasta Lake, Lake Oroville, and Folsom Lake and regulation of summer flows for best use of cold water for control of temperature conditions adverse to anadromous fish and increasing Delta export and SWP project allocations to improve water supply reliability to South-of-the-Delta municipal and industrial (M&I) water users. During these times, Sites Reservoir stored water is released into the system as rapidly as possible to meet these needs.

In other hydrologic conditions (non-drought), approximately one-third of Sites Reservoir stored water is used each summer and fall to manage Delta water quality to improve Delta water quality at M&I intakes, to improve flows for Delta fisheries habitat based on X2 position, and to stabilize fall flows for improving spawning and rearing success of anadromous fish. Water quality for M&I users is improved both by improving Delta water quality at M&I intakes in non-drought conditions as well as increasing Delta exports in drought conditions (Total dissolved solid [TDS] levels in exports from the Delta are often lower than other supplies such as from the Colorado River; therefore, there is a blending improvement by increased flows from the Delta).

Each action alternative would be operated to integrate and coordinate the releases from Sites Reservoir with releases from Trinity Lake, Shasta Lake, Lake Oroville, and Folsom Lake. Often, and especially in drought (driest periods) hydrologic conditions, releasing from Sites Reservoir allows releases from other reservoirs to be reduced while still meeting requirements for minimum instream flow objectives and Delta salinity control objectives. Through this reduction in releases, storage can be conserved in Trinity Lake, Shasta Lake, Lake Oroville, and Folsom Lake, providing greater flexibility for management of releases. This improvement in storage conditions throughout the system of reservoirs adds significantly to the operational flexibility to meet the primary objectives in the most effective way possible.

NODOS Project Operations – Power Operations

The NODOS project team supplied PARO with the physical and operational attributes of the project components which are the basis for this study. The schematic drawing in Figure H.4-2 shows the different NODOS project components and the relative location and interconnection of the different components to each other and to the Sacramento River.



Plant Mode	Pumping Mode					Generation Mode		
Plant Name	TC Canal	GCID Canal	TRR	Sac River	Sites	Sites	TRR	Sac River
Planned Capacity, MW	6	3.39	19.68	65.65	181.35	123	9.8	10.8
Planned Capacity, cfs	2250	3000	1890	2000	5900	5100	1500	1500

*** Note: Under Alt B, the Sacramento River will have no diversion pumps and only release facilities (No Pumping or Generation facilities)

Figure H.4-2. NODOS Project, Schematic of Conveyance and Storage Interconnection

For NODOS project operations and for the purpose of this study, the base assumptions and scenarios used in developing the CALSIM II model are maintained for the different project components. The CALSIM II model was used to simulate the operations of the NODOS project, as a component of the integrated CVP and SWP operations. More details on the CALSIM II model formulation are available in Appendix 6A and 6B of the NODOS EIR/EIS Appendix. The CALSIM II model is a tool that was setup to emulate the operations strategy set forth for the project, and to help determine many of the project benefits and impacts.

For the purpose of modeling the power operations of the NODOS project, three modes for project operations are identified: Diversion mode (pumping from the Sacramento River to fill up Sites Reservoir); Release mode (generation incidental to water releases from Sites Reservoir to meet the NODOS project water release objectives); and a Pump-back mode (to better utilize residual capacities of the different project components). NODOS project pump-back operations are meant to enhance the project economics by capturing opportunities offered by the energy market (energy price differentials between on-peak and off-peak hours, and ancillary services

[AS]), and to provide the support/products needed to integrate renewable energy (wind, solar, etc.).

In modeling the power needs for the diversion mode, an optimization strategy is developed to minimize the energy costs of pumping operations, yet, maintain NODOS project water operations objectives. Hence, flat monthly pumping operations are maintained (where/when applicable, 24 hours a day, 7 days a week), for all three diversion points along the Sacramento River. Once water is diverted from the Sacramento River into Holthouse Reservoir, the rest of the diversion operations (i.e., pumping into Sites Reservoir) could be optimized to better utilize Sites pumping plant capacity, and the available storage in Holthouse Reservoir. It would be more economical to retain the on-peak diversions from the Sacramento River in Holthouse Reservoir (as scheduled) and to pump that water into Sites Reservoir in the off-peak hours (on a daily basis). The intent of reshaping the diversion mode is to avoid high on-peak (and super peak) electricity prices. Therefore, all pumping operations into Sites Reservoir are optimized to occur (if possible) during the off-peak hours (including shoulder hours immediately before the transitions to on-peak occurs). Moreover, this shift in operations will provide an opportunity to superimpose pump-back operations cycle on the NODOS project diversion mode. In an optimized mode and in the on-peak (or super peak) hours, Sites Pumping/Generating Plant will be available for generation. In the off-peak hours, the residual pumping capacity will be available to pump the water back into Sites Reservoir.

For the water Release mode (Generation mode) of the NODOS project, an optimization strategy is developed to maximize generation revenues from the project's generation assets. For this strategy and to the extent physically possible, all intended daily water releases from Sites Reservoir into Holthouse Reservoir will occur during the on-peak (or super peak) hours to capture the most value the energy market offers for NODOS project generation. Incidental to the on-peak releases from Sites Reservoir into Holthouse Reservoir, water will be released into the TRR, T-C Canal, and the Sacramento River up to the capacities of these facilities (and within the planned limits for the water release). The residual water in Holthouse Reservoir (from the On-Peak Sites Reservoir releases) would be released during the Off-Peak hours to satisfy water delivery obligations of NODOS. A key requirement for this strategy to be effective is that Holthouse Reservoir active storage would be made available before the beginning of the next On-Peak cycle (i.e., next day's cycle). Optimizing the Release (generation) mode will better use Sites Reservoir generation capacity (maximize revenues), and provide an opportunity to superimpose a Pump-back mode on the Release mode.

A third component of the NODOS project power operations is a daily pump-back operations cycle. For periods when the NODOS project is in neither Diversion nor in Release modes, Sites Reservoir pumping and generation assets can operate in a pure Pump-back mode to take advantage of energy price differentials between the on-peak and off-peak hours, and AS market needs. Under a pure Pump-back mode, water would be released from Sites Reservoir into Holthouse Reservoir during the on-peak (or super peak) hours to generate energy and would be pumped back into Sites Reservoir in the off-peak hours to complete the pump-back cycle. The pump-back operations could be a standalone operation and/or superimposed on the Diversion and Release modes when the energy market economics relative to the Sites Reservoir Plant's efficiency (cycle efficiency) are conducive to do that. At Sites Reservoir, the extent of the pure pump-back operations and pump-back operations incidental to NODOS Diversion and Release

modes are driven by market economics, pumping/generating cycle efficiency, residual pumping capacity, residual generation capacity, and residual storage capacity in Holthouse Reservoir.

H1.5 Power Portfolio Model

Current power portfolio models available to PARO are used to execute the analysis for the NODOS project. The operations of the NODOS project's different assets are translated to a representative set of financial instruments and are input into the EPM model. The model is used to monetize the probabilistic value of NODOS power portfolio for each of the action alternatives and operational scenarios used in the study. EPRI Fast Fit model, version 2.5, is used to describe the needed power and fuel price volatilities term structures, and the correlations between the different energy markets the NODOS project will be participating in, or exposed to.

Using the most current CALSIM II model runs, a median case (seasonal cycle) operational time-series is defined for each of the three action alternatives considered for the project. The median case time-series (sequential) period matches the 30-year planning period for the project. The time-series is derived from the 82-year time-series from the most current CALSIM II runs. The total water diversions (in AF) from the Sacramento River into Sites Reservoir is used as a criteria for isolating the 30-year time-series that represents the median case project's operations, for each of the three action alternatives considered for the project. Moving averages and frequency analysis are used to reduce the 82-year record to 53 potential scenarios for the operations of the project. Then, the 53 scenarios are ranked, and the median of these scenarios is identified with the corresponding 30-year time-series that generated its value. The underlying 30-year time-series for all project's components is also identified and grouped, to represent NODOS project operations.

Time-series representing NODOS project water diversions and releases are translated into pumping and generation capacities and Energy (MW and MWh) for each of the project components, using the appropriate design parameters and the physical attributes of the system. Figures H.5-1 through Figure H5-7 show the median case time-series, for the 30-year planning period, for the Optimized operations of each NODOS project component, in terms of utilized capacity in MW (which is the input to the EPM model), for Alternative C.

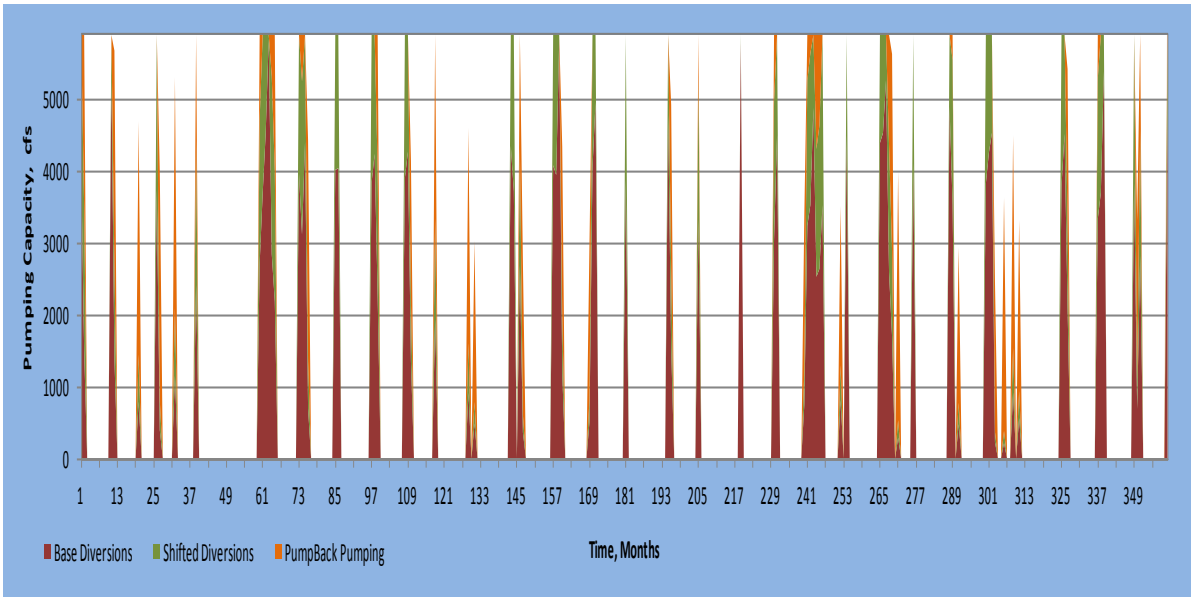


Figure H.5-1. NODOS Project, Sites Reservoir Operations - Diversion Mode, Alternative C

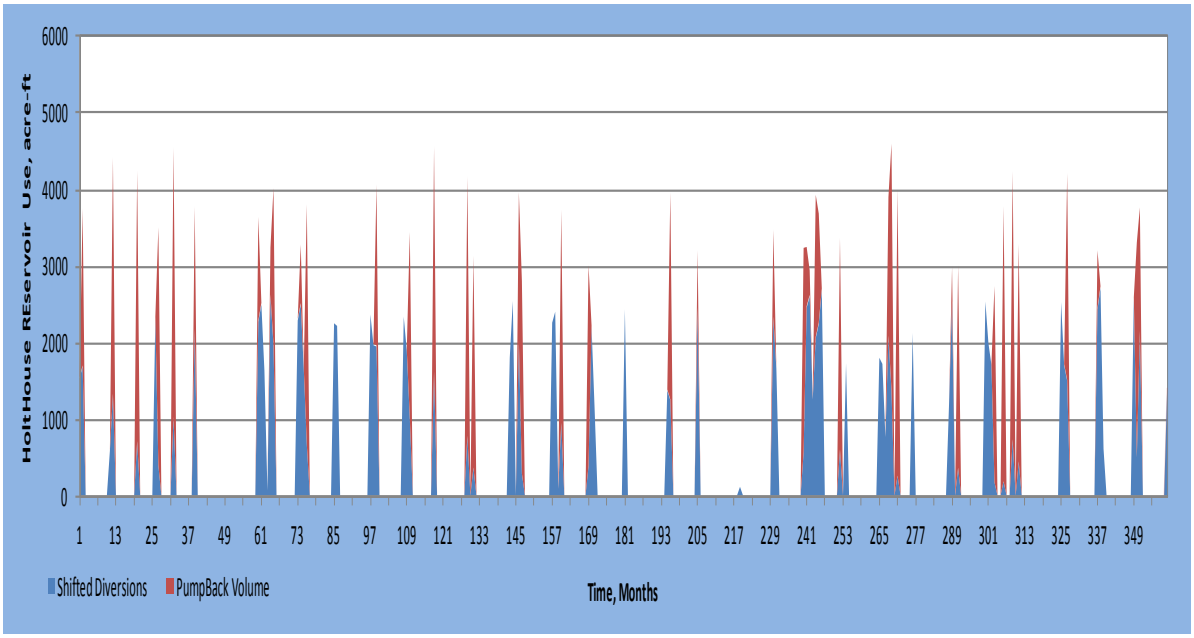


Figure H.5-2. NODOS Project, Holthouse Reservoir Operations - Diversion Mode, Alternative C

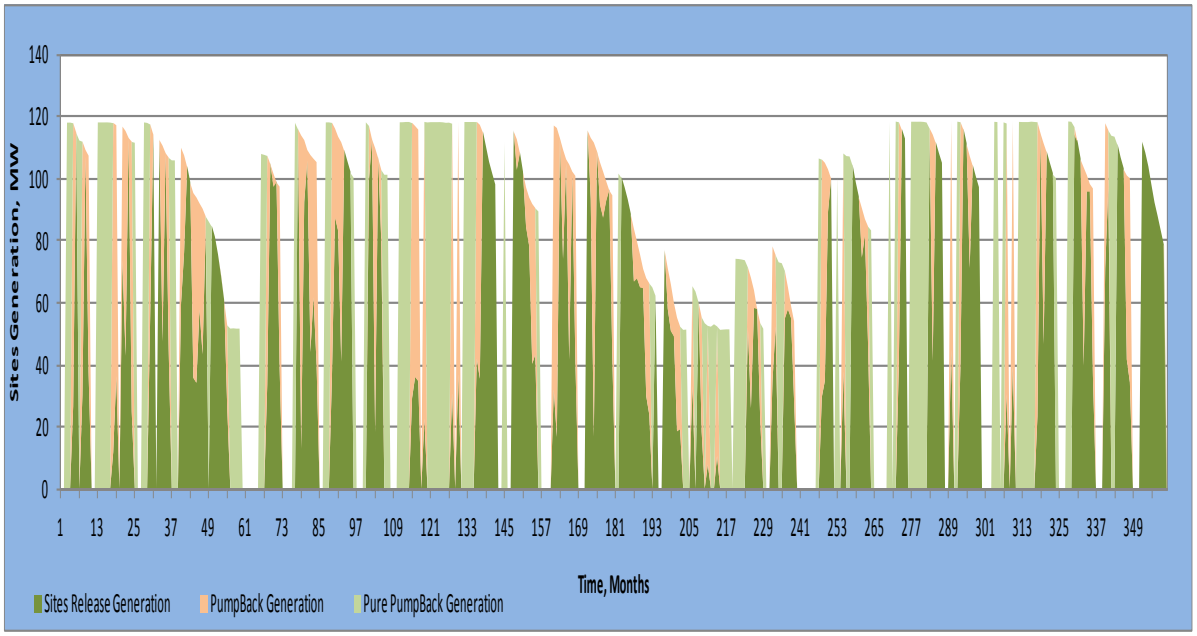


Figure H.5-3. NODOS Project, Sites Reservoir Operations - Release and Pump-Back Modes, Alternative C

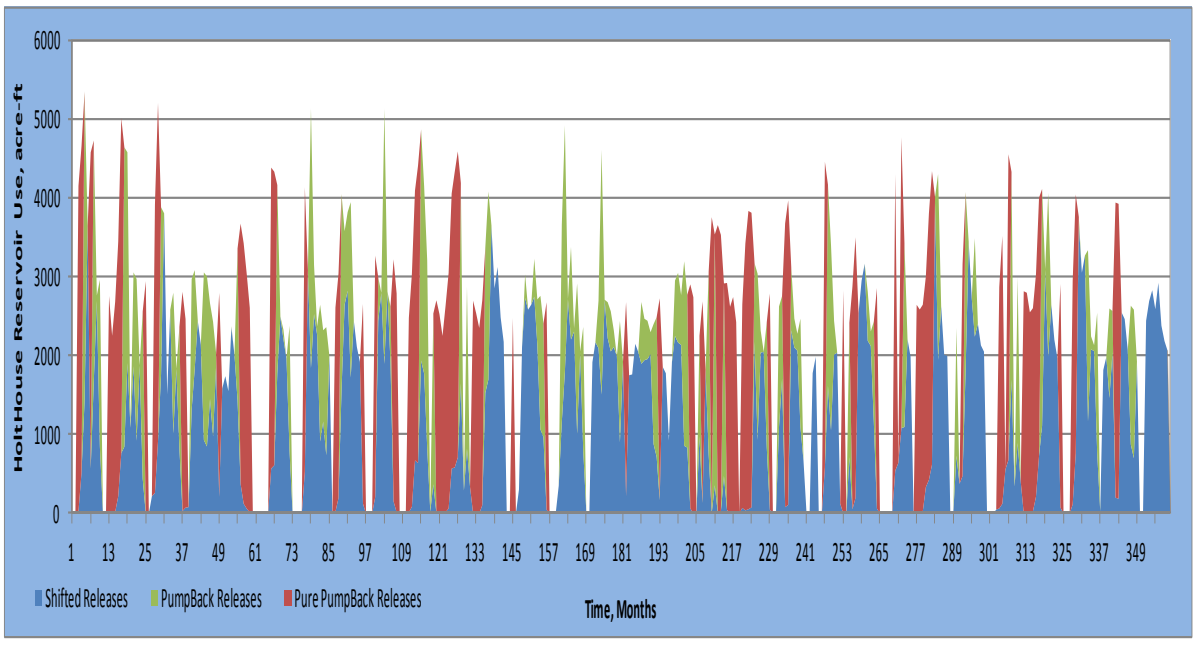


Figure H.5-4. NODOS Project, Holthouse Reservoir Operations - Diversion Mode, Alternative C

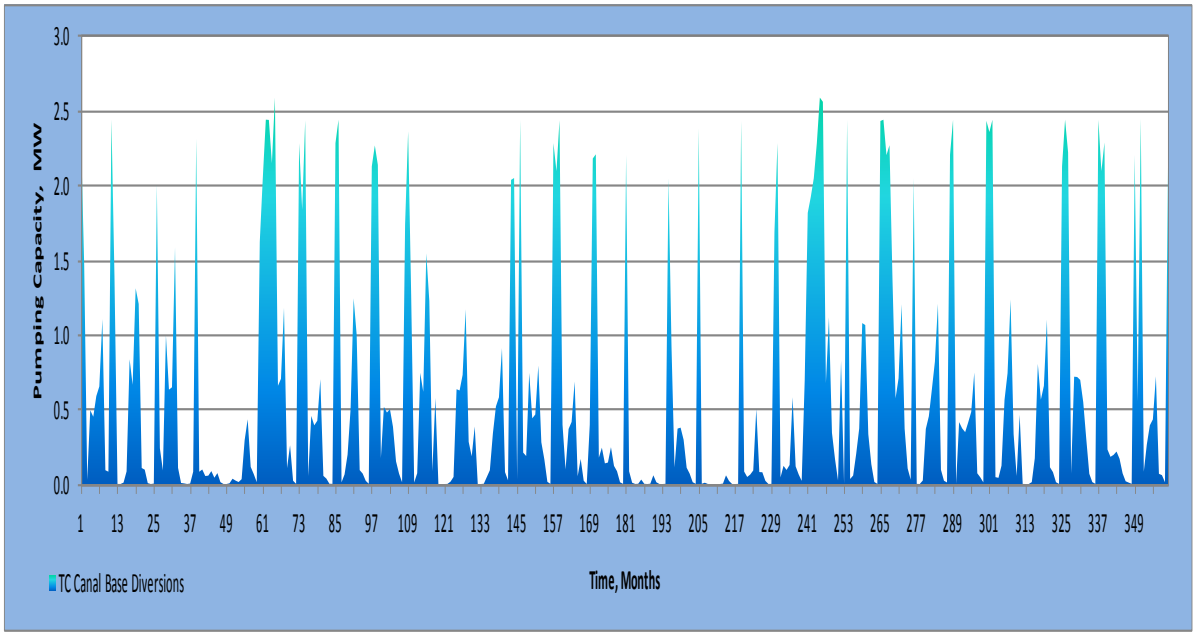


Figure H.5-5. NODOS Project, T-C Canal Pumping Plant Operations, Alternative C

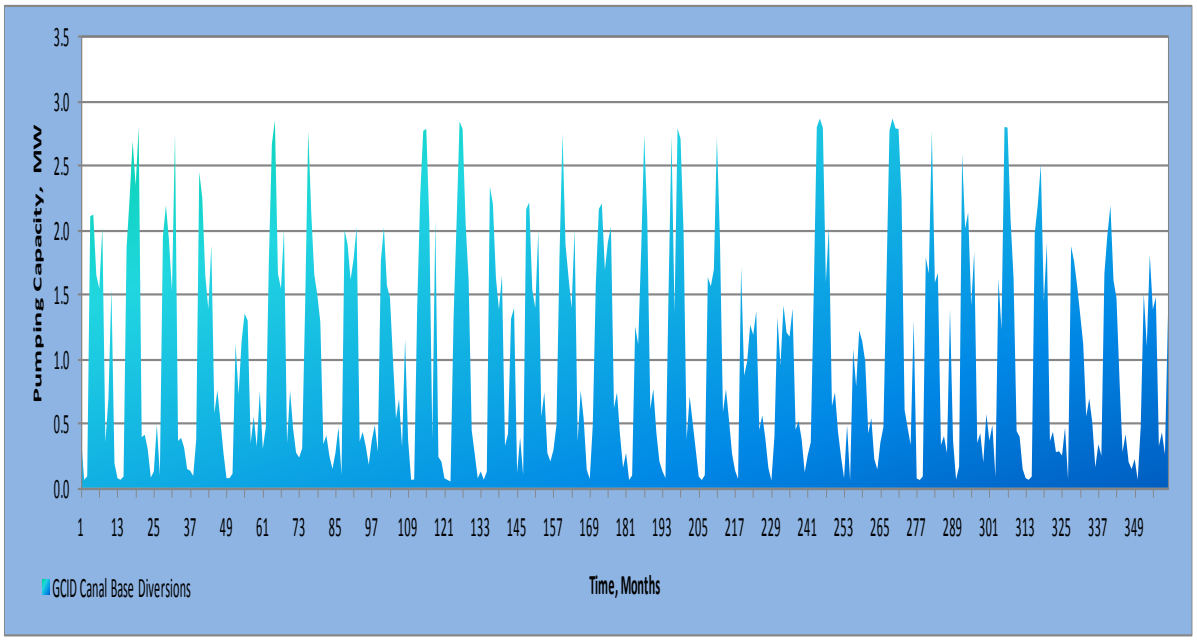


Figure H.5-6. NODOS Project, GCID Canal Pumping Plant Operations, Alternative C

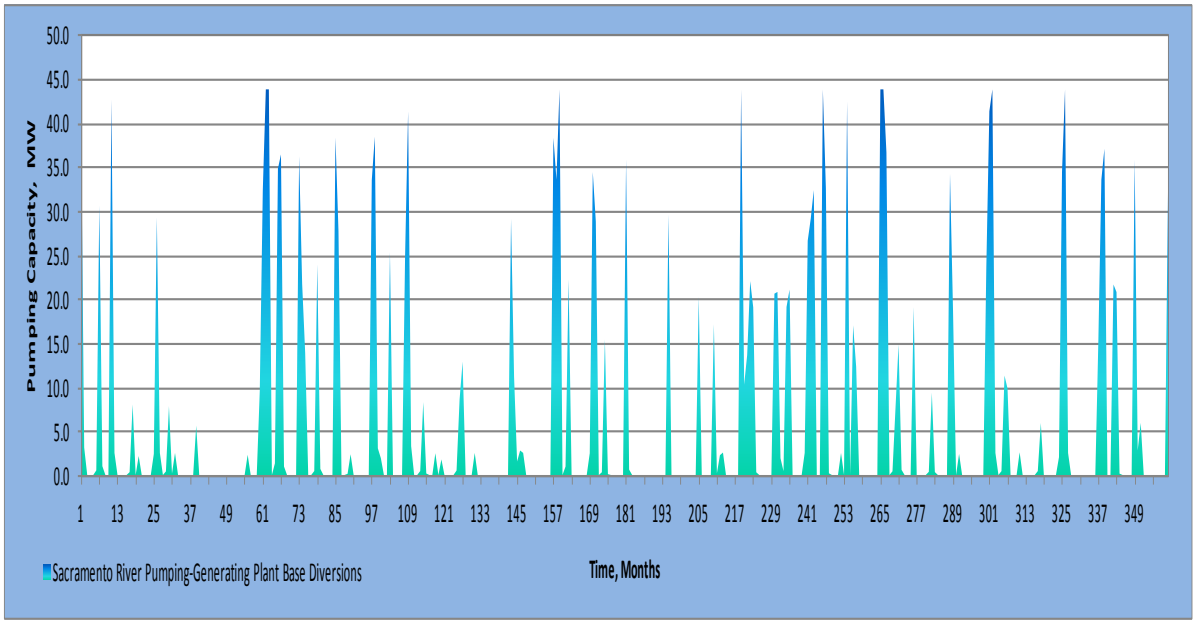


Figure H.5-7. NODOS Project, Sacramento River Pumping Plant Operations, Alternative C

Tables H.5-1 through H.5-4 summarize of the monthly, 30-year planning period pumping and generation capacities used to model the median case of NODOS project operations (See Appendix C for complete version of Tables H.5-1 through H.5-4) for Alternative C. Two operational scenarios are used to model each of the three action alternatives considered for the project: Incidental and Optimized. For the Incidental scenario, pumping and generating at the different NODOS project facilities are driven by water diversions and releases. For the Optimized scenario, pumping and generating at the Sites Reservoir Pumping/Generating Plant are optimized to minimize pumping costs obligations and maximize energy generation revenues for the project. The modeling results are presented for both the Incidental and the Optimized operational scenarios to report the energy portfolio value and describe the gain (monetary value) from optimizing NODOS project operations. The information in the aforementioned tables is the input data needed to run the EPM model. Different financial instruments were used in the EPM model to represent the power portfolio and to estimate the value of energy and risk associated with the operations of the project.

Table H.5-1. NODOS Project Pumping and Generation Time Series, Incidental, Alternative C

		Incidental Pumping and Generation to Water Releases (no shaping)							
Plant Mode		Incidental Pumping , MW					Incidental Generation, MW		
Plant Name		TC Canal	GCID Canal	TRR	Sac River	Sites	Sites	TRR	Sac River
Installed Capacity, MW		6.00	3.39	19.68	65.65	181.35	123.00	9.33	10.80
Installed Capacity, cfs		2250	3000	1890	2000	5900	5100	1500	1500
Month	# of Hours	All Hours					All Hours		
1	744	2.28	0.37	2.73	39.11	118.75	0.00	0.00	0.00
2	672	1.46	0.06	0.00	3.13	44.87	0.00	0.00	0.00
3	744	0.03	0.09	0.00	0.00	0.11	0.05	0.00	0.00
4	720	0.49	2.11	0.00	0.00	0.63	0.37	0.00	0.00
5	744	0.45	2.12	0.00	0.00	0.00	2.52	0.40	0.40
6	720	0.59	1.66	0.00	0.53	0.00	36.39	7.38	6.41
7	744	0.65	1.55	0.00	30.75	0.18	60.89	7.30	0.00
8	744	1.10	2.03	0.00	1.01	0.00	12.45	0.60	4.96
9	720	0.09	0.35	0.00	0.00	0.00	23.79	1.52	9.10
10	744	0.08	0.69	0.00	0.00	0.00	12.94	0.16	5.11
11	720	2.44	1.55	12.30	42.85	151.73	9.86	0.00	0.00
12	744	1.39	0.19	0.00	2.52	41.50	0.02	0.00	0.00
13	744	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
14	672	0.00	0.06	0.00	0.00	0.00	9.91	0.00	0.00
15	744	0.01	0.09	0.00	0.00	0.09	2.12	0.00	0.00
16	720	0.08	1.87	0.00	0.00	0.81	26.21	0.00	0.00
17	744	0.83	2.25	0.32	0.33	1.53	1.43	0.05	0.00
18	720	0.66	2.70	0.00	8.05	0.00	0.71	1.26	0.07
19	744	1.31	2.35	0.00	0.00	0.00	3.19	1.21	3.96
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

CALSIM II Model Results = Monthly Pumping- Generating Operations 82-yr
Power Planning Study Results= Incidental and Optimized Operations, 30-yr Median Case Deliveries

Table H.5-2. NODOS Project Pumping and Generation T-Series, Optimized Pumping, Alternative C

Plant Mode		Optimized Pumping					
Plant Name		Sites					
Installed Capacity, MW		181.35					
Installed Capacity, cfs		MaxQ=5900 cfs					
Month	# of Hours	On-Peak, MW	On-Peak, MWh	Off-Peak, MW	Off-Peak, MWh	On-Peak, cfs	Off-Peak, cfs
1	744	79.00	32924	169.89	55732	2305	5900
2	672	0.00	0	104.73	30207	0	5900
3	744	0.00	0	0.00	0	0	0
4	720	0.00	0	0.00	0	0	0
5	744	0.00	0	0.00	0	0	0
6	720	0.00	0	0.00	0	0	0
7	744	0.00	0	0.00	0	0	0
8	744	0.00	0	0.00	0	0	0
9	720	0.00	0	0.00	0	0	0
10	744	0.00	0	0.00	0	0	0
11	720	110.00	45589	168.00	63794	3336	5900
12	744	0.00	0	80.24	30910	0	5680
13	744	0.00	0	0.00	0	0	0
14	672	0.00	0	0.00	0	0	0
15	744	0.00	0	0.00	0	0	0
16	720	0.00	0	0.00	0	0	0
17	744	0.00	0	0.00	0	0	0
18	720	0.00	0	0.00	0	0	0
19	744	0.00	0	0.00	0	0	0
20	744	0.00	0	42.96	17481	0	4695

CALSIM II Model Results = Monthly Pumping- Generating Operations 82-yr
Power Planning Study Results= Incidental and Optimized Operations, 30-yr Median Case Deliveries

Table H.5-3. NODOS Project Pumping and Generation T-Series, Optimized Generation, Alternative C

Plant Mode		Optimized Genration, MW				
Plant Name		Sites				
Installed Capacity, MW		123.00				
Installed Capacity, cfs		MaxQ=5100 cfs				
Month	# of Hours	On-Peak, MW	On-Peak, MWh	Off-Peak, MW	On-Peak, cfs	Off-Peak, cfs
1	744	0.00	0	0.00	0	0
2	672	0.00	0	0.00	0	0
3	744	0.00	0	0.00	0	0
4	720	0.00	0	0.00	0	0
5	744	26.47	9818	0.00	1141	0
6	720	114.95	39777	0.00	5100	0
7	744	0.00	0	0.00	0	0
8	744	30.10	9261	0.00	1366	0
9	720	107.43	28368	0.00	5009	0
10	744	37.38	8916	0.00	1771	0
11	720	0.00	0	0.00	0	0
12	744	0.00	0	0.00	0	0
13	744	0.00	0	0.00	0	0
14	672	0.00	0	0.00	0	0
15	744	0.00	0	0.00	0	0
16	720	0.00	0	0.00	0	0
17	744	0.00	0	0.00	0	0
18	720	11.70	3508	0.00	503	0
19	744	36.38	10349	0.00	1579	0
20	744	0.00	0	0.00	0	0

CALSIM II Model Results = Monthly Pumping- Generating Operations 82-yr
Power Planning Study Results= Incidental and Optimized Operations, 30-yr Median Case Deliveries

Table H.5-4. NODOS Project Pumping and Generation T-Series, Pump-Back Operations, Alternative C

Plant Mode		Pump Back Operations, MW								
Plant Name		With Pump cycle			With Gen Cycle			Pure Pump Back		
Installed Capacity, MW		123.00			123.00			123.00		
Installed Capacity, cfs		MaxQ=5100 cfs			MaxQ=5100 cfs			MaxQ=5100 cfs		
Month	# of Hours	On-Peak	On-Peak, MWh	PumpBack Q cfs	On-Peak	On-Peak, MWh	PumpBack Q cfs	On-Peak	On-Peak, MWh	PumpBack Q cfs
1	744	0.00	0	0	0.00	0	0	0.00	0	0
2	672	51.61	16049	2226	0.00	0	0	0.00	0	0
3	744	0.00	0	0	0.00	0	0	118.32	35905	5100
4	720	0.00	0	0	0.00	0	0	118.34	34870	5100
5	744	0.00	0	0	91.65	33991	3959	0.00	0	0
6	720	0.00	0	0	0.00	0	0	0.00	0	0
7	744	0.00	0	0	0.00	0	0	112.55	33216	5100
8	744	0.00	0	0	82.05	25251	3734	0.00	0	0
9	720	0.00	0	0	1.96	518	91	0.00	0	0
10	744	0.00	0	0	70.16	16733	3329	0.00	0	0
11	720	0.00	0	0	0.00	0	0	0.00	0	0
12	744	117.71	26633	5100	0.00	0	0	0.00	0	0
13	744	0.00	0	0	0.00	0	0	118.39	24019	5100
14	672	0.00	0	0	0.00	0	0	118.39	17722	5100
15	744	0.00	0	0	0.00	0	0	118.39	23223	5100
16	720	0.00	0	0	0.00	0	0	118.41	27197	5100
17	744	0.00	0	0	0.00	0	0	118.34	36952	5100
18	720	0.00	0	0	106.45	31919	4597	0.00	0	0
19	744	0.00	0	0	81.00	23044	3521	0.00	0	0

CALSIM II Model Results = Monthly Pumping- Generating Operations 82-yr
Power Planning Study Results= Incidental and Optimized Operations, 30-yr Median Case Deliveries

Daily pump-back operations of NODOS project facilities are modeled in three components. The three components are pump-back operations incidental to its Diversion mode, incidental to its Release mode, and pure pump-back operations. For the purpose of this study, the pure Pump-back mode is limited to the months that the monthly average diversions into the NODOS project are less than 200 cfs. For each month of the 30-year planning period, the available generation and pumping capacities at the Sites Pumping/ Generating Plant are estimated based on the available head (level of storage) at Sites Reservoir (from the previous month's operations). Then a dispatch profile for the daily pump-back operations is generated based on market opportunities, pumping/ generation cycle efficiency, available pumping/generating capacities, and available storage at Holthouse Reservoir. Through the use of a complex modeling scheme, Sites Reservoir pumping/generating plant is economically dispatched in the NP-15 CAISO market. Ultimately, the model is set up to utilize NODOS project pump-back potential based on the plant's availability and market economics. The median case dispatch profile for the pump-back operations for Alternative C of the NODOS project is depicted in Figures H.5-1 and H.5-4.

Additional information needed to run the EPM model includes forward energy prices, volatility term structure, correlations (between different underlying energy markets), delivery hours, and generation blocks. All necessary information are either generated through the EPM model's graphic user interface, or externally developed and input into the model.

This page intentionally left blank

H1.6. Modeling Results

Power Portfolio Energy Value

Table H.6-1 is a summary of the EPM modeling results (energy value and risk) for Alternatives A, B, and C considered in this study. The results in Table H.6-1 are in $1,000 of NPV, for the 30-years planning period, for each of the project's cycles and components. For the purposes of this study, NPV is defined as the current market value of the net portfolio's cash flows in $1,000 of present value. The results are grouped based on the operational cycle of the project facilities. The basic assumption is that pumping at all project diversion points along the Sacramento River is incidental to water operations (flat operations). Also assumed, pumping and generating at Sites Reservoir Pumping/Generating Plant can be optimized and may include a pump-back operations component. Optimizing operations is conditional to maintaining NODOS project water delivery objectives at all times. During pump-back operations, power generation is mainly driven by the plant's availability and energy market price signals. As mentioned previously, two operational scenarios are used to model each of the three action alternatives: Incidental and Optimized. For the Incidental scenario, pumping and generating at the different NODOS project facilities are driven by water diversions and releases (no reshaping). For the Optimized scenario, pumping and generating at the Sites Reservoir Pumping/Generating Plant are optimized to minimize pumping obligations (costs) and maximize project energy generation revenues. The modeling results are presented for both the Incidental and the Optimized operational scenarios in Table H.6-1 to report the energy portfolio value, and describe the monetary value of optimizing NODOS project operations. Revenues from pump-back operations are presented separately to allow for better breakdown of costs and revenues from project's water diversions and releases. In studying the modeling results, it is important to remember that modeling of project operations is meant to monetize the energy costs and revenues, and not the water use benefits of the project. It should be noted that pumping costs and generating revenues are impacted by water surface elevations at Sites Reservoir, resulting from the different configurations and system-wide water operations for each of the three action alternatives for the NODOS project (Alternative A compared to Alternative C). It is also noteworthy that pump-back operations will net more revenues under alternatives with less water deliveries (Alternative A compared to Alternative C) because of the fact that NODOS project assets would be less utilized, and more opportunity (percent of time) exist for pump-back operations.

Table H.6-1. NODOS Project, Summary Modeling Results, NPV ($1000)

Portfolio NPV Comparison- Modeled CALSIM Deliveries Scenarios						
Pumping-Generation Site	CALSIM Deliveries					
Planning Alternative	Alt A		Alt B		Alt C	
Operations Strategy	Incidental	Optimized	Incidental	Optimized	Incidental	Optimized
NODOS Pumping	Period Total, NPV ($1000)					
TC Canal Pumping	-6,085	-6,085	-7,511	-7,511	-5,786	-5,786
GCID Pumping	-10,083	-10,083	-11,519	-11,519	-9,964	-9,964
Sac River Pumping	-53,500	-53,500	N/A	N/A	-59,196	-59,196
TRR Pumping	-9,939	-9,939	-16,454	-16,454	-11,839	-11,839
Sites Pumping	-149,357	-137,397	-147,694	-133,100	-172,219	-157,841
Subtotal	-228,964	-217,004	-183,178	-168,584	-259,004	-244,626
	Preliminary Results					
NODOS Generation	Period Total, NPV ($1000)					
Sites Genereration	109,077	121,405	111,262	125,493	134,216	149,580
TRR Generation	19,651	20,400	6,839	7,146	20,385	21,243
Sac River Generation	49,873	49,873	N/A	N/A	50,197	50,197
Subtotal	178,601	191,678	118,101	132,639	204,798	221,020
NODOS PumpBack Operations	Period Total, NPV ($1000)					
PumpBack during Diversion cycle	N/A	7,031	N/A	13,999	N/A	7,444
PumpBack During Release Cycle	N/A	23,000	N/A	18,299	N/A	21,564
Pure PumpBack Operations Cycle	N/A	17,435	N/A	14,916	N/A	17,395
Subtotal		47,466		47,214		46,403
NODOS Project Portfolio Value	-50,363	22,140	-65,077	11,269	-54,206	22,797
NODOS Project Optimization Potential		72,503		76,346		77,003
NODOS Risk Metrics	Period Total, NPV ($1000)					
Value-at-Risk	1,863	2,336	1,523	2,425	1,644	2,504
Cash-Flow-at-Risk	94,976	96,161	112,192	117,079	107,668	113,228

Notes
Cash Flow reported pre-tax in PV($000).
Evaluation performed 06/17/2011
Report updated at 03:40:00 PM.
Sac River Generation is not optimized to minimize the impact of headloss at higher releases thru the plant

For Alternative A Incidental operations, the 30-year total pumping costs (for the median case of diversions) of the NODOS project in NPV are $228,964,000, whereas the corresponding energy generation revenues incidental to Project releases in NPV are $178,601,000. For Alternative A Optimized operations, the 30-year total pumping costs (for the median case diversions) of the NODOS project in NPV are $217,004,000, whereas the corresponding energy generation revenues from optimized project releases in NPV are $191,678,000. For the Optimized operations, additional revenues in NPV of $47,466,000 would be realized from the pump-back operations (daily operations). Pump-back operations and revenues are a combination of pump-back operations superimposed on the generation and pumping cycles, and pure pump-back operations in months that the project's average diversion is less than 200 cfs (i.e., project assets

are not in use). It should be noted that for the Incidental operations, the assumption was that no pump-back operations will take place (project assets are tied up in flat operations).

For Alternative B Incidental operations, the 30-year total pumping costs (for the median case of diversions) of the NODOS project in NPV are $183,178,000, whereas the corresponding generation revenues incidental to project releases in NPV are $118,101,000. For Alternative B Optimized operations, the 30-year total pumping costs (for the median case of diversions) of the NODOS project in NPV are $168,584,000, whereas the corresponding generation revenues from optimized project releases in NPV are $132,639,000. For the Optimized operations, additional revenues in NPV of $47,214,000 would be realized from the pump-back operations (daily operations).

For Alternative C Incidental operations, the 30-year total pumping costs (for the median case of diversions) of the NODOS project in NPV are $259,004,000, whereas the corresponding generation revenues incidental to project releases in NPV are $204,798,000. For Alternative C Optimized operations, the 30-year total pumping costs (for the median case of diversions) of the NODOS project in NPV are $244,626,000, whereas the corresponding generation revenues from optimized project releases in NPV are $221,020,000. For the Optimized operations, additional revenues in NPV of $46,403,000 would be realized from the pump-back operations (daily operations).

For the 30-year planning period, optimizing NODOS project operations (as described in the section titled “NODOS Project Operations – Power Operations,” below) resulted in additional revenues for the project in NPV totaling $72,503,000 for Alternative A, $76,343,000 for Alternative B, and $77,003,000 for Alternative C. For all three action alternatives considered for the NODOS project, optimizing operations resulted in changing the net project cash flow from a negative to a positive cash flow which would significantly enhance the economics of the project. For NODOS project Incidental operations, the net total project’s power portfolio value (generation revenues minus pumping costs) (for the median case of diversions) in NPV is $-50,363,000, $-65,077,000, and $-54,206,000 for Alternatives A, B, and C, respectively. Whereas, for NODOS project Optimized operations, the net project’s power portfolio value (generation revenues-pumping cost) (for the median case of diversions) in NPV is $22,140,000, $11,269,000, and $22,797,000 for Alternatives A, B, and C, respectively.

Table H.6-1 provides a summary breakdown of the contributions of each component, and in each operational mode (pumping, generating, and pump-back cycles).

Tables H.6-2 and H.6-3 show the NODOS project power portfolio annual cash flow present value, in present value in $1,000s for the median case of deliveries under Alternative C of the project (complete version of these tables for all three action alternatives are in Appendix B). The annual cash flows are reported, in present value, through the 30-year planning period of the project. The cumulative value of the cash flows in present value for each project component represents the NPV of that component. The sum of the NPV of all project components is the net total value of the project for that specific alternative and specific operational scenario.

Table H.6-2. NODOS Project, Modeling Results, Annual Cashflow, Incidental Ops, Alternative C

Cash Flow Report for the NODOS Project, CALSIM 30-Yr Planning Period, Alt C (Incidental Operations) Deliveries Case

Pumping-Generation Site	NPV	Year Project in Service							
		1	2	3	4	5	6	7	8
NODOS Pumping	Period Total	Period Total, NPV ($1000)							
TC Canal Pumping	-5,788	-279	-128	-180	-80	-82	-411	-251	-238
GCID Pumping	-9,968	-306	-375	-347	-349	-231	-431	-355	-335
Sac River Pumping	-59,196	-3,040	-273	-1,227	-155	-370	-5,674	-2,940	-1,998
TRR Pumping	-11,839	-410	-204	-295	-28	-180	-1,057	-657	-159
Sites Pumping	-172,219	-9,319	-823	-4,546	-1,836	-1,298	-11,927	-9,489	-6,630
Subtotal	-259,010	-13,354	-1,803	-6,595	-2,448	-2,161	-19,500	-13,692	-9,360
NODOS Generation	Period Total	Period Total, NPV ($1000)							
Sites Genereration	134,217	3,210	2,997	5,049	6,577	4,109	3,477	4,764	6,204
TRR Generation	20,385	723	438	981	765	1,128	807	1,246	963
Sac River Genenration	50,193	1,191	1,147	1,384	3,310	2,147	1,742	1,635	1,880
Subtotal	204,795	5,124	4,582	7,414	10,652	7,384	6,026	7,645	9,047
PumpBack Operations	Period Total	Period Total, NPV ($1000)							
PumpBack during Diversion cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PumpBack During Release Cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pure PumpBack Operations Cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Subtotal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NODOS Project Total	-54,215	-8,230	2,779	819	8,204	5,223	-13,474	-6,047	-313

30-year Planning Period

NPV, is the current market value of the Net Portfolio's Cash flows in $1000

Notes

Cash Flow reported pre-tax in PV($000).
Evaluation performed 07/07/2011
Report updated at 10:28:53 AM.

Table H.6-3. NODOS Project, Modeling Results, Annual Cashflow, Optimized Ops, Alternative C

Cash Flow Report for the NODOS Project, CALSIM 30-Yr Planning Period, Alt C (Optimized Operations) Deliveries Case

Pumping-Generation Site	NPV	Year Project in Service							
		1	2	3	4	5	6	7	8
NODOS Pumping	Period Total	Period Total, NPV ($1000)							
TC Canal Pumping	-5,788	-279	-128	-180	-80	-82	-411	-251	-23
GCID Pumping	-9,968	-306	-375	-347	-349	-231	-431	-355	-33
Sac River Pumping	-59,196	-3,040	-273	-1,227	-155	-370	-5,674	-2,940	-1,9
TRR Pumping	-11,839	-410	-204	-295	-28	-180	-1,057	-657	-15
Sites Pumping	-157,842	-8,578	-627	-3,872	-1,587	-1,105	-10,846	-8,646	-5,9
Subtotal	-244,633	-12,613	-1,607	-5,921	-2,199	-1,968	-18,419	-12,849	-8,6
NODOS Generation	Period Total	Period Total, NPV ($1000)							
Sites Genereration	149,578	4,268	3,456	5,915	7,547	4,251	4,017	5,702	7,13
TRR Generation	21,249	781	480	1,032	799	1,151	843	1,307	1,01
Sac River Genenration	50,193	1,191	1,147	1,384	3,310	2,147	1,742	1,635	1,880
Subtotal	221,020	6,240	5,083	8,331	11,656	7,549	6,602	8,644	10,03
PumpBack Operations	Period Total	Period Total, NPV ($1000)							
PumpBack during Diversion cycle	7,445	213	470	623	96	49	214	239	0
PumpBack During Release Cycle	21,566	1,717	1,412	563	824	276	401	1,371	998
Pure PumpBack Operations Cycle	17,395	323	1,571	775	278	642	1,054	0	410
Subtotal	46,406	2,253	3,453	1,961	1,198	967	1,669	1,610	1,408
NODOS Project Total	22,793	-4,120	6,929	4,371	10,655	6,548	-10,148	-2,595	2,752

30-year Planning Period

NPV, is the current market value of the Net Portfolio's Cash flows in $1000

Notes

Cash Flow reported pre-tax in PV($000).
Evaluation performed 07/07/2011
Report updated at 10:28:53 AM.

Figures H.6-1 and H.6-2 graphically depict the Alternative C NODOS project power portfolio cash flows in each delivery period for the 30-year horizon modeled in EPM, for the median case of deliveries, and for both Incidental and Optimized operations. The solid diamond markers represent the present value of the portfolio's cash flow for a specific period. And the high and low error bars correspond to the upper and lower percentiles of the cash flow distribution

estimated using the Monte-Carlo simulation. The error bars correspond to the 95 percent and 5 percent confidence limits of the cash flow distribution for that specific period.

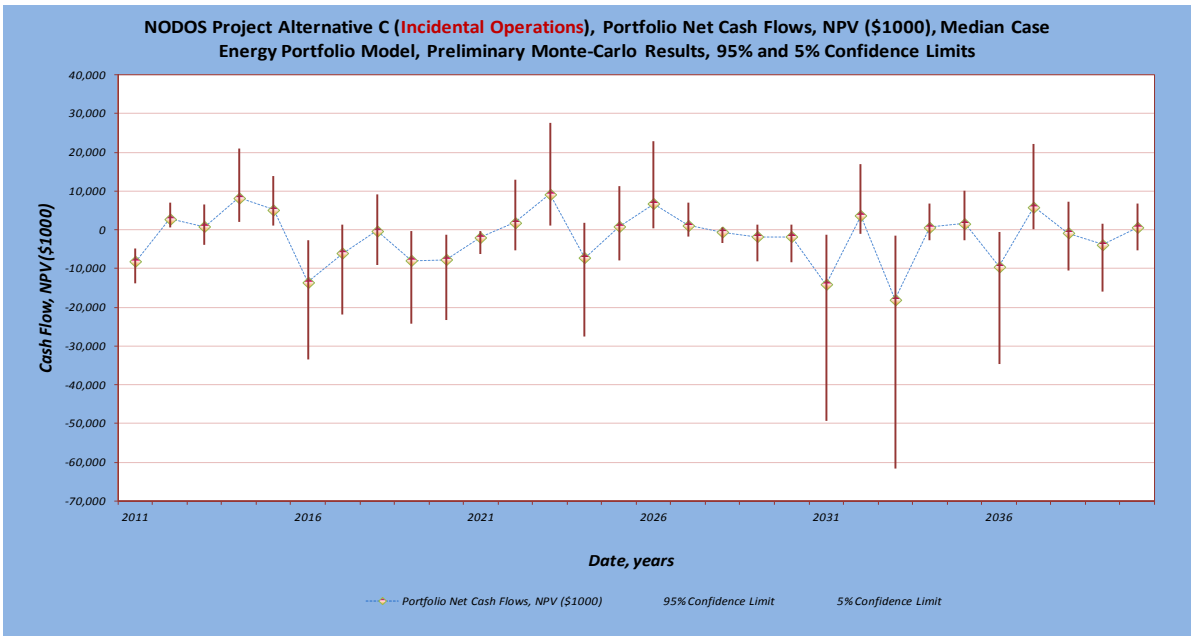


Figure H.6-1. NODOS Project, Portfolio Cash Flow at Risk, Incidental Operations, Alternative C

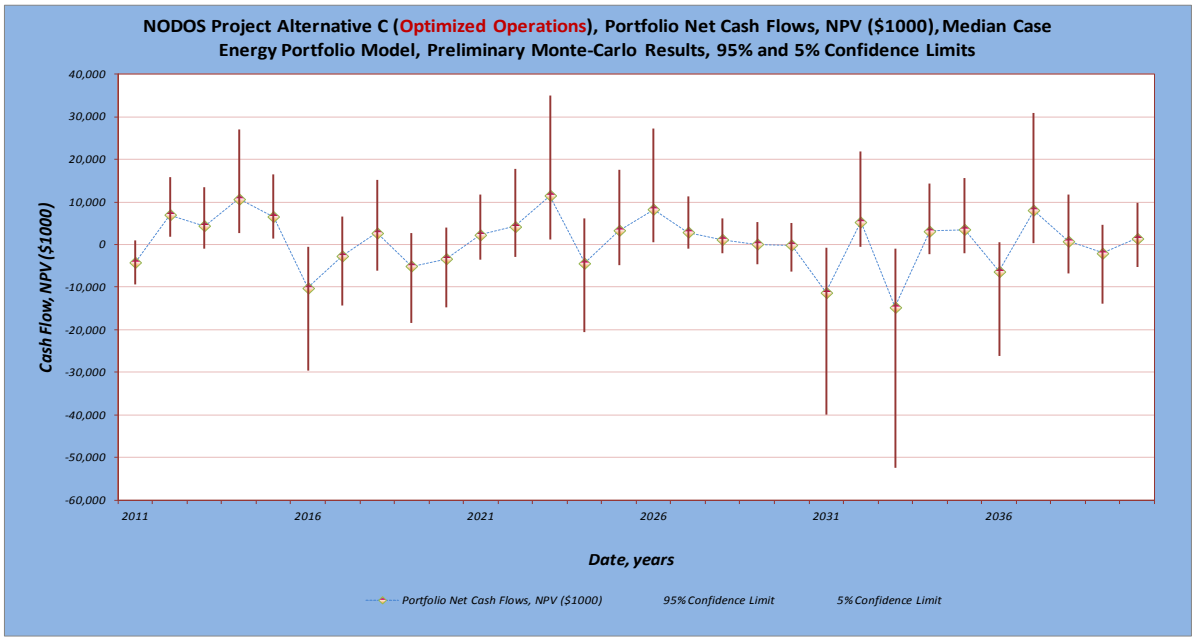


Figure H.6-2. NODOS Project, Portfolio Cash Flow at Risk, Optimized Operations, Alternative C

Power Portfolio Risk Metrics

EPM model results also include a description of the financial risk resulting from uncertainty and volatility of the underlying fuel and power markets in which the NODOS project will be participating. The EPM model produces risk metrics associated with a portfolio of assets that correspond to the exposure of an individual asset in a portfolio, or risk metrics that describe the collective risk associated with the portfolio, as a whole. The EPM model uses a Monte-Carlo-based algorithm (random generation-based) to generate a pre-assumed log-normal distribution of the expected cash flow of an asset. The generated distribution is based on the specific period's marginal volatility, time to delivery, and the analysis date. The number of draws for the Monte-Carlo approximation (2,000 draws are being used for this study), the specified confidence level (95 percent is being used for this study), the volatility and correlations of the underlying markets, and the holding period (all are input parameters to EPM) are the basis for the Monte-Carlo generated distribution of the cash flow of an asset. Financial risk associated with an asset or a portfolio of assets could be measured from the Monte-Carlo generated distribution.

Two commonly used risk metrics in describing the financial risk associated with a portfolio are the Value-at-Risk and Cash-Flow-at-Risk. Value-at-Risk is a measure of the potential for loss on a portfolio of assets or an asset value, within a specified holding period. Value-at-Risk is a commonly used risk metric to describe the risk associated with the value of a portfolio of assets within a short period of time (days). A second risk metric is a Cash-Flow-at-Risk, and is defined as the maximum loss that could be realized over a specified holding period at a specified confidence level. Other risk metrics, such as Price Exposure, could also be reported as partial output of the EPM risk report. Price Exposure measures an asset exposure to a specific price risk, and reports how many dollars of the value of that asset is at stake.

For Alternative C, the power portfolio cumulative probability distribution is depicted in Figure H.6-3 for both the Incidental and Optimized operations. The Monte-Carlo simulation provides the cumulative probability distribution of the NODOS project power portfolio's cash flows around its mean value. On Figure H.6-3, the Cash-Flow-at-Risk could be measured from the difference in NPV of portfolio cash flows between the 50 percent and the zero percent probabilities for the pre-specified confidence level (95 percent in this case). Cash-Flow-at-Risk for a specific period could also be generated. The annual Cash-flow-at-Risk is graphically depicted on Figures H.6-1 and H.6-2 as the difference between the diamond markers and the lower end of the error bar for that specific period. Value-at-Risk and Cash-Flow-at-Risk of the NODOS project are summarized for the three action alternatives in Table H.6-1.

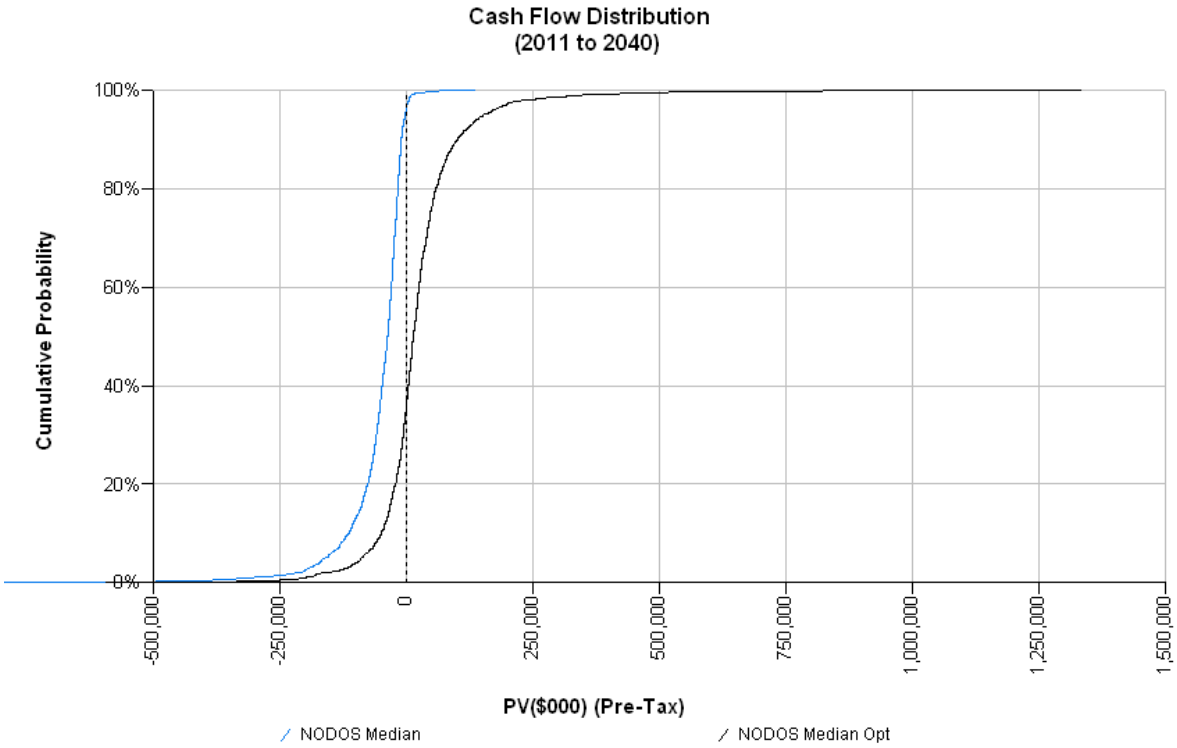


Figure H.6-3. NODOS Project, Cumulative Cash Flow Distribution Comparison

This page intentionally left blank

H1.7 NODOS Project Capacity and Ancillary Services

Capacity Value Analysis

CAISO is charged, under both California law and by the Federal Energy Regulatory Commission (FERC), with the responsibility of maintaining and operating a reliable grid system (transmission system) – a system that is under their operational control. System reliability is a very complex subject, as it is inextricably intertwined with market economics (a subject that is beyond the scope of this study). Nevertheless, a crucial element of reliable grid operations relevant to NODOS project operations is resource adequacy (RA). CAISO, through their FERC-approved tariff, along with RA requirements adopted by California Public Utilities Commission (CPUC) mandates, intend to establish a process that ensures that capacity procured for RA purposes is available when and where it is needed. For the NODOS project, RA obligations are a pseudo financial obligation in pumping/diversion cycle (self-provided), and a revenue opportunity in generation/release cycle.

There are several ways through which capacity value of a power asset can be harnessed. One way is the consideration of RA capacity value utilization. The State of California has embraced an RA mandate/regime (AB 380) in order to make power resources available when and where they are needed, and to promote investment in new resources and maintenance of existing facilities. CPUC governs the RA program for entities under its jurisdiction and CAISO monitors the RA program implementation by utilities, including publicly owned utilities and government agencies. Currently, RA capacity is being traded bilaterally through a solicitation and bidding process and the price of capacity negotiation is opaque. However, the CAISO tariff requires CAISO to procure capacity as a backstop should a load serving entity fail to meet its RA obligation showings and for within the month exceptional dispatch requirements. The RA obligation showings take place in an annual showing, as well as monthly showings. FERC has authorized CAISO to charge or pay the default RA capacity procurement price of $67.5/kW-year (pending FERC approval). In terms of capacity rate determination needed to estimate RA revenues and/or obligations, three options can be considered:

1. Bilateral trade capacity value: It is not transparent and the rate at which the capacity is procured is unknown. It could be lower in some months and higher during summer months (seasonal trend).
2. Default Capacity Procurement Mechanism (CPM) procurement rate: The FERC-approved CAISO tariff rate of $67.5/kW-year (pending FERC approval) is the backstop procurement rate. It is constant for all the months, and represents an implied cap on RA value in the CAISO market. This default rate is subject to change in future stakeholder processes at CAISO and subsequent FERC approval. Also, there is little chance that an asset can realize this level of capacity payment because of the narrow CAISO capacity market at the CPM rate.
3. Based on escalated 2009 California Energy Commission (CEC) costs of generation technologies: Capacity value would be the revenue stream from selling capacity needed

to make an economic/feasible investment in a simple cycle generation unit. Modeling a 100 MW simple cycle generation unit using the escalated 2009 CEC costs of generation technologies revealed a capacity revenue requirement of $25.40/kW-year.

It is assumed that the NODOS project will offer capacity in the CAISO market to participants that need to secure capacity resource to meet their RA obligations. For a generation asset, there are two different levels of participation (local RA, and system RA) in CAISO's capacity market based on the relative location of that specific asset to pre-identified local congested areas within the CAISO-managed grid. The NODOS project facilities and their potential interconnection location to the CAISO grid do not currently fall in one of the congested local areas where the generation assets can sell local RA products. Moreover, the CAISO market currently has sufficient system RA with very little monetary value for assets to capture from capacity offerings. However, system RA needs, system configuration, and assets geographical distribution are changing all the time. There may be some future opportunities for the NODOS project to participate in the RA market as the CAISO market evolves to integrate the 33 percent Renewables target in 2020. Monetizing potential revenues for the NODOS project from participation in the Capacity market is a difficult task. The uncertainty in projecting where and when RA products are needed will render any estimate worthless at this time. A range of values is offered to describe potential revenues for NODOS project RA offerings, and was based on a $2/kW-year (from recent market offerings) to $25.40/kW-year (as described in #3 above).

NODOS project RA obligations resulting from its pumping load are met through the self-provided provisions of current CAISO tariff, providing that it meets CAISO participating load requirements. In reality, the NODOS project would meet its RA obligations in the pumping mode through a load dropping scheme and would satisfy CAISO's RA requirements. For the Alternative C pumping mode, the monetary value of meeting RA obligations, which can be described as avoided cost, has a range in NPV of $1,666,000 to $20,944,000 for the Incidental operations and $827,000 to $10,338,000 for the Optimized operations, for the median case deliveries and the 30-year planning period. The significant difference in the RA obligations between the Incidental and the Optimized operations is the result of avoiding pumping during the super peak hours (which determines an asset's RA obligations in CAISO) in the Optimized pumping mode.

For the NODOS project generation mode, the corresponding potential Capacity revenues are estimated at a NPV of $946,080 to $11,826,000 for the Incidental operations, and $2,572,000 to $32,149,000 for the Optimized operations. Optimizing NODOS project operations would result in a significant increase in generation assets utilization during the super peak hours (and enhance its RA offerings potential). The Pump-back mode for the NODOS project would be in sync with CAISO's Capacity market optimal values (super peak generation hours) and least obligations (off--peak load). The pump-back operations can add to the NODOS project RA potential revenues in NPV between $3,040,000 and $38,000,000. It should be noted that estimates for Capacity revenues are projections that are highly dependent (and uncertain) on whether the CAISO market will evolve with the need to secure RA resources (to integrate Renewables) from assets similar to the NODOS project.

Ancillary Services Potential

CAISO procures AS to ensure that it has adequate reserve generation capacity to maintain the electric system reliability and system frequency, by matching generation and load at all times under both normal and abnormal operating conditions. In their restructured electricity market (Post MRTU), CAISO obtains AS services through a competitive bidding process. On a daily basis, CAISO procures four primary AS services (regulation, spinning reserves, non-spinning reserves, and replacement reserves), in day-ahead and in hour-ahead markets. The two additional AS that CAISO procures are black-start and voltage support services, which are procured on a long term basis. The four primary AS are procured on separate basis, in a competitive open market environment, designed as being an integral component of the energy market. The Primary AS markets are defined by CAISO, as follows:

1. Regulation: Generation that is online and synchronized with the CAISO-controlled grid so that the energy can be increased or decreased instantly through automatic generation control (AGC), directly by the CAISO monitoring system. Regulation is used to maintain continuous balancing of resources and loads within the CAISO-controlled grid, as well as maintains frequency during normal operating conditions.
2. Spinning Reserve: Generation that is online, or "spinning," with additional capacity that is capable of ramping over a specified range within 10 minutes and running for at least 2 hours.
3. Non-Spinning Reserve: Generation that is available but not online, that is capable of being synchronized and ramping to a specified level within 10 minutes, and capable of producing dispatched energy for at least 2 hours.
4. Replacement Reserves: Generation that is capable of starting up if not already operating, synchronized with CAISO controlled grid and ramping to a specified load within 1 hour, and running for at least 2 hours.

The two remaining AS (voltage support and black-start) are procured primarily through the Reliability Must Run (RMR) contracts. CAISO is responsible for conducting a competitive market of the four primary AS on behalf of the market participants.

For NODOS project pumping/generating facilities, if interconnected to the CAISO grid, AS would be a significant operations and costs/revenues concern. For the NODOS project to participate in the CAISO AS market, the CAISO tariff requires a participating generator to undergo a certification process- the process details are beyond the scope of this study. CAISO tariff states that a participating generator is a generator or other seller of energy or AS through a scheduling coordinator over the CAISO grid from a generating unit with a rated capacity of one MW or greater, or from a generating unit providing AS and/or Imbalance Energy through an aggregation arrangement approved by CAISO, a criteria that the NODOS project will clearly meet. CAISO accepts market bids for energy and AS only from scheduling coordinators on behalf of the participating generator.

A preliminary assessment for AS opportunities for the NODOS project is conducted using the median case CALSIM II deliveries for the 30-year planning period. Although the opportunity exists for NODOS project facilities to participate in providing AS in the CAISO day-ahead and

hour-ahead markets, analysis focuses on the day-ahead market opportunities. More thorough analysis will be conducted in the next phase of the study as the NODOS project evolves into an advanced stage and more granular details are developed through improved modeling efforts (daily, and hourly time steps) for project operations. In general, participation in the AS market is an opportunity to translate inherent operational flexibilities, and excess capacities into revenue opportunities. For the NODOS project, the ultimate priority is to maintain the intended seasonal water cycle diversions/deliveries that the project was designed to capture. Therefore, revenue opportunities from participation in the AS market will have to be designed as an incidental activity to satisfying the intended project's operations. More operational scenarios will be considered in the next phase of the study where operations would be optimized to capture the most revenues the market offers for both energy and AS, coincidently.

The restructured CAISO market (post MRTU) is still evolving and price signals have not necessarily matured to reflect long-term market trends for AS prices. Moreover, CAISO's renewable integration initiative and market redesign will have great impact on AS needs and prices. New CAISO AS products (such as fast ramping) may provide an exceptional opportunity for hydro installation, such as the NODOS project, to capture and participate in. For the current study, the best available approach to value the NODOS project potential revenues from AS markets is to use recent historical AS clearing prices for the CAISO market as a reference (available on CAISO's OASIS website).

For the pumping cycle, the NODOS project will have the opportunity as a participating load (meeting CAISO tariff definition) to sell Non-Spin AS (as described in #3 above) into the CAISO market. However, the AS participation will be limited to the Sites Reservoir pumping plant, so that water diversions from the Sacramento River could be maintained, at all times. The assumption is that when the pump load at Sites Reservoir pumping plant gets dropped by CAISO, water diversions from the Sacramento River could be stored temporarily in Holthouse Reservoir until CAISO needs the service. A two-hour maximum period is anticipated for a Non-Spin AS. Stored water at Holthouse Reservoir could then be pumped into Sites Reservoir at a later time within the same day. CALSIM II runs indicate that in months with potentially highest water diversions from the Sacramento River it is possible to use excess pumping capacity at Sites Reservoir to accommodate the Non-Spin AS participation. More detailed analysis is needed for the pumping cycle in the next phase of the study to develop AS participation strategies. Figure H.7-1 depicts the Non-Spin AS potential in MWh, for Sites Reservoir pumping plant, for Alternative C.

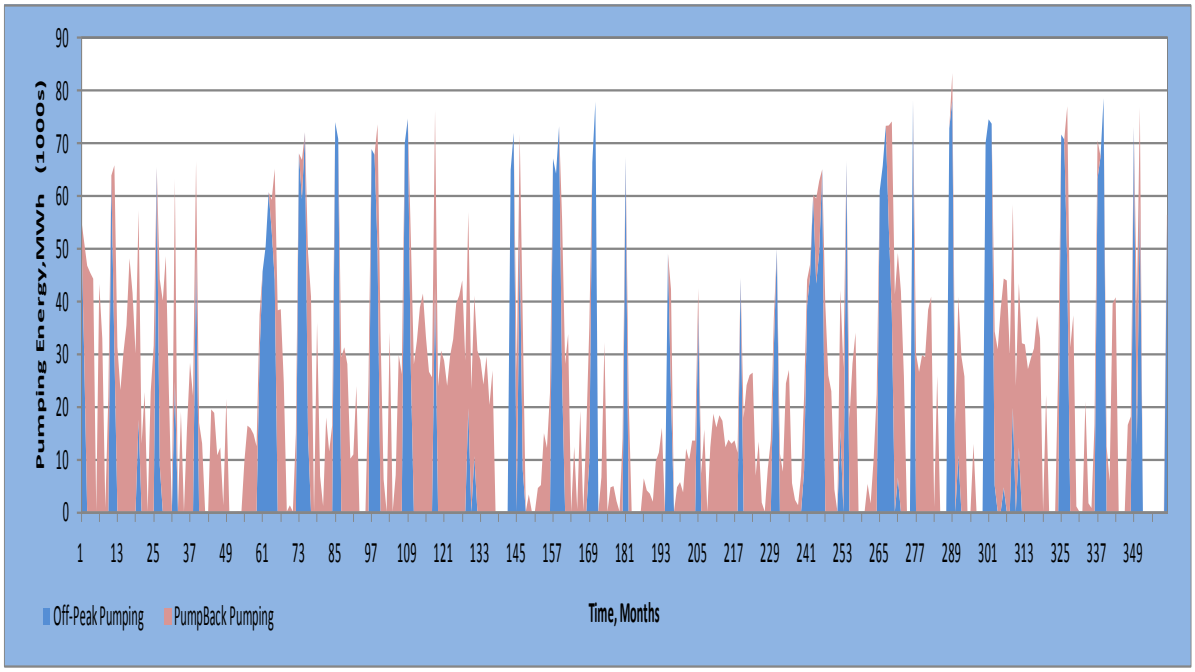


Figure H.7-1. Ancillary Service Potential, Sites Reservoir Pumping Cycle, Median Case

For the generation cycle, the NODOS project will have the opportunity to sell Regulation Down AS (as described in #1 above) in the CAISO market. NODOS project water Release mode was optimized (in this study) to capture the most value for its incidental generation that the market offers. Hence, water releases from Sites Reservoir are designed to occur in the on-peak (or super peak) hours. Accordingly, NODOS project generation facilities are assumed to sell Regulation Down AS, mostly in the on-peak (and super peak) hours and to a lesser extent in the off-peak hours. The assumption is that Regulation Down AS for the NODOS project, if called upon, represents a temporary delay in water releases and could be rectified within few hours. Also, it is assumed that NODOS project facilities will be equipped with an automatic generation control (AGC) system and that the generation units would be of the type that could quickly be ramped down to satisfy CAISO requirements for this type of AS support. Participating in the Regulation Down AS market may result in foregoing some of the on-peak generation revenues. More detailed analysis will be conducted in the next phase of the study to estimate the value of lost opportunity resulting from shifting generation needed by AS dispatch. The AS participation impact on NODOS project revenues need to be done in the context of the frequency at which CAISO calls upon this type of AS support. Figure H.7-2 depicts the Regulation Down AS potential for NODOS project generation facilities in MWh, for Alternative C.

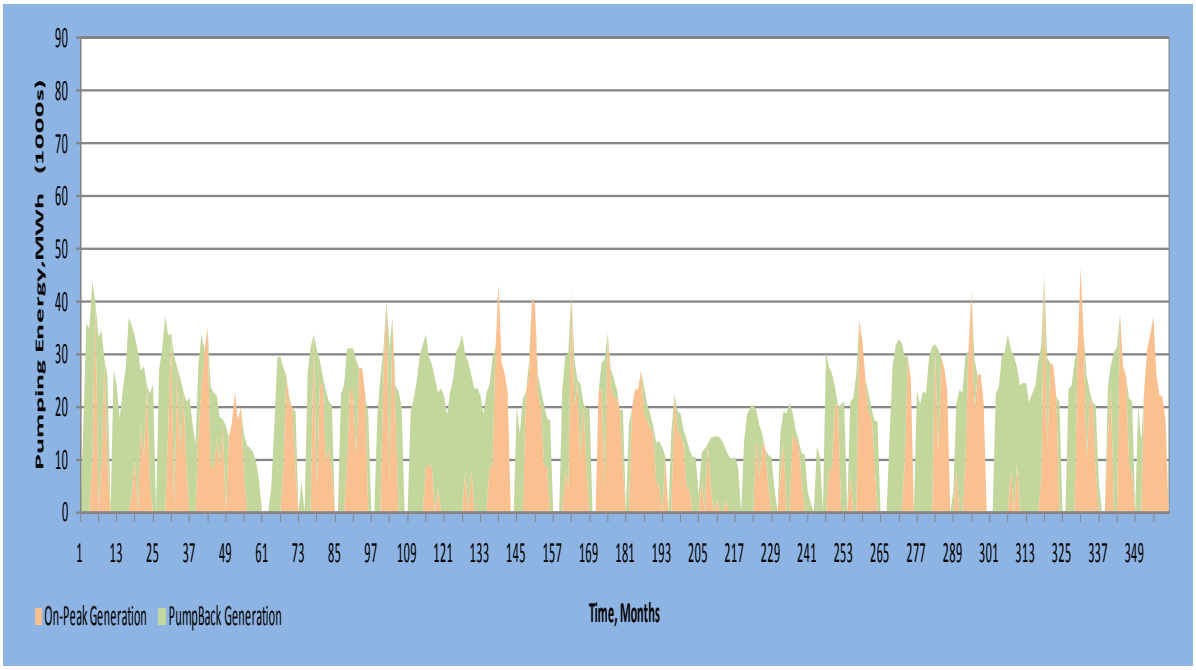


Figure H.7-2. Ancillary Service Potential, NODOS Project Generation Cycle, Median Case

The average values for the off-peak Non-Spin, and on-peak Regulation Down are calculated using published clearing prices for the CAISO AS markets. For the NODOS project, the total AS revenues from Non-Spin (the pump mode) for the 30-year planning period in NPV is $4,925,000. The corresponding total AS revenues from Regulation Down (in the generation mode) for the project in NPV is $9,198,000. The total AS revenues from the pump-back operations in NPV is $11,595,000. The NODOS project's total potential AS revenues in NPV is $25,718,000 for the 30-year planning period. It should be noted that the aforementioned AS revenues are only a measure of potential revenues based on current market trends, granted that the CAISO market will evolve overtime to accommodate load growth, renewable integration, regulatory changes, etc.

Renewable Integration

The California Renewable Energy Resources Act (CRERA), signed by California Governor Brown on April 12, 2011, significantly increased the State's renewable portfolio standard (RPS) targets from 20 percent to 33 percent by 2020. CRERA also expanded the compliance obligations to include virtually all retail sales of electricity in California. In September 2010, CAISO undertook a multi-phase stakeholder process (Renewable Integration Market and Product Review Initiative [RIMPR]), aimed at identifying changes to the energy market structure and at introducing new market products to reliably mitigate the impact of Renewable generation (Intermittent generation) as it penetrates the market. Recently CAISO has refocused its RIMPR from an expansive market design changes to a more incremental phased approach. CAISO is focused on developing a high-level roadmap addressing short-, medium-, and long-term market enhancement to meet renewable integration needs.

Other emerging developments in the power sector include energy storage technologies. This includes using pump-storage hydroelectric facilities to share off-peak energy for use during the on-peak periods or to provide AS. This includes supporting the use of intermittent renewable energy facilities into dispatchable resources and enhancing grid reliability and power quality. Other forces driving the need for energy storage technologies are climate change policies, smart grid initiatives, and the desire to improve utilization of generation and transmission capacities.

For the NODOS project, there is great potential for the project's generation and pumping assets to participate in providing renewable integration services as the market needs evolve. Hydropower assets have a unique feature that is not available from other energy storage technologies, fast ramping that can simultaneously provide both high capacity and energy. Although the NODOS project's potential in renewable energy integration is certain, it is difficult to monetize that potential at this time because of the absence of a clear tradable market for these services. CAISO RIMPR may introduce new market products that the NODOS project can provide, yet sustain its primary water storage and delivery objectives.

The inherent nature of excess capacity for hydropower installations resulting from hydrology swings provide the opportunity to participate in providing energy storage services and the need to better utilize the excess capacity of project's assets (to enhance project economics). NODOS project multi-purpose objectives will further enhance its chances in competing in the market as an energy storage asset (as project costs are socialized among multiple objectives) relative to more costly technologies. The limiting factors for NODOS project participation are the inherent priorities of meeting the water delivery obligations over market driven power operations of the project's assets.

This page intentionally left blank

H1.8 Recommendations and Next Steps

This NODOS Power Planning Study is meant to provide a feasibility-level assessment of the designed project components and operational scenarios from a power planning perspective. Three action alternatives, each with different configuration and components capacities, are considered and analyzed. Power planning perspective is important in capturing the impacts of the energy market economies and regulatory mandates and will be consequential to the costs and revenues for the NODOS project to be adopted and built. Although the NODOS project is envisioned to provide off-stream storage needed to support CVP and SWP operations and functions, its power portfolio is a major component in determining the project's ultimate viability. More work is needed to improve on the findings of the current phase of the study, including:

- Use anticipated CALSIM II modeling results (reflecting latest BiOp) for daily operations to refine the optimization of NODOS project operations.
- Use available market information (i.e., LMP prices and trends) to optimize NODOS project operations. Update the AS duration curves to reflect CAISO locational markets, and potential future markets resulting from the need to integrate Renewables.
- Integrate CAISO's RIMPR changes to the energy market in optimizing and valuing the NODOS project power portfolio.
- Explore and propose modifications to the physical and operational attributes of the power generation complex in light of the modeling results. Consider the change in designed capacities needed to correspond to the optimized operations, and needed project flexibilities.
- Identify operational scenarios and design modifications that could be modeled to optimize the project's operations and to enhance its value.
- Consider scenarios reflecting climate change impacts on NODOS project operations, design needs, and ultimate viability.
- Propose a sensitivity analysis process that would describe the impact of adjusting design parameters, operational and financial uncertainty, on the project's value.
- Look into trends in technologies and setups that represent current practice in designing hydropower projects. Many recently designed pump-storage facilities are using separate pumping and generating facilities to increase efficiency and add operational flexibility.
- Consider a 50-year planning period that is more consistent with the lifecycle of hydropower project components.

Acronyms and Abbreviations

AB	Assemble Bill
AF	acre-feet
AGC	automatic generation control
AS	ancillary services
BDCP	Bay Delta Conservation Plan
BiOp	Biological Opinion
CAISO	California Independent System Operator
CALSIM	California Statewide Integrated System
CEC	California Energy Commission
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CPM	Capacity Procurement Mechanism
CPUC	California Public Utilities Commission
CRERA	California Renewable Energy Resources Act
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
D-1641	Water Rights Decisoin 1641
DSIWM	Division of Statewide Integrated Water Management
DWR	Department of Water Resources
EBS	Energy Book System
EIR	environmental impact report
EIS	environmental impact statement
EPM	Energy Portfolio Model
EPRI	Electric Power Research Institute
FERC	Federal Energy Regulatory Commission
GCID	Glenn-Colusa Irrigation District
GED	Global Energy Decisions
GHG	greenhouse gas
HH	Henry Hub
kW	kilowatt

M&I	municipal and industrial
MAF	million acre-foot
MW	megawatts
MWh	megawatt hour
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NODOS	North-of-Delta Offstream Storage
NPV	net present value
NYMEX	New York Mercantile Exchange
P&Gs	Principles and Guidelines
PARO	Power and Risk Office
PG&E	Pacific, Gas and Electric Company
RA	Resource Adequacy
REC	Renewable Energy Credit market
Reclamation	Bureau of Reclamation
RIMPR	Renewable Integration Market and Product Review Initiative
RMR	Reliability Must Run
RPS	renewable portfolio standard
SIS	System Impact Studies
SMUD	Sacramento Municipal Utility District
SoCal	Southern California
study	Power Planning Study
SWP	State Water Project
SWRCB	State Water Resources Control Board
T-C	Tehama-Colusa
TDS	Total dissolved solid
TRR	Terminal Regulating Reservoir
Tullet	Tullet Liberty
USFWS	U.S. Fish and Wildlife Service
WAPA	Western Area Power Administration
WECC	Western Electricity Coordinating Council
WRC	Water Resources Council

Attachment A –
Transmission Interconnection Road Map

This page intentionally left blank

Transmission Interconnection Process

PARO's Transmission Planning Branch prepared a description of the normal process that DWR has taken when exploring transmission interconnection options for new or existing facilities. The discussion below should serve as a roadmap for the transmission interconnection process for the NODOS project.

Preliminary Details

Before PARO can initiate its actions for obtaining physical interconnection and transmission service for DWR facilities, the following need to be ascertained:

1. Estimated peak capacity needs (MWs) at facilities' start-up and during construction
2. Planned load growth for future enlargements at said facilities
3. Probable location of Point of Interconnection to high-voltage system
4. Identification of all potential transmission providers

Transmission Provider Studies

All of the major transmission service providers in California require various engineering studies which evaluate the impact of a proposed facility on the overall high-voltage system. These studies, usually known as System Impact Studies (SIS), are of value to DWR for two reasons. First, the reports resulting from these studies can be utilized in any EIR/EIS documentation for discussion of transmission impacts (i.e., line routing and substations). Second, the studies, a necessary first level of review required by any of the potential transmission service providers, give a good indication of which provider represents the preferred option. However, it must be noted that any cost estimates provided at the SIS stage are considered preliminary and non-binding.

Once DWR has reviewed the various SIS reports and validated their findings, DWR must initiate the second stage of the transmission planning studies (typically called a Facility Study). These studies build upon the SIS and identify specific hardware that will be needed to implement the transmission service interconnection. Typically, one can assume that the Facility Study will provide accurate cost estimates that could be used in determining the economics of the project.

Transmission Service Request

Once the results of the various studies (i.e., SIS and Facility Study) are compiled, DWR can determine which provider it will seek an interconnection with, and subsequent transmission service. Typically, DWR will need to arrange for an interconnection service agreement and a transmission service agreement.

Route and Construction

Once DWR completes the transmission interconnection agreements, actual construction-related activities begin. These activities include ordering and receiving equipment; land acquisition and permitting; and actual construction.

It is important to note that there must be adequate lead time for all of the activities described above before the new DWR facility is expected to be on-line. To illustrate this, Table H.A-1 represents a typical timeline.

Table H.A-1. A Typical Timeline for New Transmission Interconnection

Phase	Action	PARO's Role	Duration
Preliminary Details			
	Assessing Project Needs (e.g., location and loads)	Support DWR's project team where necessary	(unknown, but for purposes of this timeline, completion of Preliminary Details is T_0)
Transmission Provider Studies			
	Coordination with Transmission Providers	Prepare necessary letters and documentation. Facilitate groundwork discussions between DWR and Providers.	2 months
	Formal Studies (System Impact Studies and Facility Studies)	Prepare necessary documentation. Negotiate study agreements. Facilitate payments for studies. Monitor process. Assist DOE-Electrical Engineering in reviewing results. Submit recommendations to management identifying which transmission option is preferable.	Up to 2 years
Transmission Service Requests			
	Formal Request to Preferred Transmission Provider	Prepare necessary documentation for request. Negotiate transmission interconnection agreement. Negotiate transmission service agreement. Facilitate upfront payments as required by agreements.	1 year
Construction Phase			
	DWR to order required hardware for its side of interconnection and for Provider to order hardware for their side.	Assist DWR project team and Department of Energy-Electrical Engineering as necessary	3 years
	Install DWR's hardware; Provider installs on their side of interconnection, per agreements	Assist DWR project team and Department of Energy-Electrical Engineering as necessary	2 years
Online Date** Assuming no major obstacles to Timeline ** 8 years after preliminary project details are complete			

This page intentionally left blank

Attachment B –
NODOS Project Power Operations, Modeling Results

This page intentionally left blank

Table H.B-1. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative A

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt A (Incidental Operations) Deliveries Cas

Pumping-Generation Site	NPV	Year Project in Service							
		1	2	3	4	5	6	7	8
NODOS Pumping	**Period Total**	**Period Total, NPV ($1000)**							
TC Canal Pumping	-6,080	-285	-115	-276	-321	-105	-180	-152	-188
GCID Pumping	-10,085	-319	-268	-383	-433	-357	-350	-387	-341
Sac River Pumping	-53,500	-2,821	-2,867	-1,926	-1,689	-667	-1,109	-2,531	-1,383
TRR Pumping	-9,937	-530	-85	-204	-1,254	-190	-81	-552	-597
Sites Pumping	-149,355	-8,238	-3,209	-5,500	-10,489	-848	-4,019	-4,825	-5,680
Subtotal	-228,957	-12,193	-6,544	-8,289	-14,186	-2,167	-5,739	-8,447	-8,189
NODOS Generation	**Period Total**	**Period Total, NPV ($1000)**							
Sites Geneneration	109,079	3,825	3,961	4,215	4,083	3,420	5,604	2,330	7,173
TRR Generation	19,649	528	1,333	510	969	544	777	761	1,223
Sac River Genenration	49,875	2,395	2,591	2,465	1,448	1,662	2,706	1,821	3,621
Subtotal	178,603	6,748	7,885	7,190	6,500	5,626	9,087	4,912	12,017
PumpBack Operations	**Period Total**	**Period Total, NPV ($1000)**							
PumpBack during Diversion cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PumpBack During Release Cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pure PumpBack Operations Cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Subtotal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NODOS Project Total	-50,354	-5,445	1,341	-1,099	-7,686	3,459	3,348	-3,535	3,828

Notes

Cash Flow reported pre-tax in PV($000).

Evaluation performed 07/07/2011

Report updated at 10:28:53 AM.

Incidental – Operations based on water diversions and releases.

Table H.B-1. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative A (Cont.)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt A (Incidental Operations) Deliveries Case (Cont.)

9	10	11	12	13	14	15	16	17	18	19
-303	-262	-123	-413	-214	-249	-180	-352	-197	-276	-232
-463	-329	-364	-391	-340	-343	-299	-446	-360	-382	-357
-2,682	-1,584	-999	-2,887	-2,268	-2,768	-1,223	-3,367	-1,146	-1,509	-816
-880	-154	-83	-477	-187	-191	-92	-572	-391	-297	-341
-8,511	-4,654	-2,829	-10,341	-4,830	-6,085	-4,499	-9,575	-4,863	-6,585	-5,663
-12,839	**-6,983**	**-4,398**	**-14,509**	**-7,839**	**-9,636**	**-6,293**	**-14,312**	**-6,957**	**-9,049**	**-7,409**
3,016	4,255	5,263	5,063	4,476	3,517	4,900	4,016	5,829	4,217	3,911
448	793	757	673	1,071	679	1,019	326	708	539	618
1,478	2,033	2,996	2,191	1,879	1,508	1,645	2,011	2,255	1,494	1,424
4,942	**7,081**	**9,016**	**7,927**	**7,426**	**5,704**	**7,564**	**6,353**	**8,792**	**6,250**	**5,953**
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-7,897	**98**	**4,618**	**-6,582**	**-413**	**-3,932**	**1,271**	**-7,959**	**1,835**	**-2,799**	**-1,456**

Table H.B-1. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative A (Cont.)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt A (Incidental Operations) Deliveries Case (Cont.)

20	21	22	23	24	25	26	27	28	29	30
-248	-118	-158	-71	-61	-266	-159	-168	-240	-83	-85
-342	-356	-313	-306	-182	-332	-242	-252	-272	-300	-276
-2,973	-261	-1,142	-558	-1,338	-3,348	-2,035	-1,064	-3,502	-529	-508
-401	-197	-255	-13	-145	-735	-137	-121	-350	-259	-166
-6,740	-679	-3,443	-1,224	-1,016	-7,681	-4,392	-3,731	-7,159	-1,220	-827
-10,704	**-1,611**	**-5,311**	**-2,172**	**-2,742**	**-12,362**	**-6,965**	**-5,336**	**-11,523**	**-2,391**	**-1,862**
2,877	2,299	3,610	3,646	1,110	3,319	2,661	3,755	1,689	570	469
661	313	672	524	839	502	703	565	449	60	85
997	930	951	2,158	599	1,345	875	1,120	836	265	176
4,535	**3,542**	**5,233**	**6,328**	**2,548**	**5,166**	**4,239**	**5,440**	**2,974**	**895**	**730**
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-6,169	**1,931**	**-78**	**4,156**	**-194**	**-7,196**	**-2,726**	**104**	**-8,549**	**-1,496**	**-1,132**

Incidental – Operations based on water diversions and releases.

Table H.B-2. NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative A

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt A (Optimized Operations) Deliveries Case

Pumping-Generation Site	NPV	Year Project in Service							
		1	2	3	4	5	6	7	8
NODOS Pumping	**Period Total**	**Period Total, NPV ($1000)**							
TC Canal Pumping	**-6,080**	-285	-115	-276	-321	-105	-180	-152	-188
GCID Pumping	**-10,085**	-319	-268	-383	-433	-357	-350	-387	-341
Sac River Pumping	**-53,500**	-2,821	-2,867	-1,926	-1,689	-667	-1,109	-2,531	-1,383
TRR Pumping	**-9,937**	-530	-85	-204	-1,254	-190	-81	-552	-597
Sites Pumping	**-137,398**	-7,693	-2,879	-4,892	-9,329	-678	-3,718	-4,443	-5,301
Subtotal	**-217,000**	**-11,648**	**-6,214**	**-7,681**	**-13,026**	**-1,997**	**-5,438**	**-8,065**	**-7,810**
NODOS Generation	**Period Total**	**Period Total, NPV ($1000)**							
Sites Geneneration	**121,405**	4,764	4,397	4,861	4,493	3,786	6,027	2,731	7,921
TRR Generation	**20,396**	580	1,377	546	982	605	803	769	1,237
Sac River Genenration	**49,875**	2,395	2,591	2,465	1,448	1,662	2,706	1,821	3,621
Subtotal	**191,676**	**7,739**	**8,365**	**7,872**	**6,923**	**6,053**	**9,536**	**5,321**	**12,779**
PumpBack Operations	**Period Total**	**Period Total, NPV ($1000)**							
PumpBack during Diversion cycle	**7,031**	101	0	0	366	384	152	0	368
PumpBack During Release Cycle	**22,998**	1,176	984	578	617	557	926	1,150	204
Pure PumpBack Operations Cycle	**17,435**	152	1,083	1,100	274	1,359	117	876	0
Subtotal	**47,464**	1,429	2,067	1,678	1,257	2,300	1,195	2,026	572
NODOS Project Total	**22,140**	**-2,480**	**4,218**	**1,869**	**-4,846**	**6,356**	**5,293**	**-718**	**5,541**

Notes

Cash Flow reported pre-tax in PV($000).
Evaluation performed 07/07/2011
Report updated at 10:28:53 AM.

Incidental – Operations based on water diversions and releases.

Table H.B-2. NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative A (Cont.)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt A (Optimized Operations) Deliveries Case (Cont.)

9	10	11	12	13	14	15	16	17	18	19
-303	-262	-123	-413	-214	-249	-180	-352	-197	-276	-232
-463	-329	-364	-391	-340	-343	-299	-446	-360	-382	-357
-2,682	-1,584	-999	-2,887	-2,268	-2,768	-1,223	-3,367	-1,146	-1,509	-816
-880	-154	-83	-477	-187	-191	-92	-572	-391	-297	-341
-7,979	-4,007	-2,701	-9,343	-4,431	-5,506	-4,200	-8,921	-4,680	-6,060	-5,222
-12,307	**-6,336**	**-4,270**	**-13,511**	**-7,440**	**-9,057**	**-5,994**	**-13,658**	**-6,774**	**-8,524**	**-6,968**
3,294	4,652	5,941	5,441	4,921	4,065	5,416	4,667	6,450	4,763	4,030
466	825	788	672	1,094	728	1,060	354	735	528	638
1,478	2,033	2,996	2,191	1,879	1,508	1,645	2,011	2,255	1,494	1,424
5,238	**7,510**	**9,725**	**8,304**	**7,894**	**6,301**	**8,121**	**7,032**	**9,440**	**6,785**	**6,092**
171	380	121	722	93	181	120	186	166	554	299
837	906	590	662	1,020	846	691	751	371	839	821
497	623	264	0	512	874	518	452	481	178	547
1,505	1,909	975	1,384	1,625	1,901	1,329	1,389	1,018	1,571	1,667
-5,564	**3,083**	**6,430**	**-3,823**	**2,079**	**-855**	**3,456**	**-5,237**	**3,684**	**-168**	**791**

Optimized – Operations shaped to minimize pumping costs and maximize revenue from energy generation.

Table H.B-2. NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative A (Cont.)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt A (Optimized Operations) Deliveries Case (Cont.)

20	21	22	23	24	25	26	27	28	29	30
-248	-118	-158	-71	-61	-266	-159	-168	-240	-83	-85
-342	-356	-313	-306	-182	-332	-242	-252	-272	-300	-276
-2,973	-261	-1,142	-558	-1,338	-3,348	-2,035	-1,064	-3,502	-529	-508
-401	-197	-255	-13	-145	-735	-137	-121	-350	-259	-166
-6,354	-543	-3,073	-1,125	-986	-7,247	-4,139	-3,517	-6,784	-1,018	-629
-10,318	**-1,475**	**-4,941**	**-2,073**	**-2,712**	**-11,928**	**-6,712**	**-5,122**	**-11,148**	**-2,189**	**-1,664**
3,189	2,557	4,147	4,121	1,007	3,544	2,859	4,275	1,911	661	514
695	345	714	540	865	525	731	593	466	52	83
997	930	951	2,158	599	1,345	875	1,120	836	265	176
4,881	**3,832**	**5,812**	**6,819**	**2,471**	**5,414**	**4,465**	**5,988**	**3,213**	**978**	**773**
170	397	471	142	58	148	212	83	149	384	453
1,090	1,066	705	908	328	861	1,031	673	639	609	562
476	957	335	287	964	233	291	293	746	1,474	1,472
1,736	2,420	1,511	1,337	1,350	1,242	1,534	1,049	1,534	2,467	2,487
-3,701	**4,777**	**2,382**	**6,083**	**1,109**	**-5,272**	**-713**	**1,915**	**-6,401**	**1,256**	**1,596**

Optimized – Operations shaped to minimize pumping costs and maximize revenue from energy generation.

Table H.B-3. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative B

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt B (Incidental Operations)Deliveries Case

Pumping-Generation Site	NPV	Year Project in Service							
		1	2	3	4	5	6	7	8
NODOS Pumping	**Period Total**	**Period Total, NPV ($1000)**							
TC Canal Pumping	-7,508	-118	-154	-156	-89	-223	-179	-231	-186
GCID Pumping	-11,520	-346	-356	-341	-302	-306	-288	-429	-436
Sac River Pumping	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRR Pumping	-16,451	-69	-576	-357	-71	-45	-158	-763	-443
Sites Pumping	-147,695	-1,167	-4,894	-1,321	-1,747	-1,645	-2,469	-4,482	-4,074
Subtotal	**-183,174**	**-1,700**	**-5,980**	**-2,175**	**-2,209**	**-2,219**	**-3,094**	**-5,905**	**-5,139**
NODOS Generation	**Period Total**	**Period Total, NPV ($1000)**							
Sites Geneneration	111,264	4,644	5,875	117	2,159	696	2,165	3,841	1,508
TRR Generation	6,840	1	824	0	0	43	0	429	3
Sac River Genenration	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Subtotal	**118,104**	**4,645**	**6,699**	**117**	**2,159**	**739**	**2,165**	**4,270**	**1,511**
PumpBack Operations	**Period Total**	**Period Total, NPV ($1000)**							
PumpBack during Diversion cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PumpBack During Release Cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pure PumpBack Operations Cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Subtotal	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NODOS Project Total	**-65,070**	**2,945**	**719**	**-2,058**	**-50**	**-1,480**	**-929**	**-1,635**	**-3,628**

Notes

Cash Flow reported pre-tax in PV($000).

Evaluation performed 07/07/2011

Report updated at 10:28:53 AM.

Incidental – Operations based on water diversions and releases.

Table H.B-3. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative B (Cont'd)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt B (Incidental Operations)Deliveries Case (Cont.)

9	10	11	12	13	14	15	16	17	18	19
-342	-367	-117	-438	-538	-395	-230	-164	-271	-197	-227
-524	-478	-436	-529	-541	-386	-305	-412	-405	-406	-413
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-1,067	-977	0	-1,260	-1,841	-696	-164	-194	-503	-141	-316
-6,558	-8,746	0	-7,909	-13,152	-8,759	-4,990	-3,798	-3,854	-3,220	-3,142
-8,491	**-10,568**	**-553**	**-10,136**	**-16,072**	**-10,236**	**-5,689**	**-4,568**	**-5,033**	**-3,964**	**-4,098**
1,152	5,084	6,489	3,551	4,164	5,899	8,109	4,598	3,151	3,845	3,936
5	282	42	5	261	716	1,033	10	382	8	5
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,157	**5,366**	**6,531**	**3,556**	**4,425**	**6,615**	**9,142**	**4,608**	**3,533**	**3,853**	**3,941**
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-7,334	**-5,202**	**5,978**	**-6,580**	**-11,647**	**-3,621**	**3,453**	**40**	**-1,500**	**-111**	**-157**

Table H.B-3. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative B (Cont.)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt B (Incidental Operations)Deliveries Case (Cont.)

20	21	22	23	24	25	26	27	28	29	30
-295	-207	-270	-347	-413	-167	-291	-120	-258	-304	-214
-410	-400	-391	-403	-436	-313	-301	-312	-334	-330	-251
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-766	-295	-732	-723	-1,216	-333	-742	-64	-692	-956	-291
-6,095	-2,066	-6,661	-6,706	-10,470	-2,796	-7,128	-1,787	-6,679	-7,579	-3,801
-7,566	**-2,968**	**-8,054**	**-8,179**	**-12,535**	**-3,609**	**-8,462**	**-2,283**	**-7,963**	**-9,169**	**-4,557**
1,179	3,161	3,444	5,318	2,858	4,657	5,028	3,151	3,864	4,200	3,421
6	10	392	95	167	403	558	7	295	485	373
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,185	**3,171**	**3,836**	**5,413**	**3,025**	**5,060**	**5,586**	**3,158**	**4,159**	**4,685**	**3,794**
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-6,381	**203**	**-4,218**	**-2,766**	**-9,510**	**1,451**	**-2,876**	**875**	**-3,804**	**-4,484**	**-763**

Incidental – Operations based on water diversions and releases.

Table H.B-4. NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative B

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt B (Optimized Operations) Deliveries Case

Pumping-Generation Site	NPV	Year Project in Service							
		1	2	3	4	5	6	7	8
NODOS Pumping	**Period Total**	**Period Total, NPV ($1000)**							
TC Canal Pumping	**-7,508**	-118	-154	-156	-89	-223	-179	-231	-186
GCID Pumping	**-11,520**	-346	-356	-341	-302	-306	-288	-429	-436
Sac River Pumping	**0**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRR Pumping	**-16,451**	-69	-576	-357	-71	-45	-158	-763	-443
Sites Pumping	**-133,104**	-947	-4,203	-1,078	-1,537	-1,439	-2,190	-3,949	-3,520
Subtotal	**-168,583**	**-1,480**	**-5,289**	**-1,932**	**-1,999**	**-2,013**	**-2,815**	**-5,372**	**-4,585**
NODOS Generation	**Period Total**	**Period Total, NPV ($1000)**							
Sites Geneneration	**125,490**	5,854	6,830	0	2,625	843	2,526	4,442	1,700
TRR Generation	**7,145**	0	841	0	0	56	0	441	0
Sac River Genenration	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Subtotal	**132,635**	**5,854**	**7,671**	**0**	**2,625**	**899**	**2,526**	**4,883**	**1,700**
PumpBack Operations	**Period Total**	**Period Total, NPV ($1000)**							
PumpBack during Diversion cycle	**13,999**	20	286	49	174	175	326	457	756
PumpBack During Release Cycle	**18,298**	1,192	546	0	672	270	376	284	666
Pure PumpBack Operations Cycle	**14,916**	362	0	1,663	435	1,072	540	83	663
Subtotal	**47,213**	1,574	832	1,712	1,281	1,517	1,242	824	2,085
NODOS Project Total	**11,265**	**5,948**	**3,214**	**-220**	**1,907**	**403**	**953**	**335**	**-800**

Notes

Cash Flow reported pre-tax in PV($000).
Evaluation performed 07/07/2011
Report updated at 10:28:53 AM.

Optimized – Operations shaped to minimize pumping costs and maximize revenue from energy generation.

Table H.B-4. NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative B (Cont.)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt B (Optimized Operations) Deliveries Case (Cont.)

9	10	11	12	13	14	15	16	17	18	19
-342	-367	-117	-438	-538	-395	-230	-164	-271	-197	-227
-524	-478	-436	-529	-541	-386	-305	-412	-405	-406	-413
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-1,067	-977	0	-1,260	-1,841	-696	-164	-194	-503	-141	-316
-5,845	-7,775	0	-7,060	-11,879	-7,992	-4,511	-3,456	-3,406	-2,878	-2,904
-7,778	**-9,597**	**-553**	**-9,287**	**-14,799**	**-9,469**	**-5,210**	**-4,226**	**-4,585**	**-3,622**	**-3,860**
1,371	5,729	7,600	4,158	4,633	6,715	8,526	5,363	3,397	4,436	4,491
0	311	39	0	270	774	1,062	1	403	0	0
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,371	**6,040**	**7,639**	**4,158**	**4,903**	**7,489**	**9,588**	**5,364**	**3,800**	**4,436**	**4,491**
244	772	0	335	967	549	587	510	141	352	199
1,105	931	270	678	760	717	282	864	664	1,126	563
841	180	494	189	0	581	733	354	1,206	290	479
2,190	1,883	764	1,202	1,727	1,847	1,602	1,728	2,011	1,768	1,241
-4,217	**-1,674**	**7,850**	**-3,927**	**-8,169**	**-133**	**5,980**	**2,866**	**1,226**	**2,582**	**1,872**

Optimized – Operations shaped to minimize pumping costs and maximize revenue from energy generation.

Table H.B-4. NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative B (Cont.)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt B (Optimized Operations) Deliveries Case (Cont.)

20	21	22	23	24	25	26	27	28	29	30
-295	-207	-270	-347	-413	-167	-291	-120	-258	-304	-214
-410	-400	-391	-403	-436	-313	-301	-312	-334	-330	-251
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-766	-295	-732	-723	-1,216	-333	-742	-64	-692	-956	-291
-5,415	-1,854	-6,117	-6,206	-9,717	-2,434	-6,617	-1,663	-6,112	-6,957	-3,443
-6,886	**-2,756**	**-7,510**	**-7,679**	**-11,782**	**-3,247**	**-7,951**	**-2,159**	**-7,396**	**-8,547**	**-4,199**
1,372	3,690	3,635	5,951	3,120	5,035	5,321	3,539	4,283	4,557	3,748
0	1	413	100	179	427	599	0	330	498	400
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,372	**3,691**	**4,048**	**6,051**	**3,299**	**5,462**	**5,920**	**3,539**	**4,613**	**5,055**	**4,148**
685	267	420	767	1,251	1,066	415	323	694	540	672
1,015	832	534	381	502	328	376	894	519	399	552
512	783	656	0	371	344	437	548	345	174	581
2,212	1,882	1,610	1,148	2,124	1,738	1,228	1,765	1,558	1,113	1,805
-3,302	**2,817**	**-1,852**	**-480**	**-6,359**	**3,953**	**-803**	**3,145**	**-1,225**	**-2,379**	**1,754**

Optimized – Operations shaped to minimize pumping costs and maximize revenue from energy generation.

Table H.B-5. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative C

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt C (Incidental Operations) Deliveries Case

Pumping-Generation Site	NPV	Year Project in Service							
		1	2	3	4	5	6	7	8
NODOS Pumping	**Period Total**	**Period Total, NPV ($1000)**							
TC Canal Pumping	-5,788	-279	-128	-180	-80	-82	-411	-251	-238
GCID Pumping	-9,968	-306	-375	-347	-349	-231	-431	-355	-335
Sac River Pumping	-59,196	-3,040	-273	-1,227	-155	-370	-5,674	-2,940	-1,998
TRR Pumping	-11,839	-410	-204	-295	-28	-180	-1,057	-657	-159
Sites Pumping	-172,219	-9,319	-823	-4,546	-1,836	-1,298	-11,927	-9,489	-6,630
Subtotal	-259,010	-13,354	-1,803	-6,595	-2,448	-2,161	-19,500	-13,692	-9,360
NODOS Generation	**Period Total**	**Period Total, NPV ($1000)**							
Sites Geneneration	134,217	3,210	2,997	5,049	6,577	4,109	3,477	4,764	6,204
TRR Generation	20,385	723	438	981	765	1,128	807	1,246	963
Sac River Genenration	50,193	1,191	1,147	1,384	3,310	2,147	1,742	1,635	1,880
Subtotal	204,795	5,124	4,582	7,414	10,652	7,384	6,026	7,645	9,047
PumpBack Operations	**Period Total**	**Period Total, NPV ($1000)**							
PumpBack during Diversion cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PumpBack During Release Cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pure PumpBack Operations Cycle	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Subtotal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NODOS Project Total	-54,215	-8,230	2,779	819	8,204	5,223	-13,474	-6,047	-313

Notes

Cash Flow reported pre-tax in PV($000).
Evaluation performed 07/07/2011
Report updated at 10:28:53 AM.

Incidental – Operations based on water diversions and releases.

Table H.B-5. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative C (Cont.)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt C (Incidental Operations) Deliveries Case (Cont.)

9	10	11	12	13	14	15	16	17	18	19
-312	-268	-126	-207	-166	-264	-164	-71	-120	-71	-93
-344	-450	-416	-385	-345	-409	-407	-343	-432	-342	-252
-3,942	-1,761	-795	-1,225	-192	-3,931	-2,180	-1,088	-812	-1,161	-2,917
-534	-484	-291	-654	-91	-860	-516	-54	-536	-13	-460
-11,595	-7,078	-1,585	-6,587	-2,531	-11,282	-7,146	-2,959	-3,105	-1,604	-2,584
-16,727	**-10,041**	**-3,213**	**-9,058**	**-3,325**	**-16,746**	**-10,413**	**-4,515**	**-5,005**	**-3,191**	**-6,306**
5,826	1,414	806	7,843	8,524	6,353	7,552	6,942	3,492	1,109	2,006
1,135	114	166	1,136	764	906	534	719	246	525	956
1,788	725	300	1,965	3,199	2,232	3,166	3,548	2,462	955	1,542
8,749	**2,253**	**1,272**	**10,944**	**12,487**	**9,491**	**11,252**	**11,209**	**6,200**	**2,589**	**4,504**
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-7,978	**-7,788**	**-1,941**	**1,886**	**9,162**	**-7,255**	**839**	**6,694**	**1,195**	**-602**	**-1,802**

Incidental – Operations based on water diversions and releases.

Table H.B-5. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative C (Cont.)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt C (Incidental Operations) Deliveries Case (Cont.)

20	21	22	23	24	25	26	27	28	29	30
-153	-413	-149	-386	-145	-186	-195	-79	-212	-164	-195
-252	-419	-182	-460	-289	-278	-321	-251	-219	-232	-211
-2,317	-4,387	-1,716	-4,178	-1,078	-1,082	-2,570	-174	-1,728	-2,664	-1,621
-419	-899	-96	-1,227	-307	-145	-359	-11	-123	-425	-345
-3,603	-11,419	-2,922	-14,986	-3,397	-5,246	-7,031	-153	-6,238	-7,077	-6,223
-6,744	**-17,537**	**-5,065**	**-21,237**	**-5,216**	**-6,937**	**-10,476**	**-668**	**-8,520**	**-10,562**	**-8,595**
2,521	2,095	5,820	2,373	4,445	6,343	675	4,916	5,690	4,591	6,494
818	324	951	136	536	552	107	439	643	729	898
1,589	1,028	1,961	763	963	1,712	187	1,242	1,315	1,416	1,699
4,928	**3,447**	**8,732**	**3,272**	**5,944**	**8,607**	**969**	**6,597**	**7,648**	**6,736**	**9,091**
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-1,816	**-14,090**	**3,667**	**-17,965**	**728**	**1,670**	**-9,507**	**5,929**	**-872**	**-3,826**	**496**

Incidental – Operations based on water diversions and releases.

Table H.B-6. NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative C

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt C (Optimized Operations) Deliveries Case

Pumping-Generation Site	NPV	Year Project in Service							
		1	2	3	4	5	6	7	8
NODOS Pumping	**Period Total**	**Period Total, NPV ($1000)**							
TC Canal Pumping	**-5,788**	-279	-128	-180	-80	-82	-411	-251	-238
GCID Pumping	**-9,968**	-306	-375	-347	-349	-231	-431	-355	-335
Sac River Pumping	**-59,196**	-3,040	-273	-1,227	-155	-370	-5,674	-2,940	-1,998
TRR Pumping	**-11,839**	-410	-204	-295	-28	-180	-1,057	-657	-159
Sites Pumping	**-157,842**	-8,578	-627	-3,872	-1,587	-1,105	-10,846	-8,646	-5,958
Subtotal	**-244,633**	**-12,613**	**-1,607**	**-5,921**	**-2,199**	**-1,968**	**-18,419**	**-12,849**	**-8,688**
NODOS Generation	**Period Total**	**Period Total, NPV ($1000)**							
Sites Genereration	**149,578**	4,268	3,456	5,915	7,547	4,251	4,017	5,702	7,137
TRR Generation	**21,249**	781	480	1,032	799	1,151	843	1,307	1,015
Sac River Genenration	**50,193**	1,191	1,147	1,384	3,310	2,147	1,742	1,635	1,880
Subtotal	**221,020**	**6,240**	**5,083**	**8,331**	**11,656**	**7,549**	**6,602**	**8,644**	**10,032**
PumpBack Operations	**Period Total**	**Period Total, NPV ($1000)**							
PumpBack during Diversion cycle	**7,445**	213	470	623	96	49	214	239	0
PumpBack During Release Cycle	**21,566**	1,717	1,412	563	824	276	401	1,371	998
Pure PumpBack Operations Cycle	**17,395**	323	1,571	775	278	642	1,054	0	410
Subtotal	**46,406**	2,253	3,453	1,961	1,198	967	1,669	1,610	1,408
NODOS Project Total	**22,793**	**-4,120**	**6,929**	**4,371**	**10,655**	**6,548**	**-10,148**	**-2,595**	**2,752**

Notes

Cash Flow reported pre-tax in PV($000).
Evaluation performed 07/07/2011
Report updated at 10:28:53 AM.

Optimized – Operations shaped to minimize pumping costs and maximize revenue from energy generation.

Table H.B-6. NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative C (Cont.)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt C (Optimized Operations) Deliveries Case (Cont.)

9	10	11	12	13	14	15	16	17	18	19
-312	-268	-126	-207	-166	-264	-164	-71	-120	-71	-93
-344	-450	-416	-385	-345	-409	-407	-343	-432	-342	-252
-3,942	-1,761	-795	-1,225	-192	-3,931	-2,180	-1,088	-812	-1,161	-2,917
-534	-484	-291	-654	-91	-860	-516	-54	-536	-13	-460
-10,672	-6,153	-1,130	-6,082	-2,220	-10,507	-6,726	-2,694	-2,811	-1,345	-2,474
-15,804	**-9,116**	**-2,758**	**-8,553**	**-3,014**	**-15,971**	**-9,993**	**-4,250**	**-4,711**	**-2,932**	**-6,196**
6,177	1,648	894	8,639	9,115	7,129	8,656	7,731	3,916	1,161	2,323
1,176	124	173	1,185	795	946	556	716	248	528	974
1,788	725	300	1,965	3,199	2,232	3,166	3,548	2,462	955	1,542
9,141	**2,497**	**1,367**	**11,789**	**13,109**	**10,307**	**12,378**	**11,995**	**6,626**	**2,644**	**4,839**
160	473	681	0	333	208	186	0	131	32	0
1,140	1,322	740	383	594	1,073	655	487	619	606	645
221	1,453	2,318	598	394	0	0	0	190	803	738
1,521	3,248	3,739	981	1,321	1,281	841	487	940	1,441	1,383
-5,142	**-3,371**	**2,348**	**4,217**	**11,416**	**-4,383**	**3,226**	**8,232**	**2,855**	**1,153**	**26**

Optimized – Operations shaped to minimize pumping costs and maximize revenue from energy generation.

Table H.B-6 NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative C (Cont.)

Cash Flow Report for the NODOS Project, CALSIM 30-Year Planning Period, Alt C (Optimized Operations) Deliveries Case (Cont.)

20	21	22	23	24	25	26	27	28	29	30
-153	-413	-149	-386	-145	-186	-195	-79	-212	-164	-195
-252	-419	-182	-460	-289	-278	-321	-251	-219	-232	-211
-2,317	-4,387	-1,716	-4,178	-1,078	-1,082	-2,570	-174	-1,728	-2,664	-1,621
-419	-899	-96	-1,227	-307	-145	-359	-11	-123	-425	-345
-3,457	-10,359	-2,867	-13,926	-3,286	-4,787	-6,582	0	-5,916	-6,730	-5,899
-6,598	**-16,477**	**-5,010**	**-20,177**	**-5,105**	**-6,478**	**-10,027**	**-515**	**-8,198**	**-10,215**	**-8,271**
2,884	2,361	6,410	2,476	5,053	6,876	724	5,207	6,100	5,010	6,795
846	343	977	142	575	587	116	470	671	766	927
1,589	1,028	1,961	763	963	1,712	187	1,242	1,315	1,416	1,699
5,319	**3,732**	**9,348**	**3,381**	**6,591**	**9,175**	**1,027**	**6,919**	**8,086**	**7,192**	**9,421**
127	440	0	1,007	0	213	1,080	0	174	47	249
521	552	502	253	633	417	659	663	538	1,002	0
483	559	496	853	1,007	166	921	973	169	0	0
1,131	1,551	998	2,113	1,640	796	2,660	1,636	881	1,049	249
-148	**-11,194**	**5,336**	**-14,683**	**3,126**	**3,493**	**-6,340**	**8,040**	**769**	**-1,974**	**1,399**

Optimized – Operations shaped to minimize pumping costs and maximize revenue from energy generation.

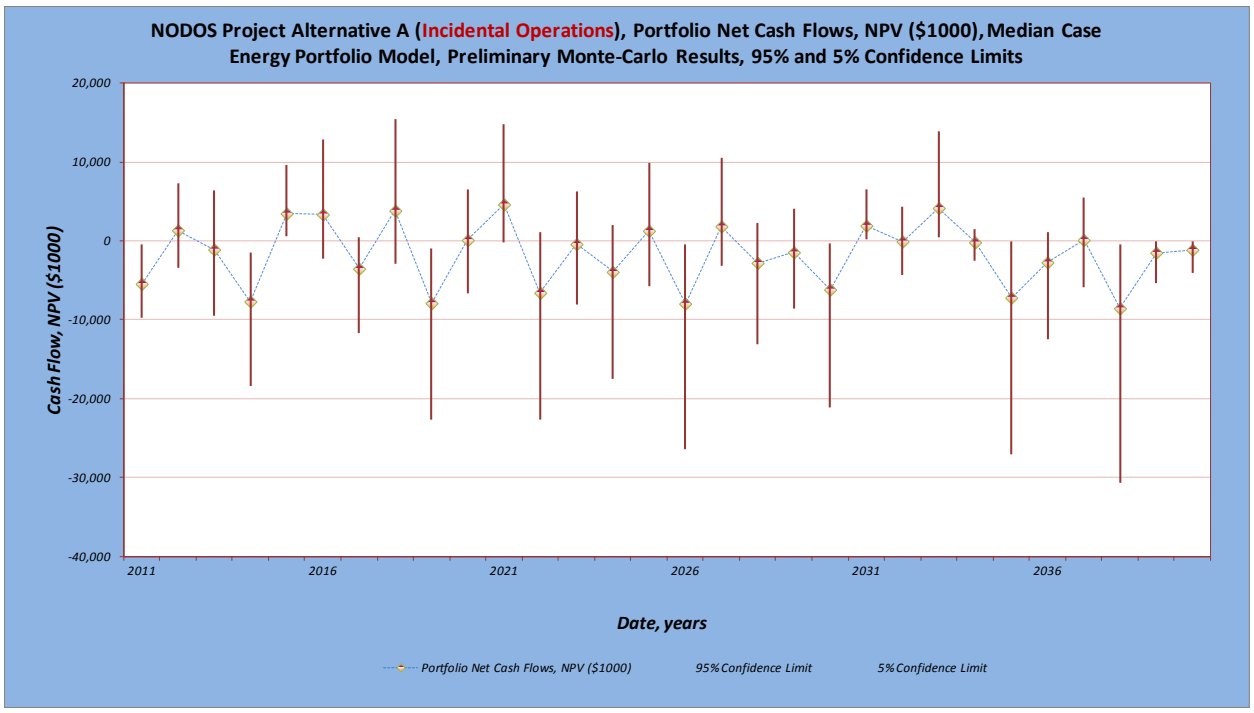


Figure H.B-1. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative A

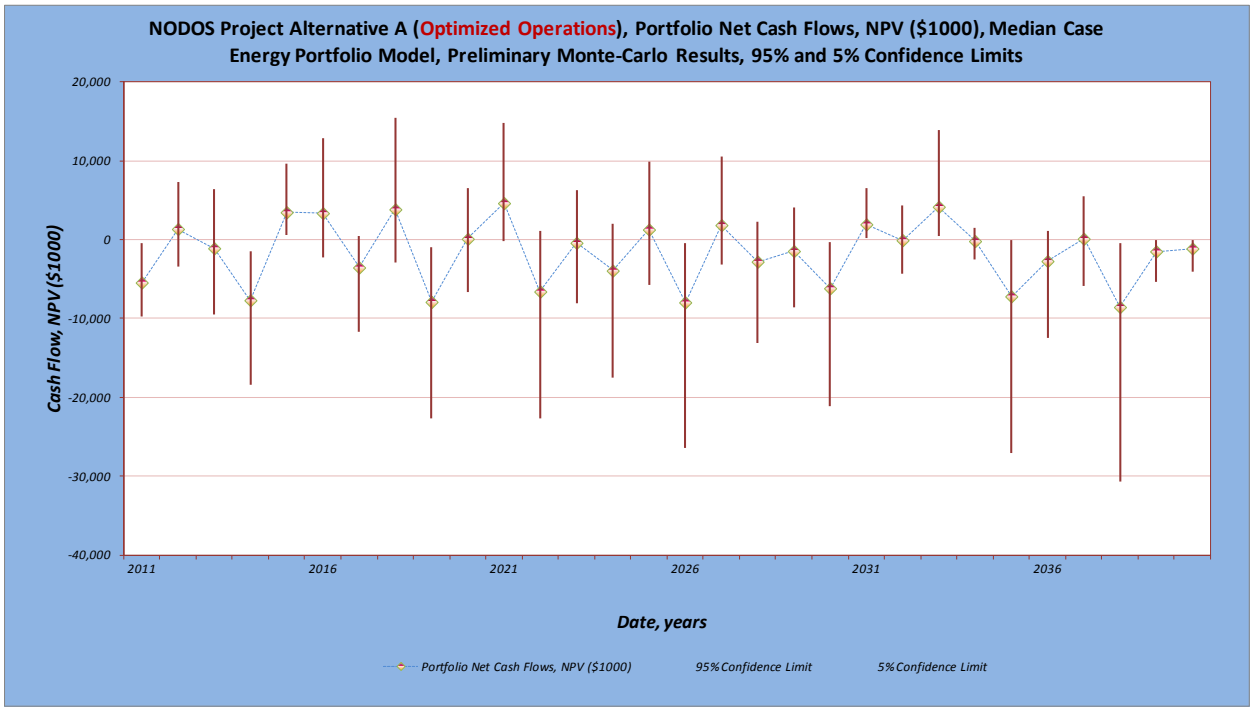


Figure H.B-2. NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative A

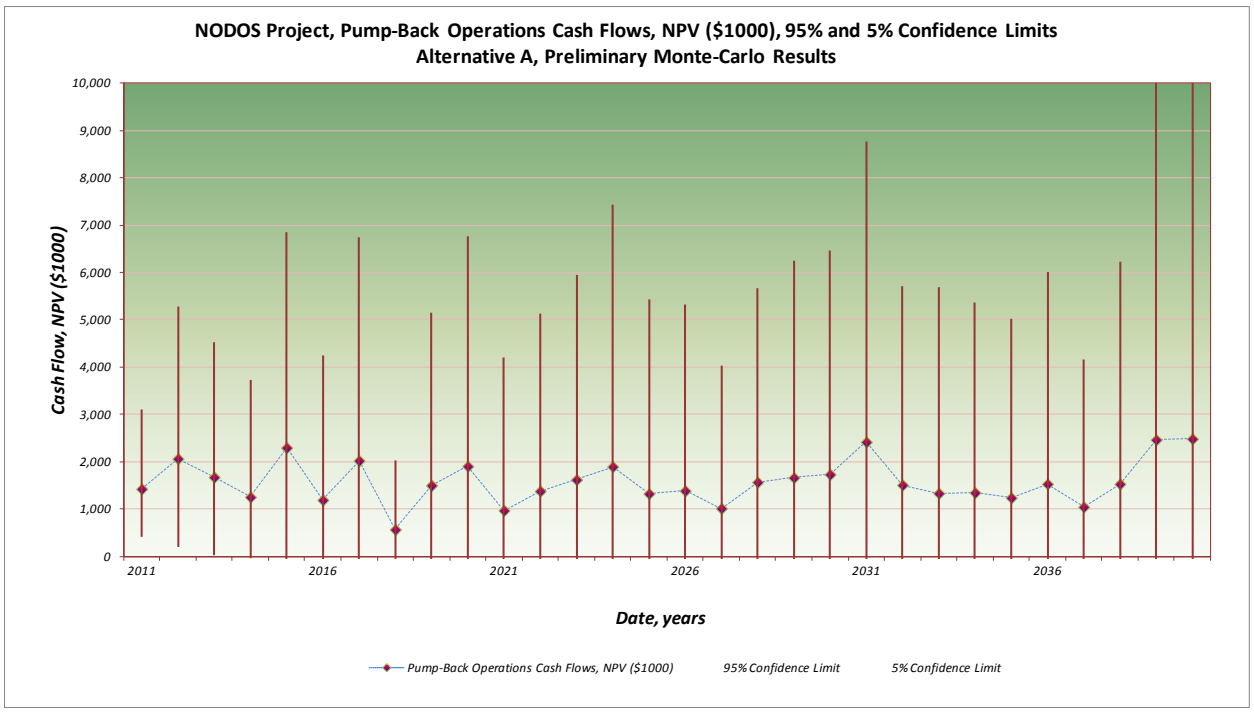


Figure H.B-3. NODOS Project, Power Portfolio-Annual Cash Flow, "Pump-Back," Alternative A

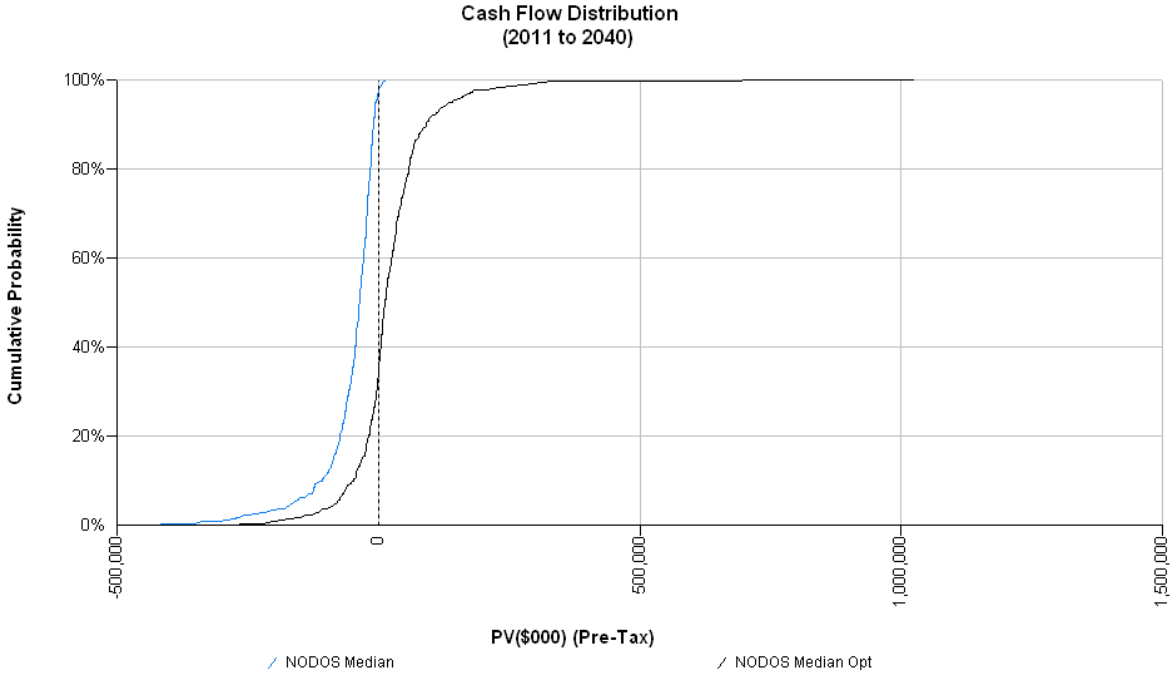


Figure H.B-4. NODOS Project, Power Portfolio Cumulative Probability Distribution, Alternative A "Incidental" vs. "Optimized"

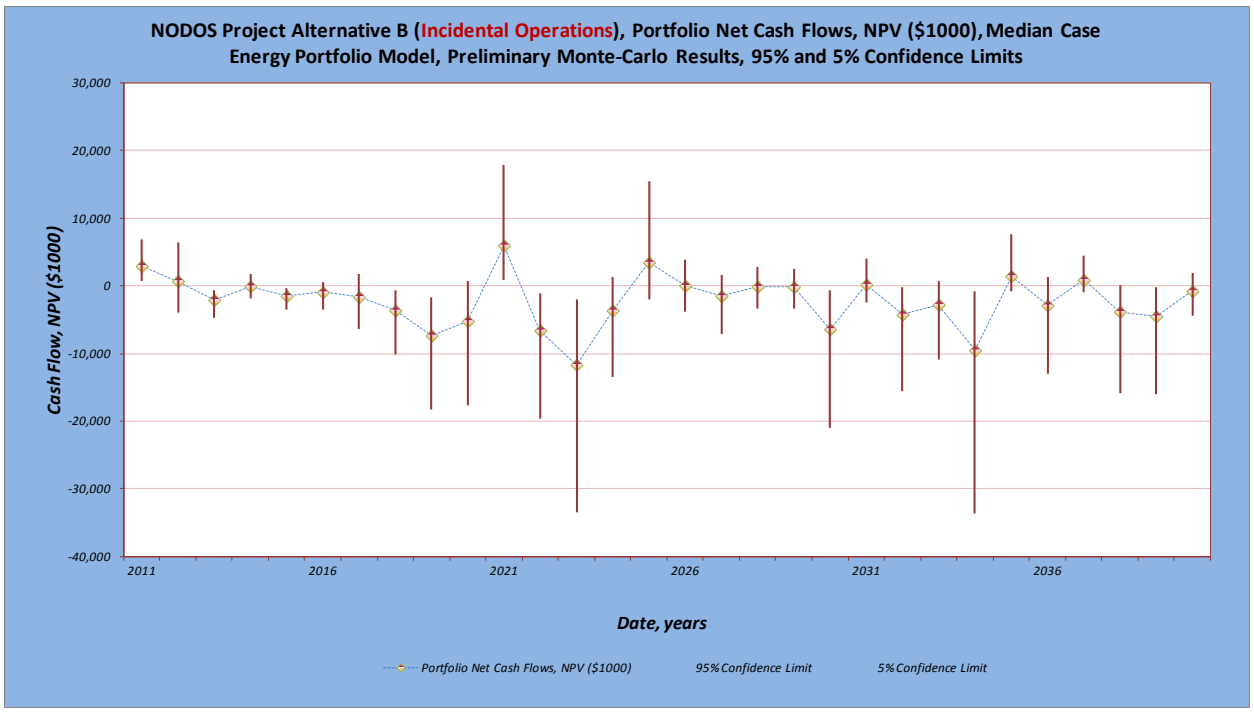


Figure H.B-5. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative B

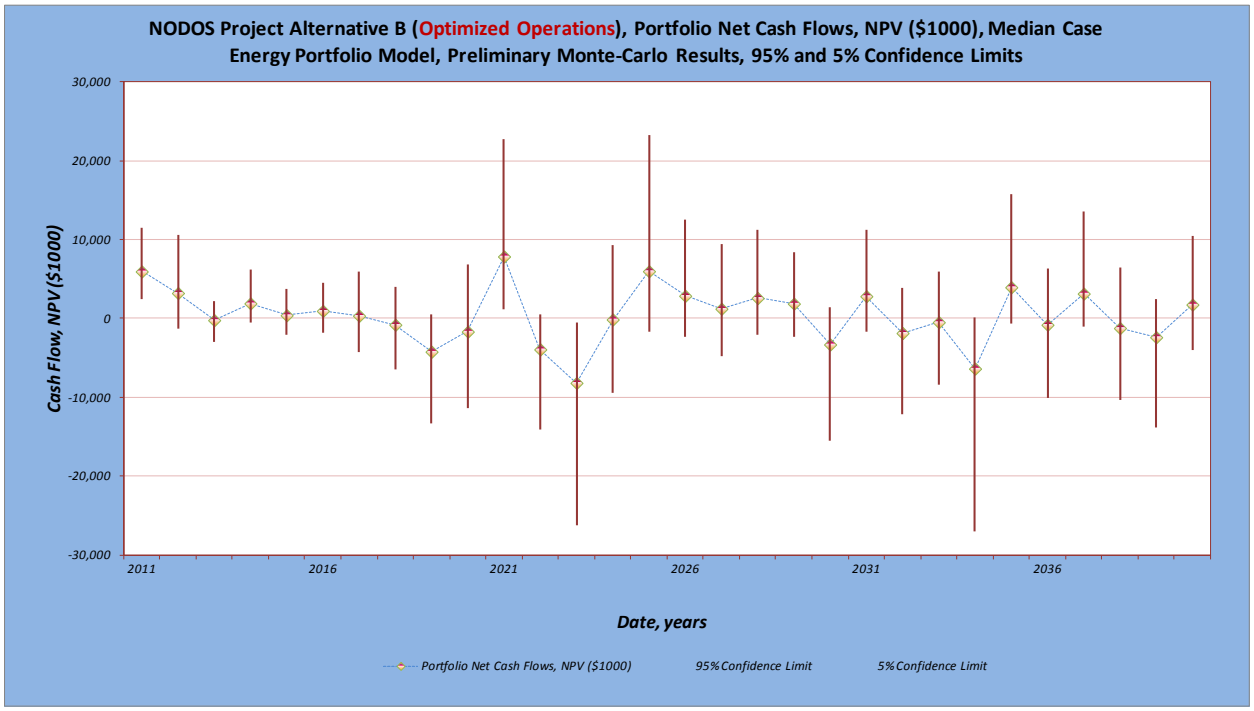


Figure H.B-6. NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative B

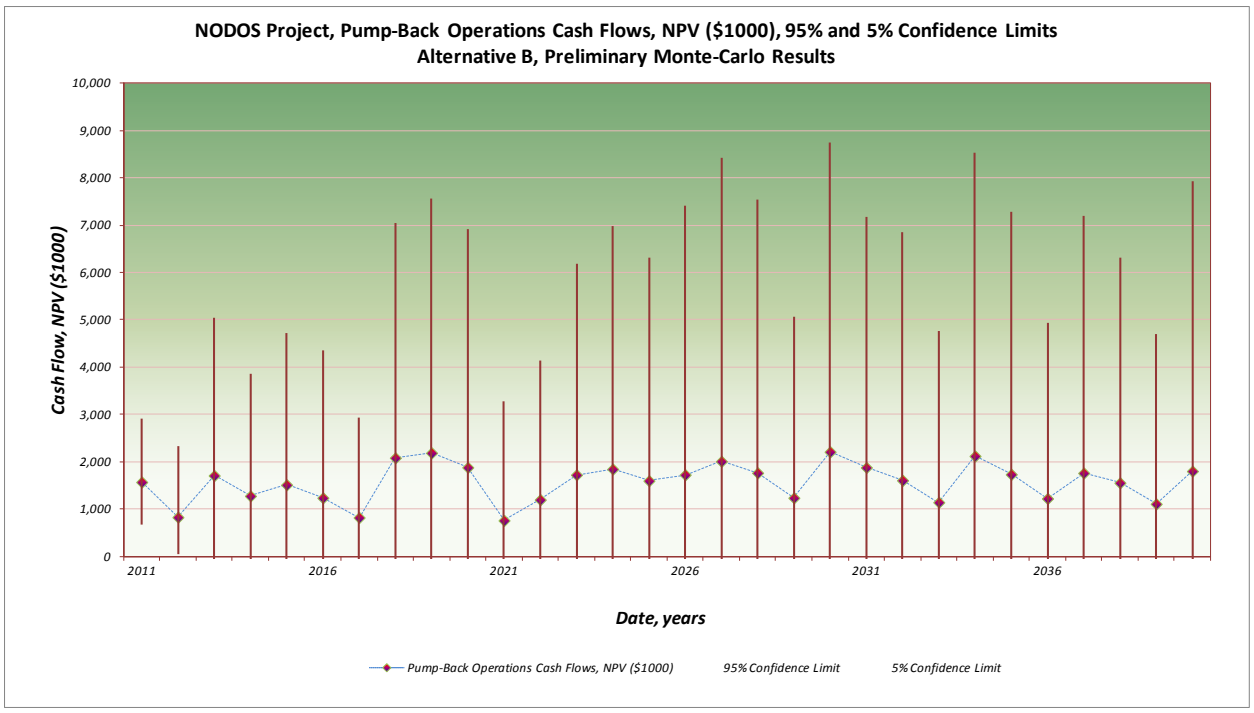


Figure H.B-7. NODOS Project, Power Portfolio-Annual Cash Flow, "Pump-Back," Alternative B

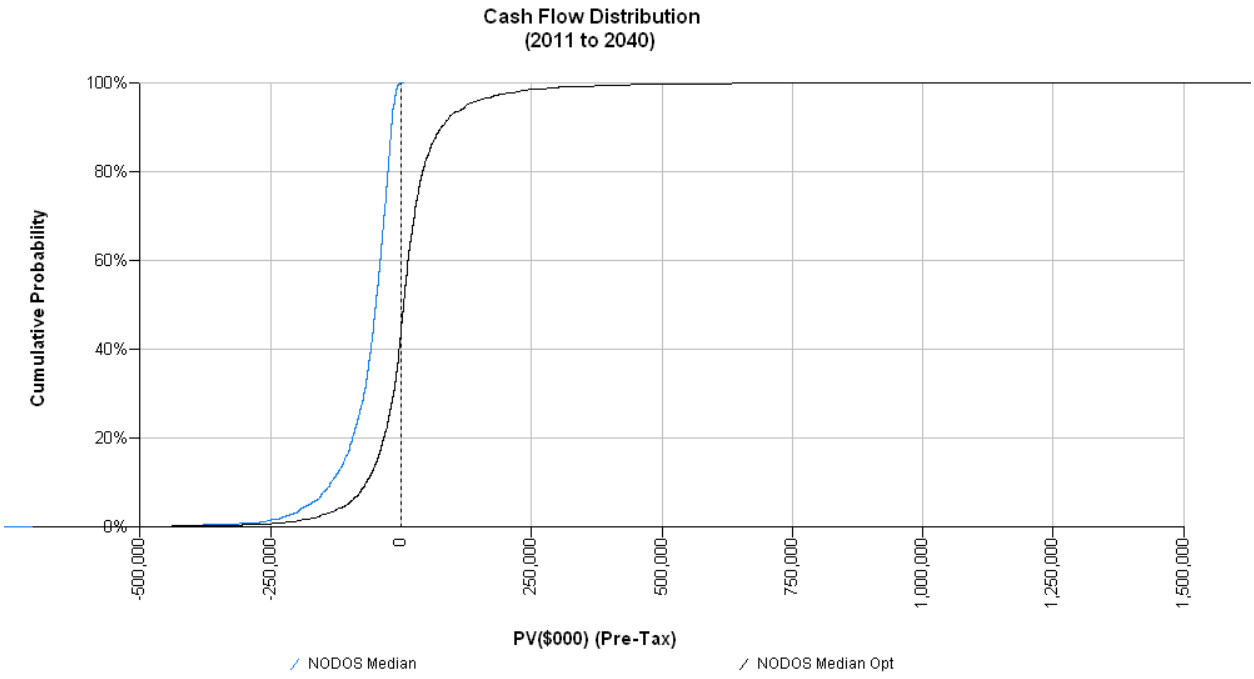


Figure H.B-8. NODOS Project, Power Portfolio Cumulative Probability Distribution, Alternative B "Incidental" vs. "Optimized"

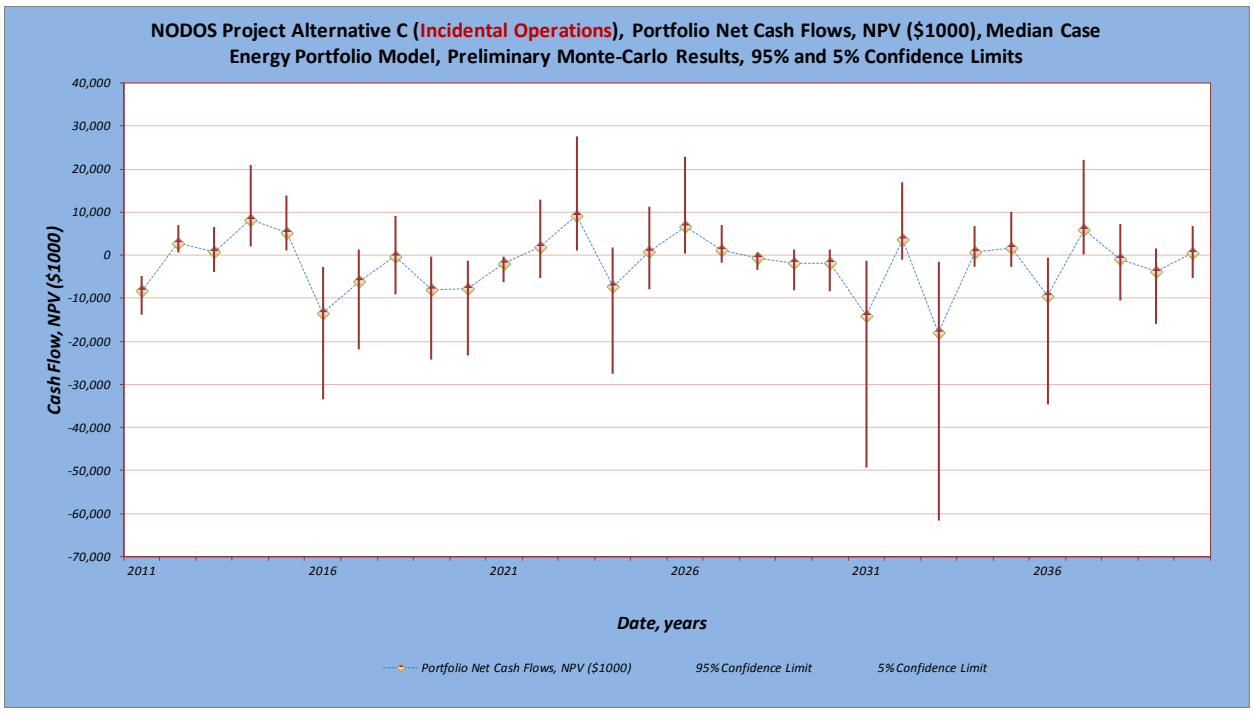


Figure H.B-9. NODOS Project, Power Portfolio-Annual Cash Flow, "Incidental," Alternative B

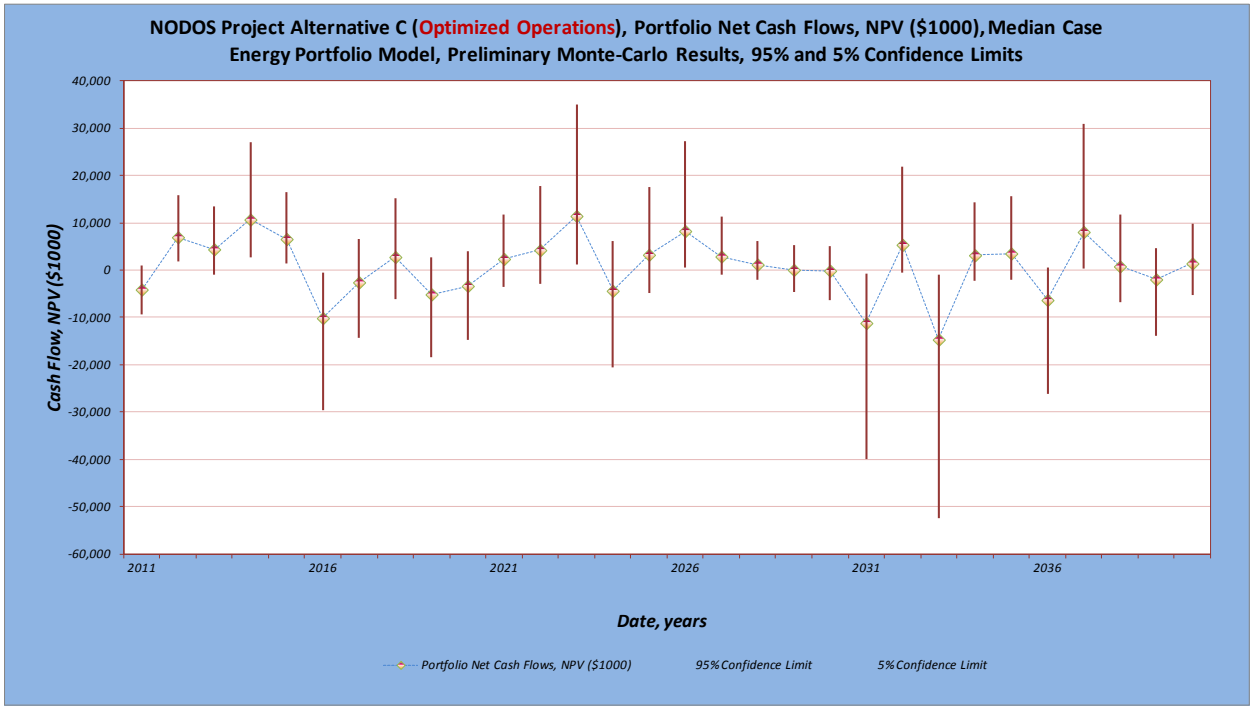


Figure H.B-10. NODOS Project, Power Portfolio-Annual Cash Flow, "Optimized," Alternative C

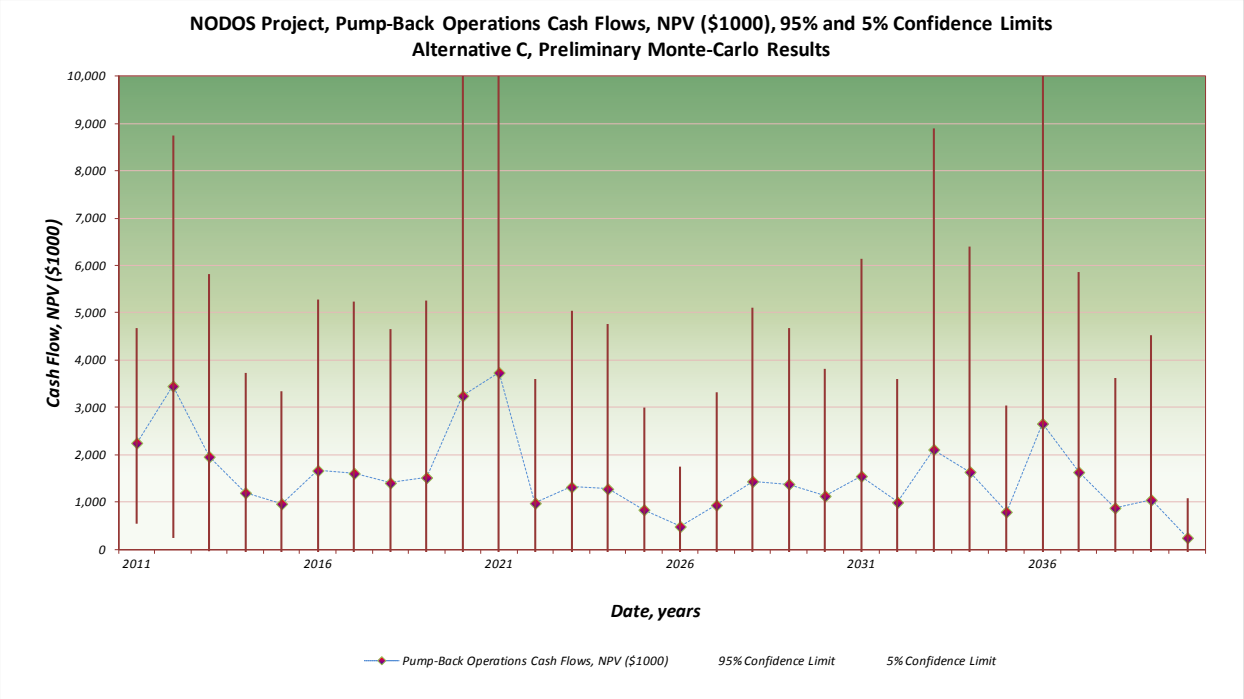


Figure H.B-11. NODOS Project, Power Portfolio-Annual Cash Flow, "Pump-Back," Alternative C

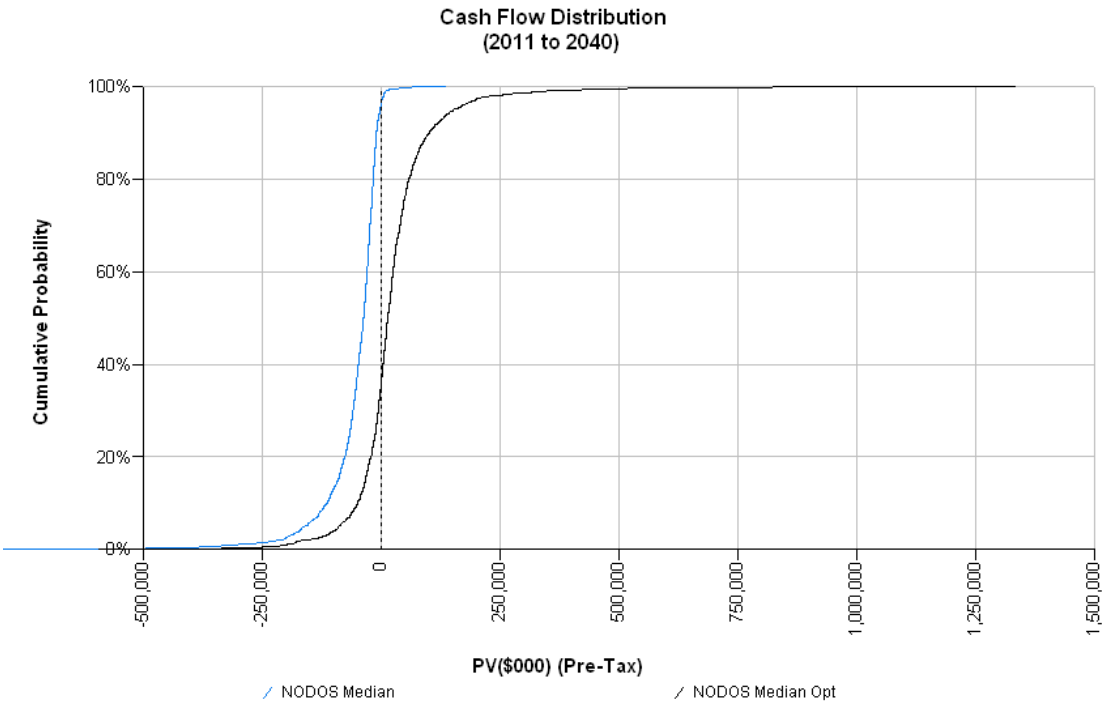


Figure H.B-12 NODOS Project, Power Portfolio Cumulative Probability Distribution, Alternative C "Incidental" vs. "Optimized"

Attachment C –
NODOS Project Power Operations

This page intentionally left blank

Table H.C-1. NODOS Project, Power Operations, "Incidental," Alternative C

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)									
		Incidental Pumping and Generation to Water Releases (no shaping)							
		Incidental Pumping , MW					Incidental Generation, MW		
		TC Canal	GCID Canal	TRR	Sac River	Sites	Sites	TRR	Sac River
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35	123.00	9.33	10.80
Plant Capacity, cfs		2250	3000	1890	2000	5900	5100	1500	1500
Month	# of Hours	All Hours					All Hours		
1	744	2.28	0.37	2.73	39.11	118.75	0.00	0.00	0.00
2	672	1.46	0.06	0.00	3.13	44.87	0.00	0.00	0.00
3	744	0.03	0.09	0.00	0.00	0.11	0.05	0.00	0.00
4	720	0.49	2.11	0.00	0.00	0.63	0.37	0.00	0.00
5	744	0.45	2.12	0.00	0.00	0.00	2.52	0.40	0.40
6	720	0.59	1.66	0.00	0.53	0.00	36.39	7.38	6.41
7	744	0.65	1.55	0.00	30.75	0.18	60.89	7.30	0.00
8	744	1.10	2.03	0.00	1.01	0.00	12.45	0.60	4.96
9	720	0.09	0.35	0.00	0.00	0.00	23.79	1.52	9.10
10	744	0.08	0.69	0.00	0.00	0.00	12.94	0.16	5.11
11	720	2.44	1.55	12.30	42.85	151.73	9.86	0.00	0.00
12	744	1.39	0.19	0.00	2.52	41.50	0.02	0.00	0.00
13	744	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
14	672	0.00	0.06	0.00	0.00	0.00	9.91	0.00	0.00
15	744	0.01	0.09	0.00	0.00	0.09	2.12	0.00	0.00
16	720	0.08	1.87	0.00	0.00	0.81	26.21	0.00	0.00
17	744	0.83	2.25	0.32	0.33	1.53	1.43	0.05	0.00
18	720	0.66	2.70	0.00	8.05	0.00	0.71	1.26	0.07
19	744	1.31	2.35	0.00	0.00	0.00	3.19	1.21	3.96
20	744	1.20	2.81	6.01	2.17	23.49	49.02	0.00	0.31
21	720	0.11	0.39	0.00	0.00	0.00	21.02	1.70	5.27
22	744	0.10	0.41	0.00	0.00	0.00	13.78	2.46	2.36
23	720	0.01	0.30	0.00	0.00	0.00	6.01	1.54	9.11
24	744	0.00	0.08	0.00	0.00	0.00	0.32	0.71	2.00
25	744	0.00	0.13	0.00	2.41	5.12	0.00	0.04	0.00
26	696	2.00	0.49	3.95	29.40	108.94	0.00	0.00	0.00
27	744	0.24	0.10	0.00	2.52	11.82	0.12	0.00	0.00
28	720	0.09	1.95	0.00	0.00	0.86	0.32	0.00	0.00
29	744	0.99	2.20	0.00	0.41	0.88	0.16	0.31	0.00
30	720	0.63	1.93	0.00	7.86	0.00	1.48	5.96	0.00
31	744	0.65	1.53	0.00	0.16	0.00	24.09	7.18	2.93
32	744	1.58	2.76	5.85	2.52	33.19	12.00	0.08	1.01
33	720	0.11	0.37	0.00	0.00	0.00	34.96	1.71	9.09
34	744	0.01	0.39	0.00	0.00	0.00	34.33	2.41	2.74
35	720	0.00	0.31	0.00	0.00	0.00	28.76	1.59	9.11
36	744	0.00	0.15	0.00	0.00	0.00	6.54	1.06	3.97
37	744	0.00	0.13	0.00	0.00	0.00	0.36	0.06	0.20
38	672	0.08	0.09	0.00	0.00	0.02	0.00	0.00	0.00
39	744	2.31	0.37	1.01	5.64	66.64	0.00	0.00	0.56
40	720	0.08	2.46	0.00	0.00	0.00	0.29	0.00	8.07
41	744	0.10	2.26	0.00	0.00	0.00	0.00	0.51	9.07
42	720	0.05	1.65	0.00	0.00	0.00	14.39	7.29	8.00
43	744	0.06	1.39	0.00	0.00	0.00	58.89	7.39	9.10
44	744	0.09	1.89	0.00	0.00	0.00	35.51	0.43	5.36
45	720	0.04	0.58	0.00	0.00	0.00	9.79	0.05	5.68
46	744	0.07	0.76	0.00	0.00	0.00	0.00	0.07	8.31
47	720	0.01	0.52	0.00	0.00	0.00	8.93	0.05	6.11
48	744	0.00	0.27	0.00	0.00	0.00	0.00	0.05	9.06
49	744	0.00	0.08	0.00	0.00	0.00	0.00	0.00	1.42
50	672	0.01	0.08	0.00	0.00	0.00	0.00	0.02	9.10
51	744	0.04	0.11	0.00	0.00	0.00	0.03	0.39	9.00
52	720	0.02	1.12	0.00	0.00	0.00	0.12	7.07	9.05
53	744	0.01	0.73	0.00	0.00	0.00	0.21	5.26	7.61
54	720	0.03	1.14	0.00	0.00	0.00	1.12	7.40	9.11
55	744	0.29	1.36	0.00	0.00	0.00	11.20	4.49	2.76
56	744	0.43	1.30	0.00	2.31	2.02	0.54	0.26	0.00
57	720	0.12	0.35	0.00	0.00	0.05	24.83	0.00	0.00
58	744	0.07	0.56	0.00	0.00	0.02	36.54	0.00	0.00
59	720	0.01	0.32	0.00	0.00	0.01	30.75	0.00	0.00
60	744	1.62	0.75	5.83	9.62	39.96	10.00	0.00	0.00

Table H.C-1. NODOS Project, Power Operations, "Incidental," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)									
		Incidental Pumping and Generation to Water Releases (no shaping)							
		Incidental Pumping , MW					Incidental Generation, MW		
		TC Canal	GCID Canal	TRR	Sac River	Sites	Sites	TRR	Sac River
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35	123.00	9.33	10.80
Plant Capacity, cfs		2250	3000	1890	2000	5900	5100	1500	1500
Month	# of Hours	All Hours					All Hours		
61	744	2.05	0.30	2.27	32.51	66.47	0.00	0.00	0.00
62	672	2.44	0.47	3.95	44.01	94.21	0.37	0.00	0.00
63	744	2.44	1.76	18.06	44.01	139.51	8.38	0.00	0.00
64	720	2.15	2.67	8.65	0.00	73.77	1.27	0.00	0.00
65	744	2.58	2.86	6.00	1.33	59.19	12.80	0.00	0.00
66	720	0.66	1.67	0.00	34.96	0.29	57.85	7.32	0.00
67	744	0.70	1.55	0.00	36.59	0.26	55.69	7.30	0.00
68	744	1.18	2.01	0.00	0.97	0.00	24.53	0.61	4.70
69	720	0.11	0.35	0.00	0.00	0.00	9.42	1.41	9.07
70	744	0.26	0.76	0.00	0.00	0.00	8.08	0.14	9.11
71	720	0.02	0.46	0.00	0.00	0.00	7.69	0.05	9.08
72	744	0.00	0.27	0.00	0.00	0.00	0.49	0.05	5.07
73	744	2.28	0.24	1.85	36.37	101.85	0.00	0.00	0.00
74	696	1.83	0.31	2.24	21.80	84.98	0.00	0.00	0.00
75	744	2.43	1.44	13.64	13.93	128.23	0.00	0.00	0.00
76	720	0.05	2.77	6.11	0.00	20.69	24.83	0.00	0.00
77	744	0.46	2.14	0.00	0.00	0.31	1.31	0.40	0.36
78	720	0.39	1.66	0.00	0.46	0.00	0.69	7.38	5.82
79	744	0.42	1.50	0.00	24.05	0.02	1.49	7.55	0.00
80	744	0.70	1.29	0.00	0.70	0.00	24.47	5.07	6.56
81	720	0.06	0.34	0.00	0.00	0.00	16.73	1.84	9.07
82	744	0.04	0.41	0.00	0.00	0.00	8.43	2.36	2.42
83	720	0.00	0.25	0.00	0.00	0.00	0.54	1.21	5.86
84	744	0.00	0.15	0.00	0.00	0.00	0.00	0.09	4.70
85	744	2.28	0.27	1.81	38.52	110.89	0.00	0.00	0.15
86	672	2.44	0.47	3.81	27.81	118.63	0.00	0.00	0.00
87	744	0.01	0.10	0.00	0.00	0.08	0.00	0.00	0.00
88	720	0.06	2.00	0.00	0.00	0.65	22.95	0.02	0.00
89	744	0.20	1.89	0.00	0.14	0.00	18.21	0.69	0.00
90	720	0.50	1.62	0.00	2.37	0.00	51.29	7.19	0.18
91	744	1.24	1.78	0.00	0.00	0.00	53.56	5.96	4.41
92	744	1.00	2.03	0.00	0.00	0.00	33.01	0.44	5.38
93	720	0.09	0.36	0.00	0.00	0.00	22.72	1.72	9.08
94	744	0.07	0.43	0.00	0.00	0.00	20.96	2.56	9.00
95	720	0.02	0.33	0.00	0.00	0.00	18.60	1.56	9.10
96	744	0.00	0.18	0.00	0.00	0.00	0.13	0.09	0.83
97	744	2.12	0.37	2.73	33.66	102.75	0.00	0.00	0.00
98	672	2.26	0.49	3.95	38.61	120.06	0.00	0.00	0.00
99	744	2.13	0.28	1.83	3.05	66.87	0.00	0.05	0.00
100	720	0.17	1.77	0.00	1.92	0.31	0.81	0.67	0.44
101	744	0.52	2.02	0.00	0.00	0.00	8.85	0.51	9.10
102	720	0.48	1.57	0.00	0.00	0.00	11.56	7.32	9.07
103	744	0.50	1.48	0.00	25.43	0.00	50.55	7.64	0.05
104	744	0.38	1.00	0.00	0.00	0.00	10.53	5.80	9.11
105	720	0.15	0.54	0.00	0.00	0.00	7.69	0.44	8.86
106	744	0.07	0.69	0.00	0.00	0.01	0.47	0.00	0.69
107	720	0.01	0.32	0.00	0.00	0.01	0.02	0.00	0.00
108	744	1.74	1.16	9.45	24.98	104.10	0.00	0.00	0.00
109	744	2.36	0.37	2.73	41.51	122.79	0.00	0.00	0.00
110	672	1.27	0.06	0.00	3.30	40.30	0.00	0.00	0.00
111	744	0.01	0.07	0.00	0.00	0.06	0.01	0.00	0.00
112	720	0.07	1.41	0.00	0.00	0.49	0.15	0.00	0.00
113	744	0.74	2.28	0.82	0.45	3.38	0.25	0.00	0.00
114	720	0.62	2.78	0.00	8.31	3.58	5.01	0.00	0.00
115	744	1.54	2.79	0.00	0.17	0.00	61.68	0.03	4.53
116	744	1.22	2.07	0.00	0.00	0.00	13.23	0.12	4.81
117	720	0.09	0.38	0.00	0.00	0.00	24.86	1.27	2.75
118	744	0.58	2.08	12.35	2.48	57.67	10.14	0.00	0.19
119	720	0.00	0.24	0.00	0.00	0.00	9.07	0.86	1.32
120	744	0.00	0.20	0.00	1.78	3.96	0.08	0.06	0.04

Table H.C-1. NODOS Project, Power Operations, "Incidental," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)									
		Incidental Pumping and Generation to Water Releases (no shaping)							
		Incidental Pumping , MW					Incidental Generation, MW		
		TC Canal	GCID Canal	TRR	Sac River	Sites	Sites	TRR	Sac River
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35	123.00	9.33	10.80
Plant Capacity, cfs		2250	3000	1890	2000	5900	5100	1500	1500
Month	# of Hours	All Hours					All Hours		
121	744	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
122	696	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
123	744	0.02	0.05	0.00	0.00	0.08	1.70	0.00	0.00
124	720	0.05	1.31	0.00	0.00	0.40	26.04	0.00	0.00
125	744	0.63	2.06	0.00	0.51	0.64	26.32	0.00	0.00
126	720	0.63	2.85	0.00	8.60	0.40	20.96	0.02	0.00
127	744	0.73	2.79	0.00	12.94	5.98	47.01	0.00	0.06
128	744	1.17	2.05	0.00	0.00	0.00	23.16	0.03	4.06
129	720	0.28	1.61	9.01	0.00	27.36	16.57	0.10	0.35
130	744	0.19	0.45	0.00	0.00	0.00	7.31	2.36	1.31
131	720	0.39	0.26	0.00	2.52	14.65	0.36	0.20	0.03
132	744	0.00	0.08	0.00	0.00	0.00	0.00	0.61	0.00
133	744	0.00	0.13	0.00	0.00	0.00	0.00	0.03	0.00
134	672	0.00	0.06	0.00	0.00	0.02	0.00	0.00	0.00
135	744	0.05	0.13	0.00	0.00	0.19	0.00	0.06	0.00
136	720	0.09	2.34	0.00	0.00	0.00	0.00	1.17	0.00
137	744	0.34	2.21	0.00	0.00	0.00	0.58	0.48	0.07
138	720	0.52	1.64	0.00	0.00	0.00	10.08	7.38	2.08
139	744	0.58	1.39	0.00	0.00	0.00	58.38	7.39	9.08
140	744	0.91	1.65	0.00	0.00	0.00	3.47	2.28	9.00
141	720	0.08	0.33	0.00	0.00	0.00	32.00	1.71	9.02
142	744	0.03	0.42	0.00	0.00	0.00	26.50	2.29	9.01
143	720	2.03	1.32	9.80	29.23	111.92	25.39	0.00	0.00
144	744	2.05	1.40	11.39	11.23	102.39	0.00	0.00	0.00
145	744	0.03	0.12	0.00	1.54	4.07	0.00	0.00	0.00
146	672	2.44	0.39	3.37	2.80	77.77	0.00	0.00	0.00
147	744	0.21	0.10	0.00	2.52	10.65	0.04	0.00	0.83
148	720	0.19	2.17	0.00	0.00	0.00	0.90	0.00	9.10
149	744	0.74	2.22	0.00	0.00	0.00	12.56	0.32	9.00
150	720	0.44	1.55	0.00	0.00	0.00	48.11	7.45	9.00
151	744	0.47	1.40	0.00	0.00	0.00	6.27	7.33	9.00
152	744	0.79	2.00	0.00	0.00	0.00	45.16	0.50	9.00
153	720	0.28	0.55	0.00	0.00	0.00	18.63	0.05	9.08
154	744	0.16	0.74	0.00	0.00	0.00	10.04	0.07	6.03
155	720	0.01	0.27	0.00	0.00	0.00	7.02	0.05	6.04
156	744	0.00	0.21	0.00	0.00	0.00	0.40	0.00	0.33
157	744	2.28	0.29	2.40	38.48	98.32	0.00	0.00	0.00
158	672	2.09	0.49	3.95	33.70	101.78	0.00	0.00	0.00
159	744	2.43	1.79	17.87	44.01	164.58	0.02	0.00	0.00
160	720	0.40	2.76	7.08	0.00	35.14	0.10	0.01	0.00
161	744	0.10	1.89	0.00	0.97	0.00	0.12	1.31	0.00
162	720	0.37	1.64	0.00	22.33	0.00	1.07	7.42	0.13
163	744	0.42	1.40	0.00	0.00	0.00	19.12	7.39	9.06
164	744	0.69	2.01	0.00	0.00	0.00	11.44	0.52	8.71
165	720	0.05	0.36	0.00	0.00	0.00	27.67	1.37	9.10
166	744	0.17	0.76	0.00	0.00	0.00	13.82	0.16	5.68
167	720	0.02	0.54	0.00	0.00	0.00	28.63	0.11	9.11
168	744	0.00	0.14	0.00	0.00	0.00	9.69	0.90	4.06
169	744	0.40	0.07	0.00	2.48	12.99	0.00	0.06	0.18
170	696	2.18	0.49	3.95	34.58	107.91	0.00	0.00	0.00
171	744	2.21	1.59	15.14	28.93	142.42	0.07	0.00	0.00
172	720	0.18	2.17	0.00	0.00	0.00	0.84	0.00	9.10
173	744	0.24	2.21	0.00	0.32	0.00	10.58	0.47	9.11
174	720	0.14	1.69	0.00	15.48	0.00	36.58	7.12	0.00
175	744	0.14	1.91	0.00	0.10	0.00	57.37	4.22	9.10
176	744	0.25	2.03	0.00	0.00	0.00	29.93	0.19	9.00
177	720	0.12	0.62	0.00	0.00	0.00	14.59	0.00	9.00
178	744	0.09	0.74	0.00	0.00	0.00	1.20	0.00	9.00
179	720	0.01	0.41	0.00	0.00	0.00	5.18	0.00	9.08
180	744	0.00	0.16	0.00	0.00	0.00	0.27	0.00	5.83

Table H.C-1. NODOS Project, Power Operations, "Incidental," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)									
		Incidental Pumping and Generation to Water Releases (no shaping)							
		Incidental Pumping , MW					Incidental Generation, MW		
		TC Canal	GCID Canal	TRR	Sac River	Sites	Sites	TRR	Sac River
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35	123.00	9.33	10.80
Plant Capacity, cfs		2250	3000	1890	2000	5900	5100	1500	1500
Month	# of Hours	All Hours					All Hours		
181	744	2.20	0.27	1.81	36.03	96.72	0.00	0.00	0.06
182	672	0.09	0.06	0.00	0.62	3.12	0.00	0.00	0.97
183	744	0.01	0.10	0.00	0.00	0.00	0.06	0.30	9.11
184	720	0.00	1.25	0.00	0.00	0.00	0.31	5.66	8.43
185	744	0.00	1.12	0.00	0.00	0.00	0.46	5.64	7.74
186	720	0.03	1.86	0.00	0.00	0.00	6.87	5.94	9.06
187	744	0.00	2.74	0.00	0.00	0.00	24.34	0.31	9.00
188	744	0.00	2.09	0.00	0.00	0.00	26.02	0.00	9.00
189	720	0.00	0.61	0.00	0.00	0.00	34.04	0.00	9.00
190	744	0.06	0.77	0.00	0.00	0.00	11.53	0.00	9.08
191	720	0.01	0.43	0.00	0.00	0.00	27.28	0.00	5.60
192	744	0.00	0.21	0.00	0.00	0.00	0.00	0.00	4.77
193	744	0.00	0.13	0.00	0.00	0.00	0.00	0.00	1.15
194	672	0.00	0.08	0.00	0.00	0.00	0.00	0.00	9.07
195	744	2.04	1.49	14.25	29.72	84.73	0.08	0.00	0.00
196	720	0.92	2.74	5.74	0.00	30.93	0.82	0.29	0.86
197	744	0.11	1.36	0.00	0.00	0.00	11.40	5.66	9.10
198	720	0.37	2.80	0.00	0.00	0.00	34.49	0.38	9.00
199	744	0.38	2.71	0.00	0.00	0.00	57.44	0.00	9.00
200	744	0.30	1.98	0.00	0.00	0.00	27.13	0.00	9.06
201	720	0.11	0.38	0.00	0.00	0.00	25.02	0.00	5.53
202	744	0.07	0.71	0.00	0.00	0.00	23.24	0.00	5.30
203	720	0.01	0.51	0.00	0.00	0.00	12.76	0.00	0.37
204	744	0.00	0.30	0.00	0.00	0.00	0.60	0.00	0.00
205	744	2.38	0.09	0.46	20.31	50.80	0.00	0.00	0.04
206	672	0.00	0.06	0.00	0.00	0.00	0.00	0.00	6.09
207	744	0.01	0.10	0.00	0.00	0.00	0.60	0.30	0.85
208	720	0.00	1.64	0.00	0.00	0.00	9.95	5.43	7.25
209	744	0.00	1.57	0.00	0.00	0.00	0.00	0.78	4.43
210	720	0.00	1.70	0.00	17.20	0.00	3.11	7.05	0.03
211	744	0.00	2.73	0.00	0.19	0.00	45.31	0.40	2.29
212	744	0.00	1.94	0.00	2.26	2.32	20.78	0.00	0.02
213	720	0.00	0.59	0.00	2.56	2.67	31.82	0.00	0.20
214	744	0.06	0.77	0.00	0.00	0.00	2.29	0.00	3.03
215	720	0.02	0.53	0.00	0.00	0.00	26.26	0.00	0.20
216	744	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00
217	744	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00
218	696	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
219	744	2.43	1.72	17.28	44.01	96.17	0.19	0.00	0.00
220	720	0.08	0.87	0.00	10.30	0.99	0.32	4.75	0.00
221	744	0.05	0.98	0.00	13.69	0.03	3.44	5.57	0.00
222	720	0.06	1.27	0.00	22.13	0.02	55.63	7.41	0.00
223	744	0.09	1.19	0.00	19.13	0.01	54.45	6.89	0.00
224	744	0.50	1.37	0.00	0.31	0.00	11.73	0.43	9.09
225	720	0.08	0.45	0.00	0.00	0.00	8.66	0.00	5.98
226	744	0.08	0.56	0.00	0.00	0.00	0.70	0.00	9.08
227	720	0.02	0.38	0.00	0.00	0.00	3.98	0.00	9.06
228	744	0.00	0.16	0.00	0.00	0.00	0.13	0.00	5.42
229	744	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.34
230	672	1.68	0.40	3.25	20.69	45.79	0.01	0.00	0.00
231	744	2.28	1.33	13.03	20.89	84.23	0.05	0.32	0.00
232	720	0.04	0.95	0.00	1.92	0.00	0.72	4.84	0.18
233	744	0.12	1.42	0.00	0.44	0.00	10.76	2.65	7.32
234	720	0.09	1.21	0.00	19.18	0.01	43.30	6.99	0.00
235	744	0.13	1.18	0.00	21.16	0.00	2.84	6.97	0.00
236	744	0.58	1.40	0.00	0.00	0.00	10.17	0.29	9.11
237	720	0.12	0.45	0.00	0.00	0.00	33.12	0.00	9.00
238	744	0.06	0.52	0.00	0.00	0.00	10.00	0.00	9.05
239	720	0.02	0.38	0.00	0.00	0.00	0.00	0.00	6.81
240	744	0.69	0.12	0.00	2.52	10.43	0.00	0.00	0.47

Table H.C-1. NODOS Project, Power Operations, "Incidental," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)									
		Incidental Pumping and Generation to Water Releases (no shaping)							
		Incidental Pumping , MW					Incidental Generation, MW		
		TC Canal	GCID Canal	TRR	Sac River	Sites	Sites	TRR	Sac River
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35	123.00	9.33	10.80
Plant Capacity, cfs		2250	3000	1890	2000	5900	5100	1500	1500
Month	# of Hours	All Hours					All Hours		
241	744	1.81	0.25	1.81	26.74	52.44	0.00	0.00	0.00
242	672	1.92	0.35	2.80	29.25	66.46	0.00	0.00	0.00
243	744	2.05	1.53	14.45	32.51	106.44	0.06	0.00	0.00
244	720	2.28	2.80	6.38	0.00	59.97	0.95	0.00	0.00
245	744	2.58	2.87	9.43	0.00	66.00	0.43	0.00	0.00
246	720	2.56	2.80	2.00	44.01	93.44	4.15	0.37	0.00
247	744	0.68	1.60	0.00	32.69	0.14	11.56	7.01	0.00
248	744	1.12	2.03	0.00	0.19	0.00	0.20	0.43	4.06
249	720	0.34	0.63	0.00	0.00	0.00	20.20	0.05	5.40
250	744	0.17	0.74	0.00	0.00	0.00	12.75	0.07	9.11
251	720	0.02	0.44	0.00	0.00	0.00	30.24	0.05	9.10
252	744	0.83	0.24	0.00	2.52	20.73	5.62	0.00	0.90
253	744	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
254	672	2.44	0.49	3.95	42.65	119.89	0.00	0.00	0.00
255	744	0.03	0.06	0.00	0.00	0.00	0.07	0.33	3.98
256	720	0.06	1.08	0.00	17.08	0.10	1.34	6.18	0.04
257	744	0.20	0.79	0.00	12.36	0.21	1.34	5.03	0.17
258	720	0.37	1.22	0.00	0.00	0.00	18.91	7.47	9.10
259	744	1.08	1.14	0.00	0.00	0.00	39.28	6.38	9.00
260	744	1.06	0.98	0.00	0.00	0.00	1.13	2.81	9.00
261	720	0.33	0.42	0.00	0.00	0.00	33.79	0.16	9.08
262	744	0.13	0.54	0.00	0.00	0.00	11.90	0.00	9.06
263	720	0.01	0.22	0.00	0.00	0.00	28.11	0.00	7.09
264	744	0.00	0.14	0.00	0.00	0.00	0.31	0.00	0.45
265	744	2.43	0.35	2.73	44.01	99.98	0.00	0.00	0.00
266	696	2.44	0.47	3.95	44.01	112.93	0.02	0.00	0.00
267	744	2.20	1.61	15.84	36.81	143.24	0.00	0.00	0.00
268	720	2.27	2.78	6.95	0.00	74.96	18.05	0.00	0.00
269	744	1.36	2.87	9.14	0.42	50.75	26.97	0.00	0.00
270	720	0.57	2.80	0.00	7.66	0.47	33.72	0.00	0.00
271	744	0.71	2.79	0.00	14.90	8.70	2.39	0.00	0.00
272	744	1.20	2.25	1.24	0.59	4.76	8.10	0.00	0.25
273	720	0.37	0.61	0.00	0.00	0.00	9.73	0.18	5.24
274	744	0.10	0.47	0.00	0.00	0.00	19.11	2.42	9.06
275	720	0.03	0.33	0.00	0.00	0.00	15.15	1.64	9.09
276	744	2.05	1.31	11.27	19.16	120.51	19.86	0.00	0.00
277	744	0.00	0.07	0.00	0.00	0.00	0.76	0.00	0.00
278	672	0.00	0.06	0.00	0.00	0.00	0.80	0.00	0.00
279	744	0.02	0.09	0.00	0.00	0.08	12.16	0.00	0.00
280	720	0.37	1.79	0.00	0.00	0.21	29.75	0.00	0.00
281	744	0.45	1.67	0.00	0.36	0.54	5.83	0.01	0.00
282	720	0.63	2.77	0.00	9.40	0.53	0.31	0.79	0.00
283	744	0.82	1.60	0.00	0.33	0.00	0.02	7.09	1.23
284	744	1.21	1.67	0.00	0.00	0.00	0.08	2.73	2.30
285	720	0.10	0.33	0.00	0.00	0.00	0.08	1.85	9.08
286	744	0.02	0.40	0.00	0.00	0.00	0.01	2.44	9.00
287	720	0.01	0.27	0.00	0.00	0.00	0.01	1.34	9.09
288	744	2.20	1.39	12.30	34.39	134.95	0.00	0.00	0.00
289	744	2.44	0.37	2.73	18.72	104.81	0.00	0.00	0.20
290	672	0.00	0.06	0.00	0.00	0.00	0.00	0.00	4.76
291	744	0.41	0.17	0.00	2.41	14.36	0.00	0.00	0.12
292	720	0.37	2.60	0.00	0.00	0.41	0.00	0.02	0.00
293	744	0.35	2.01	0.00	0.00	0.00	0.49	0.52	0.34
294	720	0.41	2.14	0.00	0.00	0.00	6.26	4.46	6.54
295	744	0.48	1.42	0.00	0.00	0.00	59.33	7.20	9.09
296	744	0.75	1.83	0.00	0.00	0.00	12.49	0.92	8.47
297	720	0.07	0.35	0.00	0.00	0.00	10.00	1.60	9.04
298	744	0.05	0.43	0.00	0.00	0.00	13.76	2.50	9.00
299	720	0.01	0.20	0.00	0.00	0.00	24.50	0.94	9.10
300	744	2.43	0.57	3.27	23.77	97.81	9.17	0.00	0.00

Table H.C-1. NODOS Project, Power Operations, "Incidental," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)									
		Incidental Pumping and Generation to Water Releases (no shaping)							
		Incidental Pumping , MW					Incidental Generation, MW		
		TC Canal	GCID Canal	TRR	Sac River	Sites	Sites	TRR	Sac River
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35	123.00	9.33	10.80
Plant Capacity, cfs		2250	3000	1890	2000	5900	5100	1500	1500
Month	# of Hours	All Hours					All Hours		
301	744	2.35	0.37	2.67	41.51	116.77	0.00	0.00	0.00
302	672	2.44	0.49	3.95	44.01	132.32	0.00	0.00	0.00
303	744	0.05	0.09	0.00	2.52	6.79	0.05	0.00	0.00
304	720	0.04	1.63	0.00	0.00	0.43	0.07	0.00	0.00
305	744	0.12	1.23	0.00	0.44	0.57	3.25	0.00	0.00
306	720	0.56	2.81	0.00	11.35	6.40	56.59	0.00	0.00
307	744	0.74	2.80	0.00	9.88	0.02	4.18	0.00	0.00
308	744	1.23	2.09	0.00	0.00	0.00	19.96	0.03	4.24
309	720	0.34	1.63	9.01	0.00	27.49	17.67	0.15	0.41
310	744	0.05	0.44	0.00	0.00	0.00	9.66	2.32	1.30
311	720	0.46	0.40	0.00	2.59	16.87	9.01	0.19	0.06
312	744	0.00	0.15	0.00	0.00	0.00	0.35	0.94	0.00
313	744	0.00	0.08	0.00	0.00	0.00	0.00	0.05	0.00
314	696	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
315	744	0.01	0.09	0.00	0.00	0.12	0.07	0.00	0.00
316	720	0.17	1.98	0.55	0.00	2.44	0.83	0.00	0.00
317	744	0.80	2.20	0.00	0.45	0.58	10.90	0.08	0.00
318	720	0.56	2.51	0.00	5.94	0.00	27.20	1.64	0.22
319	744	0.66	1.45	0.00	0.00	0.00	25.47	7.07	9.10
320	744	1.10	1.90	0.00	0.00	0.00	12.09	0.54	5.80
321	720	0.11	0.36	0.00	0.00	0.00	33.38	1.70	9.08
322	744	0.08	0.44	0.00	0.00	0.00	33.47	2.53	9.00
323	720	0.01	0.28	0.00	0.00	0.00	24.74	1.33	9.10
324	744	0.00	0.29	0.00	2.04	3.96	1.42	0.08	0.54
325	744	2.12	0.25	2.02	34.58	101.13	0.00	0.00	0.00
326	672	2.44	0.47	3.81	44.01	128.19	0.00	0.00	0.00
327	744	2.22	0.07	0.00	2.52	62.50	0.00	0.00	0.00
328	720	0.07	1.88	0.00	0.00	0.57	1.59	0.00	0.00
329	744	0.72	1.76	0.00	0.00	0.62	26.42	0.46	0.08
330	720	0.72	1.57	0.00	0.00	0.00	2.41	7.32	1.93
331	744	0.70	1.35	0.00	0.00	0.00	0.99	7.60	9.10
332	744	0.55	1.12	0.00	0.00	0.00	26.88	5.91	8.00
333	720	0.30	0.56	0.00	0.00	0.00	18.20	0.36	5.62
334	744	0.07	0.70	0.00	0.00	0.00	1.03	0.07	9.06
335	720	0.01	0.51	0.00	0.00	0.00	0.03	0.11	9.08
336	744	0.00	0.16	0.00	0.00	0.00	0.00	1.00	3.86
337	744	2.44	0.34	2.40	15.21	84.68	0.00	0.00	0.20
338	672	2.09	0.25	1.68	33.70	100.03	0.00	0.00	0.00
339	744	2.28	1.67	16.46	37.23	156.42	0.04	0.00	0.00
340	720	0.23	1.97	0.00	0.00	0.47	0.15	0.00	7.61
341	744	0.18	2.20	0.00	0.00	0.00	0.18	0.40	9.09
342	720	0.20	1.62	0.00	21.74	0.00	0.21	7.38	0.26
343	744	0.22	1.47	0.00	20.87	0.00	0.50	7.60	0.00
344	744	0.17	0.83	0.00	0.16	0.00	9.80	6.01	9.10
345	720	0.07	0.28	0.00	0.00	0.00	9.92	1.84	9.00
346	744	0.02	0.42	0.00	0.00	0.00	0.00	2.44	9.08
347	720	0.01	0.20	0.00	0.00	0.00	5.08	1.03	4.50
348	744	0.00	0.15	0.00	0.00	0.00	0.14	0.08	4.61
349	744	2.20	0.22	1.36	36.01	100.53	0.00	0.00	0.08
350	672	0.55	0.06	0.00	2.80	18.81	0.00	0.00	0.00
351	744	2.44	0.48	3.54	5.95	79.66	0.02	0.42	0.18
352	720	0.08	1.51	0.00	0.00	0.00	0.14	6.66	3.39
353	744	0.26	1.10	0.00	0.00	0.00	0.15	5.54	8.32
354	720	0.39	1.81	0.00	0.00	0.00	0.36	6.56	8.80
355	744	0.43	1.39	0.00	0.00	0.00	0.67	7.39	9.03
356	744	0.72	1.48	0.00	0.00	0.00	8.98	3.19	9.00
357	720	0.07	0.33	0.00	0.00	0.00	0.26	1.74	9.00
358	744	0.06	0.43	0.00	0.00	0.00	9.34	2.49	9.00
359	720	0.01	0.26	0.00	0.00	0.00	0.17	1.25	9.09
360	744	2.13	1.35	11.80	32.29	100.44	1.74	0.00	0.00

Table H.C-1. NODOS Project, Power Operations, "Incidental," Alternative C (Cont.)

		NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)									
		Optimized Pumping (for Sites Plant)									
		Incidental Pumping , MW				Optimized Pumping					
		TC Canal	GCID Canal	TRR	Sac River	Sites					
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35					
Plant Capacity, cfs		2250	3000	1890	2000	MaxQ=5900 cfs					
Month	# of Hours	All Hours				On-Peak, MW	On-Peak, MWh	Off-Peak, MW	Off-Peak, MWh	On-Peak, cfs	Off-Peak, cfs
1	744	2.28	0.37	2.73	39.11	79.00	32924	169.89	55732	2305	5900
2	672	1.46	0.06	0.00	3.13	0.00	0	104.73	30207	0	5900
3	744	0.03	0.09	0.00	0.00	0.00	0	0.00	0	0	0
4	720	0.49	2.11	0.00	0.00	0.00	0	0.00	0	0	0
5	744	0.45	2.12	0.00	0.00	0.00	0	0.00	0	0	0
6	720	0.59	1.66	0.00	0.53	0.00	0	0.00	0	0	0
7	744	0.65	1.55	0.00	30.75	0.00	0	0.00	0	0	0
8	744	1.10	2.03	0.00	1.01	0.00	0	0.00	0	0	0
9	720	0.09	0.35	0.00	0.00	0.00	0	0.00	0	0	0
10	744	0.08	0.69	0.00	0.00	0.00	0	0.00	0	0	0
11	720	2.44	1.55	12.30	42.85	110.00	45589	168.00	63794	3336	5900
12	744	1.39	0.19	0.00	2.52	0.00	0	80.24	30910	0	5680
13	744	0.00	0.08	0.00	0.00	0.00	0	0.00	0	0	0
14	672	0.00	0.06	0.00	0.00	0.00	0	0.00	0	0	0
15	744	0.01	0.09	0.00	0.00	0.00	0	0.00	0	0	0
16	720	0.08	1.87	0.00	0.00	0.00	0	0.00	0	0	0
17	744	0.83	2.25	0.32	0.33	0.00	0	0.00	0	0	0
18	720	0.66	2.70	0.00	8.05	0.00	0	0.00	0	0	0
19	744	1.31	2.35	0.00	0.00	0.00	0	0.00	0	0	0
20	744	1.20	2.81	6.01	2.17	0.00	0	42.96	17481	0	4695
21	720	0.11	0.39	0.00	0.00	0.00	0	0.00	0	0	0
22	744	0.10	0.41	0.00	0.00	0.00	0	0.00	0	0	0
23	720	0.01	0.30	0.00	0.00	0.00	0	0.00	0	0	0
24	744	0.00	0.08	0.00	0.00	0.00	0	0.00	0	0	0
25	744	0.00	0.13	0.00	2.41	0.00	0	0.00	0	0	0
26	696	2.00	0.49	3.95	29.40	27.00	10797	172.65	65326	795	5900
27	744	0.24	0.10	0.00	2.52	0.00	0	24.06	8791	0	3985
28	720	0.09	1.95	0.00	0.00	0.00	0	0.00	0	0	0
29	744	0.99	2.20	0.00	0.41	0.00	0	0.00	0	0	0
30	720	0.63	1.93	0.00	7.86	0.00	0	0.00	0	0	0
31	744	0.65	1.53	0.00	0.16	0.00	0	0.00	0	0	0
32	744	1.58	2.76	5.85	2.52	0.00	0	60.36	24705	0	5308
33	720	0.11	0.37	0.00	0.00	0.00	0	0.00	0	0	0
34	744	0.01	0.39	0.00	0.00	0.00	0	0.00	0	0	0
35	720	0.00	0.31	0.00	0.00	0.00	0	0.00	0	0	0
36	744	0.00	0.15	0.00	0.00	0.00	0	0.00	0	0	0
37	744	0.00	0.13	0.00	0.00	0.00	0	0.00	0	0	0
38	672	0.08	0.09	0.00	0.00	0.00	0	0.00	0	0	0
39	744	2.31	0.37	1.01	5.64	0.00	0	122.47	49721	0	5900
40	720	0.08	2.46	0.00	0.00	0.00	0	0.00	0	0	0
41	744	0.10	2.26	0.00	0.00	0.00	0	0.00	0	0	0
42	720	0.05	1.65	0.00	0.00	0.00	0	0.00	0	0	0
43	744	0.06	1.39	0.00	0.00	0.00	0	0.00	0	0	0
44	744	0.09	1.89	0.00	0.00	0.00	0	0.00	0	0	0
45	720	0.04	0.58	0.00	0.00	0.00	0	0.00	0	0	0
46	744	0.07	0.76	0.00	0.00	0.00	0	0.00	0	0	0
47	720	0.01	0.52	0.00	0.00	0.00	0	0.00	0	0	0
48	744	0.00	0.27	0.00	0.00	0.00	0	0.00	0	0	0
49	744	0.00	0.08	0.00	0.00	0.00	0	0.00	0	0	0
50	672	0.01	0.08	0.00	0.00	0.00	0	0.00	0	0	0
51	744	0.04	0.11	0.00	0.00	0.00	0	0.00	0	0	0
52	720	0.02	1.12	0.00	0.00	0.00	0	0.00	0	0	0
53	744	0.01	0.73	0.00	0.00	0.00	0	0.00	0	0	0
54	720	0.03	1.14	0.00	0.00	0.00	0	0.00	0	0	0
55	744	0.29	1.36	0.00	0.00	0.00	0	0.00	0	0	0
56	744	0.43	1.30	0.00	2.31	0.00	0	0.00	0	0	0
57	720	0.12	0.35	0.00	0.00	0.00	0	0.00	0	0	0
58	744	0.07	0.56	0.00	0.00	0.00	0	0.00	0	0	0
59	720	0.01	0.32	0.00	0.00	0.00	0	0.00	0	0	0
60	744	1.62	0.75	5.83	9.62	0.00	0	69.90	29896	0	5900

Table H.C-2. NODOS Project, Power Operations, "Optimized," Alternative C

		NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)									
		Optimized Pumping (for Sites Plant)									
		Incidental Pumping , MW				Optimized Pumping					
		TC Canal	GCID Canal	TRR	Sac River	Sites					
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35					
Plant Capacity, cfs		2250	3000	1890	2000	MaxQ=5900 cfs					
Month	# of Hours	All Hours				On-Peak, MW	On-Peak, MWh	Off-Peak, MW	Off-Peak, MWh	On-Peak, cfs	Off-Peak, cfs
61	744	2.05	0.30	2.27	32.51	10.00	4113	106.95	45669	457	5900
62	672	2.44	0.47	3.95	44.01	34.00	13189	123.00	50360	1412	5900
63	744	2.44	1.76	18.06	44.01	104.00	43177	140.80	60633	3648	5900
64	720	2.15	2.67	8.65	0.00	0.00	0	138.53	53345	0	5900
65	744	2.58	2.86	6.00	1.33	0.00	0	108.93	44142	0	5900
66	720	0.66	1.67	0.00	34.96	0.00	0	0.00	0	0	0
67	744	0.70	1.55	0.00	36.59	0.00	0	0.00	0	0	0
68	744	1.18	2.01	0.00	0.97	0.00	0	0.00	0	0	0
69	720	0.11	0.35	0.00	0.00	0.00	0	0.00	0	0	0
70	744	0.26	0.76	0.00	0.00	0.00	0	0.00	0	0	0
71	720	0.02	0.46	0.00	0.00	0.00	0	0.00	0	0	0
72	744	0.00	0.27	0.00	0.00	0.00	0	0.00	0	0	0
73	744	2.28	0.24	1.85	36.37	20.00	8120	152.22	67971	635	5900
74	696	1.83	0.31	2.24	21.80	0.00	0	143.63	59366	0	5900
75	744	2.43	1.44	13.64	13.93	55.00	23698	172.10	71988	1638	5900
76	720	0.05	2.77	6.11	0.00	0.00	0	40.42	14898	0	4432
77	744	0.46	2.14	0.00	0.00	0.00	0	0.00	0	0	0
78	720	0.39	1.66	0.00	0.46	0.00	0	0.00	0	0	0
79	744	0.42	1.50	0.00	24.05	0.00	0	0.00	0	0	0
80	744	0.70	1.29	0.00	0.70	0.00	0	0.00	0	0	0
81	720	0.06	0.34	0.00	0.00	0.00	0	0.00	0	0	0
82	744	0.04	0.41	0.00	0.00	0.00	0	0.00	0	0	0
83	720	0.00	0.25	0.00	0.00	0.00	0	0.00	0	0	0
84	744	0.00	0.15	0.00	0.00	0.00	0	0.00	0	0	0
85	744	2.28	0.27	1.81	38.52	21.00	8845	163.33	73970	644	5900
86	672	2.44	0.47	3.81	27.81	24.00	9226	173.72	70772	699	5900
87	744	0.01	0.10	0.00	0.00	0.00	0	0.00	0	0	0
88	720	0.06	2.00	0.00	0.00	0.00	0	0.00	0	0	0
89	744	0.20	1.89	0.00	0.14	0.00	0	0.00	0	0	0
90	720	0.50	1.62	0.00	2.37	0.00	0	0.00	0	0	0
91	744	1.24	1.78	0.00	0.00	0.00	0	0.00	0	0	0
92	744	1.00	2.03	0.00	0.00	0.00	0	0.00	0	0	0
93	720	0.09	0.36	0.00	0.00	0.00	0	0.00	0	0	0
94	744	0.07	0.43	0.00	0.00	0.00	0	0.00	0	0	0
95	720	0.02	0.33	0.00	0.00	0.00	0	0.00	0	0	0
96	744	0.00	0.18	0.00	0.00	0.00	0	0.00	0	0	0
97	744	2.12	0.37	2.73	33.66	18.00	7913	158.32	68850	595	5900
98	672	2.26	0.49	3.95	38.61	34.00	13186	167.51	67759	1037	5900
99	744	2.13	0.28	1.83	3.05	0.00	0	119.48	49857	0	5900
100	720	0.17	1.77	0.00	1.92	0.00	0	0.00	0	0	0
101	744	0.52	2.02	0.00	0.00	0.00	0	0.00	0	0	0
102	720	0.48	1.57	0.00	0.00	0.00	0	0.00	0	0	0
103	744	0.50	1.48	0.00	25.43	0.00	0	0.00	0	0	0
104	744	0.38	1.00	0.00	0.00	0.00	0	0.00	0	0	0
105	720	0.15	0.54	0.00	0.00	0.00	0	0.00	0	0	0
106	744	0.07	0.69	0.00	0.00	0.00	0	0.00	0	0	0
107	720	0.01	0.32	0.00	0.00	0.00	0	0.00	0	0	0
108	744	1.74	1.16	9.45	24.98	19.00	7737	157.67	70028	584	5900
109	744	2.36	0.37	2.73	41.51	39.00	17062	170.19	74590	1193	5900
110	672	1.27	0.06	0.00	3.30	0.00	0	65.01	27098	0	4141
111	744	0.01	0.07	0.00	0.00	0.00	0	0.00	0	0	0
112	720	0.07	1.41	0.00	0.00	0.00	0	0.00	0	0	0
113	744	0.74	2.28	0.82	0.45	0.00	0	0.00	0	0	0
114	720	0.62	2.78	0.00	8.31	0.00	0	0.00	0	0	0
115	744	1.54	2.79	0.00	0.17	0.00	0	0.00	0	0	0
116	744	1.22	2.07	0.00	0.00	0.00	0	0.00	0	0	0
117	720	0.09	0.38	0.00	0.00	0.00	0	0.00	0	0	0
118	744	0.58	2.08	12.35	2.48	0.00	0	99.71	42968	0	5900
119	720	0.00	0.24	0.00	0.00	0.00	0	0.00	0	0	0
120	744	0.00	0.20	0.00	1.78	0.00	0	0.00	0	0	0

Table H.C-2. NODOS Project, Power Operations, "Optimized," Alternative C (Cont.)

		NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)									
		Optimized Pumping (for Sites Plant)									
		Incidental Pumping , MW				Optimized Pumping					
		TC Canal	GCID Canal	TRR	Sac River	Sites					
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35					
Plant Capacity, cfs		2250	3000	1890	2000	MaxQ=5900 cfs					
Month	# of Hours	All Hours				On-Peak, MW	On-Peak, MWh	Off-Peak, MW	Off-Peak, MWh	On-Peak, cfs	Off-Peak, cfs
121	744	0.00	0.07	0.00	0.00	0.00	0	0.00	0	0	0
122	696	0.00	0.06	0.00	0.00	0.00	0	0.00	0	0	0
123	744	0.02	0.05	0.00	0.00	0.00	0	0.00	0	0	0
124	720	0.05	1.31	0.00	0.00	0.00	0	0.00	0	0	0
125	744	0.63	2.06	0.00	0.51	0.00	0	0.00	0	0	0
126	720	0.63	2.85	0.00	8.60	0.00	0	0.00	0	0	0
127	744	0.73	2.79	0.00	12.94	0.00	0	0.00	0	0	0
128	744	1.17	2.05	0.00	0.00	0.00	0	0.00	0	0	0
129	720	0.28	1.61	9.01	0.00	0.00	0	48.12	19704	0	4599
130	744	0.19	0.45	0.00	0.00	0.00	0	0.00	0	0	0
131	720	0.39	0.26	0.00	2.52	0.00	0	23.63	10551	0	3028
132	744	0.00	0.08	0.00	0.00	0.00	0	0.00	0	0	0
133	744	0.00	0.13	0.00	0.00	0.00	0	0.00	0	0	0
134	672	0.00	0.06	0.00	0.00	0.00	0	0.00	0	0	0
135	744	0.05	0.13	0.00	0.00	0.00	0	0.00	0	0	0
136	720	0.09	2.34	0.00	0.00	0.00	0	0.00	0	0	0
137	744	0.34	2.21	0.00	0.00	0.00	0	0.00	0	0	0
138	720	0.52	1.64	0.00	0.00	0.00	0	0.00	0	0	0
139	744	0.58	1.39	0.00	0.00	0.00	0	0.00	0	0	0
140	744	0.91	1.65	0.00	0.00	0.00	0	0.00	0	0	0
141	720	0.08	0.33	0.00	0.00	0.00	0	0.00	0	0	0
142	744	0.03	0.42	0.00	0.00	0.00	0	0.00	0	0	0
143	720	2.03	1.32	9.80	29.23	38.00	15959	152.23	64901	1289	5900
144	744	2.05	1.40	11.39	11.23	11.00	4597	162.87	71909	336	5900
145	744	0.03	0.12	0.00	1.54	0.00	0	0.00	0	0	0
146	672	2.44	0.39	3.37	2.80	0.00	0	125.48	52377	0	5900
147	744	0.21	0.10	0.00	2.52	0.00	0	17.85	7924	0	2727
148	720	0.19	2.17	0.00	0.00	0.00	0	0.00	0	0	0
149	744	0.74	2.22	0.00	0.00	0.00	0	0.00	0	0	0
150	720	0.44	1.55	0.00	0.00	0.00	0	0.00	0	0	0
151	744	0.47	1.40	0.00	0.00	0.00	0	0.00	0	0	0
152	744	0.79	2.00	0.00	0.00	0.00	0	0.00	0	0	0
153	720	0.28	0.55	0.00	0.00	0.00	0	0.00	0	0	0
154	744	0.16	0.74	0.00	0.00	0.00	0	0.00	0	0	0
155	720	0.01	0.27	0.00	0.00	0.00	0	0.00	0	0	0
156	744	0.00	0.21	0.00	0.00	0.00	0	0.00	0	0	0
157	744	2.28	0.29	2.40	38.48	15.00	6403	142.61	67053	534	5900
158	672	2.09	0.49	3.95	33.70	12.00	4496	152.64	64183	388	5900
159	744	2.43	1.79	17.87	44.01	114.00	49328	166.67	73136	3521	5900
160	720	0.40	2.76	7.08	0.00	0.00	0	59.05	25310	0	4340
161	744	0.10	1.89	0.00	0.97	0.00	0	0.00	0	0	0
162	720	0.37	1.64	0.00	22.33	0.00	0	0.00	0	0	0
163	744	0.42	1.40	0.00	0.00	0.00	0	0.00	0	0	0
164	744	0.69	2.01	0.00	0.00	0.00	0	0.00	0	0	0
165	720	0.05	0.36	0.00	0.00	0.00	0	0.00	0	0	0
166	744	0.17	0.76	0.00	0.00	0.00	0	0.00	0	0	0
167	720	0.02	0.54	0.00	0.00	0.00	0	0.00	0	0	0
168	744	0.00	0.14	0.00	0.00	0.00	0	0.00	0	0	0
169	744	0.40	0.07	0.00	2.48	0.00	0	21.23	9662	0	2982
170	696	2.18	0.49	3.95	34.58	23.00	9025	157.75	66366	728	5900
171	744	2.21	1.59	15.14	28.93	68.00	28352	169.64	77821	1988	5900
172	720	0.18	2.17	0.00	0.00	0.00	0	0.00	0	0	0
173	744	0.24	2.21	0.00	0.32	0.00	0	0.00	0	0	0
174	720	0.14	1.69	0.00	15.48	0.00	0	0.00	0	0	0
175	744	0.14	1.91	0.00	0.10	0.00	0	0.00	0	0	0
176	744	0.25	2.03	0.00	0.00	0.00	0	0.00	0	0	0
177	720	0.12	0.62	0.00	0.00	0.00	0	0.00	0	0	0
178	744	0.09	0.74	0.00	0.00	0.00	0	0.00	0	0	0
179	720	0.01	0.41	0.00	0.00	0.00	0	0.00	0	0	0
180	744	0.00	0.16	0.00	0.00	0.00	0	0.00	0	0	0

Table H.C-2. NODOS Project, Power Operations, "Optimized," Alternative C (Cont.)

		NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)									
		Optimized Pumping (for Sites Plant)									
		Incidental Pumping , MW				Optimized Pumping					
		TC Canal	GCID Canal	TRR	Sac River	Sites					
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35					
Plant Capacity, cfs		2250	3000	1890	2000	MaxQ=5900 cfs					
Month	# of Hours	All Hours				On-Peak, MW	On-Peak, MWh	Off-Peak, MW	Off-Peak, MWh	On-Peak, cfs	Off-Peak, cfs
181	744	2.20	0.27	1.81	36.03	12.00	5037	147.63	67241	406	5900
182	672	0.09	0.06	0.00	0.62	0.00	0	0.00	0	0	0
183	744	0.01	0.10	0.00	0.00	0.00	0	0.00	0	0	0
184	720	0.00	1.25	0.00	0.00	0.00	0	0.00	0	0	0
185	744	0.00	1.12	0.00	0.00	0.00	0	0.00	0	0	0
186	720	0.03	1.86	0.00	0.00	0.00	0	0.00	0	0	0
187	744	0.00	2.74	0.00	0.00	0.00	0	0.00	0	0	0
188	744	0.00	2.09	0.00	0.00	0.00	0	0.00	0	0	0
189	720	0.00	0.61	0.00	0.00	0.00	0	0.00	0	0	0
190	744	0.06	0.77	0.00	0.00	0.00	0	0.00	0	0	0
191	720	0.01	0.43	0.00	0.00	0.00	0	0.00	0	0	0
192	744	0.00	0.21	0.00	0.00	0.00	0	0.00	0	0	0
193	744	0.00	0.13	0.00	0.00	0.00	0	0.00	0	0	0
194	672	0.00	0.08	0.00	0.00	0.00	0	0.00	0	0	0
195	744	2.04	1.49	14.25	29.72	34.00	14349	104.81	48925	1629	5900
196	720	0.92	2.74	5.74	0.00	0.00	0	52.69	22293	0	4927
197	744	0.11	1.36	0.00	0.00	0.00	0	0.00	0	0	0
198	720	0.37	2.80	0.00	0.00	0.00	0	0.00	0	0	0
199	744	0.38	2.71	0.00	0.00	0.00	0	0.00	0	0	0
200	744	0.30	1.98	0.00	0.00	0.00	0	0.00	0	0	0
201	720	0.11	0.38	0.00	0.00	0.00	0	0.00	0	0	0
202	744	0.07	0.71	0.00	0.00	0.00	0	0.00	0	0	0
203	720	0.01	0.51	0.00	0.00	0.00	0	0.00	0	0	0
204	744	0.00	0.30	0.00	0.00	0.00	0	0.00	0	0	0
205	744	2.38	0.09	0.46	20.31	0.00	0	81.44	38034	0	5900
206	672	0.00	0.06	0.00	0.00	0.00	0	0.00	0	0	0
207	744	0.01	0.10	0.00	0.00	0.00	0	0.00	0	0	0
208	720	0.00	1.64	0.00	0.00	0.00	0	0.00	0	0	0
209	744	0.00	1.57	0.00	0.00	0.00	0	0.00	0	0	0
210	720	0.00	1.70	0.00	17.20	0.00	0	0.00	0	0	0
211	744	0.00	2.73	0.00	0.19	0.00	0	0.00	0	0	0
212	744	0.00	1.94	0.00	2.26	0.00	0	0.00	0	0	0
213	720	0.00	0.59	0.00	2.56	0.00	0	0.00	0	0	0
214	744	0.06	0.77	0.00	0.00	0.00	0	0.00	0	0	0
215	720	0.02	0.53	0.00	0.00	0.00	0	0.00	0	0	0
216	744	0.00	0.27	0.00	0.00	0.00	0	0.00	0	0	0
217	744	0.00	0.14	0.00	0.00	0.00	0	0.00	0	0	0
218	696	0.00	0.07	0.00	0.00	0.00	0	0.00	0	0	0
219	744	2.43	1.72	17.28	44.01	63.00	27300	97.79	44276	3321	5900
220	720	0.08	0.87	0.00	10.30	0.00	0	0.00	0	0	0
221	744	0.05	0.98	0.00	13.69	0.00	0	0.00	0	0	0
222	720	0.06	1.27	0.00	22.13	0.00	0	0.00	0	0	0
223	744	0.09	1.19	0.00	19.13	0.00	0	0.00	0	0	0
224	744	0.50	1.37	0.00	0.31	0.00	0	0.00	0	0	0
225	720	0.08	0.45	0.00	0.00	0.00	0	0.00	0	0	0
226	744	0.08	0.56	0.00	0.00	0.00	0	0.00	0	0	0
227	720	0.02	0.38	0.00	0.00	0.00	0	0.00	0	0	0
228	744	0.00	0.16	0.00	0.00	0.00	0	0.00	0	0	0
229	744	0.00	0.06	0.00	0.00	0.00	0	0.00	0	0	0
230	672	1.68	0.40	3.25	20.69	0.00	0	74.99	30949	0	5900
231	744	2.28	1.33	13.03	20.89	30.00	13084	110.82	49858	1404	5900
232	720	0.04	0.95	0.00	1.92	0.00	0	0.00	0	0	0
233	744	0.12	1.42	0.00	0.44	0.00	0	0.00	0	0	0
234	720	0.09	1.21	0.00	19.18	0.00	0	0.00	0	0	0
235	744	0.13	1.18	0.00	21.16	0.00	0	0.00	0	0	0
236	744	0.58	1.40	0.00	0.00	0.00	0	0.00	0	0	0
237	720	0.12	0.45	0.00	0.00	0.00	0	0.00	0	0	0
238	744	0.06	0.52	0.00	0.00	0.00	0	0.00	0	0	0
239	720	0.02	0.38	0.00	0.00	0.00	0	0.00	0	0	0
240	744	0.69	0.12	0.00	2.52	0.00	0	16.90	7764	0	3385

Table H.C-2. NODOS Project, Power Operations, "Optimized," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)											
		Optimized Pumping (for Sites Plant)									
		Incidental Pumping , MW				Optimized Pumping					
		TC Canal	GCID Canal	TRR	Sac River	Sites					
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35					
Plant Capacity, cfs		2250	3000	1890	2000	MaxQ=5900 cfs					
Month	# of Hours	All Hours				On-Peak, MW	On-Peak, MWh	Off-Peak, MW	Off-Peak, MWh	On-Peak, cfs	Off-Peak, cfs
241	744	1.81	0.25	1.81	26.74	0.00	0	85.64	39246	0	5900
242	672	1.92	0.35	2.80	29.25	0.00	0	106.79	44920	0	5900
243	744	2.05	1.53	14.45	32.51	46.00	19305	128.90	60108	1782	5900
244	720	2.28	2.80	6.38	0.00	0.00	0	102.39	43300	0	5900
245	744	2.58	2.87	9.43	0.00	0.00	0	116.26	49260	0	5900
246	720	2.56	2.80	2.00	44.01	7.00	2622	156.90	64975	205	5900
247	744	0.68	1.60	0.00	32.69	0.00	0	0.00	0	0	0
248	744	1.12	2.03	0.00	0.19	0.00	0	0.00	0	0	0
249	720	0.34	0.63	0.00	0.00	0.00	0	0.00	0	0	0
250	744	0.17	0.74	0.00	0.00	0.00	0	0.00	0	0	0
251	720	0.02	0.44	0.00	0.00	0.00	0	0.00	0	0	0
252	744	0.83	0.24	0.00	2.52	0.00	0	33.08	15429	0	3516
253	744	0.00	0.08	0.00	0.00	0.00	0	0.00	0	0	0
254	672	2.44	0.49	3.95	42.65	37.00	14399	157.61	66411	1203	5900
255	744	0.03	0.06	0.00	0.00	0.00	0	0.00	0	0	0
256	720	0.06	1.08	0.00	17.08	0.00	0	0.00	0	0	0
257	744	0.20	0.79	0.00	12.36	0.00	0	0.00	0	0	0
258	720	0.37	1.22	0.00	0.00	0.00	0	0.00	0	0	0
259	744	1.08	1.14	0.00	0.00	0.00	0	0.00	0	0	0
260	744	1.06	0.98	0.00	0.00	0.00	0	0.00	0	0	0
261	720	0.33	0.42	0.00	0.00	0.00	0	0.00	0	0	0
262	744	0.13	0.54	0.00	0.00	0.00	0	0.00	0	0	0
263	720	0.01	0.22	0.00	0.00	0.00	0	0.00	0	0	0
264	744	0.00	0.14	0.00	0.00	0.00	0	0.00	0	0	0
265	744	2.43	0.35	2.73	44.01	32.00	13717	134.70	60951	1211	5900
266	696	2.44	0.47	3.95	44.01	34.00	13163	147.37	65690	1136	5900
267	744	2.20	1.61	15.84	36.81	78.00	33497	160.62	73228	2481	5900
268	720	2.27	2.78	6.95	0.00	0.00	0	126.55	54101	0	5900
269	744	1.36	2.87	9.14	0.42	0.00	0	86.30	37793	0	5633
270	720	0.57	2.80	0.00	7.66	0.00	0	0.00	0	0	0
271	744	0.71	2.79	0.00	14.90	0.00	0	16.02	6471	0	3998
272	744	1.20	2.25	1.24	0.59	0.00	0	0.00	0	0	0
273	720	0.37	0.61	0.00	0.00	0.00	0	0.00	0	0	0
274	744	0.10	0.47	0.00	0.00	0.00	0	0.00	0	0	0
275	720	0.03	0.33	0.00	0.00	0.00	0	0.00	0	0	0
276	744	2.05	1.31	11.27	19.16	28.00	11987	173.34	77976	823	5900
277	744	0.00	0.07	0.00	0.00	0.00	0	0.00	0	0	0
278	672	0.00	0.06	0.00	0.00	0.00	0	0.00	0	0	0
279	744	0.02	0.09	0.00	0.00	0.00	0	0.00	0	0	0
280	720	0.37	1.79	0.00	0.00	0.00	0	0.00	0	0	0
281	744	0.45	1.67	0.00	0.36	0.00	0	0.00	0	0	0
282	720	0.63	2.77	0.00	9.40	0.00	0	0.00	0	0	0
283	744	0.82	1.60	0.00	0.33	0.00	0	0.00	0	0	0
284	744	1.21	1.67	0.00	0.00	0.00	0	0.00	0	0	0
285	720	0.10	0.33	0.00	0.00	0.00	0	0.00	0	0	0
286	744	0.02	0.40	0.00	0.00	0.00	0	0.00	0	0	0
287	720	0.01	0.27	0.00	0.00	0.00	0	0.00	0	0	0
288	744	2.20	1.39	12.30	34.39	64.00	27835	162.93	72784	2032	5900
289	744	2.44	0.37	2.73	18.72	0.00	0	164.67	78249	0	5900
290	672	0.00	0.06	0.00	0.00	0.00	0	0.00	0	0	0
291	744	0.41	0.17	0.00	2.41	0.00	0	23.32	10683	0	2935
292	720	0.37	2.60	0.00	0.00	0.00	0	0.00	0	0	0
293	744	0.35	2.01	0.00	0.00	0.00	0	0.00	0	0	0
294	720	0.41	2.14	0.00	0.00	0.00	0	0.00	0	0	0
295	744	0.48	1.42	0.00	0.00	0.00	0	0.00	0	0	0
296	744	0.75	1.83	0.00	0.00	0.00	0	0.00	0	0	0
297	720	0.07	0.35	0.00	0.00	0.00	0	0.00	0	0	0
298	744	0.05	0.43	0.00	0.00	0.00	0	0.00	0	0	0
299	720	0.01	0.20	0.00	0.00	0.00	0	0.00	0	0	0
300	744	2.43	0.57	3.27	23.77	7.00	3058	151.33	70031	240	5900

Table H.C-2. NODOS Project, Power Operations, "Optimized," Alternative C (Cont.)

		NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period (Cont.)									
		Optimized Pumping (for Sites Plant)									
		Incidental Pumping , MW				Optimized Pumping					
		TC Canal	GCID Canal	TRR	Sac River	Sites					
Plant Capacity, MW		6.00	3.39	19.68	65.65	181.35					
Plant Capacity, cfs		2250	3000	1890	2000	MaxQ=5900 cfs					
Month	# of Hours	All Hours				On-Peak, MW	On-Peak, MWh	Off-Peak, MW	Off-Peak, MWh	On-Peak, cfs	Off-Peak, cfs
294	720	0.41	2.14	0.00	0.00	0.00	0	0.00	0	0	0
295	744	0.48	1.42	0.00	0.00	0.00	0	0.00	0	0	0
296	744	0.75	1.83	0.00	0.00	0.00	0	0.00	0	0	0
297	720	0.07	0.35	0.00	0.00	0.00	0	0.00	0	0	0
298	744	0.05	0.43	0.00	0.00	0.00	0	0.00	0	0	0
299	720	0.01	0.20	0.00	0.00	0.00	0	0.00	0	0	0
300	744	2.43	0.57	3.27	23.77	7.00	3058	151.33	70031	240	5900
301	744	2.35	0.37	2.67	41.51	29.00	12669	162.28	74506	929	5900
302	672	2.44	0.49	3.95	44.01	40.00	15499	172.58	73664	1183	5900
303	744	0.05	0.09	0.00	2.52	0.00	0	11.15	5049	0	2490
304	720	0.04	1.63	0.00	0.00	0.00	0	0.00	0	0	0
305	744	0.12	1.23	0.00	0.44	0.00	0	0.00	0	0	0
306	720	0.56	2.81	0.00	11.35	0.00	0	11.49	4607	0	3631
307	744	0.74	2.80	0.00	9.88	0.00	0	0.00	0	0	0
308	744	1.23	2.09	0.00	0.00	0.00	0	0.00	0	0	0
309	720	0.34	1.63	9.01	0.00	0.00	0	46.15	19797	0	4496
310	744	0.05	0.44	0.00	0.00	0.00	0	0.00	0	0	0
311	720	0.46	0.40	0.00	2.59	0.00	0	28.13	12148	0	3318
312	744	0.00	0.15	0.00	0.00	0.00	0	0.00	0	0	0
313	744	0.00	0.08	0.00	0.00	0.00	0	0.00	0	0	0
314	696	0.00	0.06	0.00	0.00	0.00	0	0.00	0	0	0
315	744	0.01	0.09	0.00	0.00	0.00	0	0.00	0	0	0
316	720	0.17	1.98	0.55	0.00	0.00	0	0.00	0	0	0
317	744	0.80	2.20	0.00	0.45	0.00	0	0.00	0	0	0
318	720	0.56	2.51	0.00	5.94	0.00	0	0.00	0	0	0
319	744	0.66	1.45	0.00	0.00	0.00	0	0.00	0	0	0
320	744	1.10	1.90	0.00	0.00	0.00	0	0.00	0	0	0
321	720	0.11	0.36	0.00	0.00	0.00	0	0.00	0	0	0
322	744	0.08	0.44	0.00	0.00	0.00	0	0.00	0	0	0
323	720	0.01	0.28	0.00	0.00	0.00	0	0.00	0	0	0
324	744	0.00	0.29	0.00	2.04	0.00	0	0.00	0	0	0
325	744	2.12	0.25	2.02	34.58	9.00	3952	157.91	71608	298	5900
326	672	2.44	0.47	3.81	44.01	41.00	15731	167.78	70659	1235	5900
327	744	2.22	0.07	0.00	2.52	0.00	0	98.16	46553	0	5425
328	720	0.07	1.88	0.00	0.00	0.00	0	0.00	0	0	0
329	744	0.72	1.76	0.00	0.00	0.00	0	0.00	0	0	0
330	720	0.72	1.57	0.00	0.00	0.00	0	0.00	0	0	0
331	744	0.70	1.35	0.00	0.00	0.00	0	0.00	0	0	0
332	744	0.55	1.12	0.00	0.00	0.00	0	0.00	0	0	0
333	720	0.30	0.56	0.00	0.00	0.00	0	0.00	0	0	0
334	744	0.07	0.70	0.00	0.00	0.00	0	0.00	0	0	0
335	720	0.01	0.51	0.00	0.00	0.00	0	0.00	0	0	0
336	744	0.00	0.16	0.00	0.00	0.00	0	0.00	0	0	0
337	744	2.44	0.34	2.40	15.21	0.00	0	134.73	63240	0	5900
338	672	2.09	0.25	1.68	33.70	0.00	0	160.16	67438	0	5900
339	744	2.28	1.67	16.46	37.23	88.00	38029	171.22	78474	2642	5900
340	720	0.23	1.97	0.00	0.00	0.00	0	0.00	0	0	0
341	744	0.18	2.20	0.00	0.00	0.00	0	0.00	0	0	0
342	720	0.20	1.62	0.00	21.74	0.00	0	0.00	0	0	0
343	744	0.22	1.47	0.00	20.87	0.00	0	0.00	0	0	0
344	744	0.17	0.83	0.00	0.16	0.00	0	0.00	0	0	0
345	720	0.07	0.28	0.00	0.00	0.00	0	0.00	0	0	0
346	744	0.02	0.42	0.00	0.00	0.00	0	0.00	0	0	0
347	720	0.01	0.20	0.00	0.00	0.00	0	0.00	0	0	0
348	744	0.00	0.15	0.00	0.00	0.00	0	0.00	0	0	0
349	744	2.20	0.22	1.36	36.01	5.00	2152	155.47	72959	165	5900
350	672	0.55	0.06	0.00	2.80	0.00	0	29.63	12640	0	3312
351	744	2.44	0.48	3.54	5.95	0.00	0	129.66	59419	0	5900
352	720	0.08	1.51	0.00	0.00	0.00	0	0.00	0	0	0
353	744	0.26	1.10	0.00	0.00	0.00	0	0.00	0	0	0
354	720	0.39	1.81	0.00	0.00	0.00	0	0.00	0	0	0
355	744	0.43	1.39	0.00	0.00	0.00	0	0.00	0	0	0
356	744	0.72	1.48	0.00	0.00	0.00	0	0.00	0	0	0
357	720	0.07	0.33	0.00	0.00	0.00	0	0.00	0	0	0
358	744	0.06	0.43	0.00	0.00	0.00	0	0.00	0	0	0
359	720	0.01	0.26	0.00	0.00	0.00	0	0.00	0	0	0
360	744	2.13	1.35	11.80	32.29	43.00	18665	125.96	56310	1763	5900

Table H.C-2. NODOS Project, Power Operations, "Optimized," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period													
		Optimized Generation (except Sac River)											
		Optimized Genration, MW											
		Sites					TRR						
Plant Capacity, MW		123.00					9.33						
Plant Capacity, cfs		MaxQ=5100 cfs					MaxQ=1500 cfs						
Month	# of Hours	On-Peak, MW	On-Peak, MWh	Off-Peak, MW	On-Peak, cfs	Off-Peak, cfs	On-Peak	On-Peak, MWh	Off-Peak	Off-Peak, MWh	On-Peak, cfs	Off-Peak, cfs
1	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
2	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
3	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
4	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
5	744	26.47	9818	0.00	1141	0	0.81	300	0.00	0	116	0
6	720	114.95	39777	0.00	5100	0	9.18	3820	4.41	1341	1500	650
7	744	0.00	0	0.00	0	0	9.18	3967	4.17	1301	1500	613
8	744	30.10	9261	0.00	1366	0	1.44	443	0.00	0	207	0
9	720	107.43	28368	0.00	5009	0	4.07	1074	0.00	0	597	0
10	744	37.38	8916	0.00	1771	0	0.49	117	0.00	0	70	0
11	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
12	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
13	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
14	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
15	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
16	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
17	744	0.00	0	0.00	0	0	0.12	36	0.00	0	17	0
18	720	11.70	3508	0.00	503	0	2.99	896	0.00	0	435	0
19	744	36.38	10349	0.00	1579	0	3.13	890	0.00	0	455	0
20	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
21	720	73.73	16890	0.00	3217	0	5.19	1188	0.00	0	772	0
22	744	42.77	10242	0.00	1886	0	7.19	1722	0.00	0	1108	0
23	720	113.26	23951	0.00	5100	0	5.57	1071	0.00	0	833	0
24	744	24.86	4980	0.00	1128	0	2.63	526	0.00	0	381	0
25	744	0.00	0	0.00	0	0	0.15	32	0.00	0	21	0
26	696	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
27	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
28	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
29	744	0.00	0	0.00	0	0	0.72	228	0.00	0	104	0
30	720	55.68	15888	0.00	2412	0	9.18	3820	0.51	154	1500	73
31	744	114.37	33872	0.00	5100	0	9.18	3820	4.13	1355	1500	607
32	744	0.00	0	0.00	0	0	0.23	58	0.00	0	32	0
33	720	112.59	27407	0.00	5100	0	5.20	1193	0.00	0	773	0
34	744	47.37	10873	0.00	2179	0	7.33	1683	0.00	0	1133	0
35	720	108.36	22980	0.00	5100	0	5.82	1100	0.00	0	873	0
36	744	44.75	8756	0.00	2133	0	3.95	772	0.00	0	579	0
37	744	0.00	0	0.00	0	0	0.22	45	0.00	0	32	0
38	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
39	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
40	720	59.31	15142	0.00	2748	0	0.01	2	0.00	0	1	0
41	744	76.05	23901	0.00	3604	0	1.20	378	0.00	0	173	0
42	720	103.82	30822	0.00	5100	0	9.18	3673	4.46	1428	1500	657
43	744	98.69	35142	0.00	5100	0	9.18	3967	4.40	1373	1500	648
44	744	35.70	8912	0.00	1906	0	1.28	321	0.00	0	185	0
45	720	34.10	8196	0.00	1847	0	0.15	37	0.00	0	22	0
46	744	57.88	13884	0.00	3205	0	0.22	52	0.00	0	31	0
47	720	43.29	8585	0.00	2441	0	0.19	38	0.00	0	27	0
48	744	83.43	16702	0.00	4838	0	0.17	34	0.00	0	25	0
49	744	0.00	0	0.00	0	0	0.01	2	0.00	0	2	0
50	672	84.60	14199	0.00	5100	0	0.10	15	0.00	0	15	0
51	744	81.09	16769	0.00	5100	0	1.58	287	0.00	0	229	0
52	720	75.45	22665	0.00	5100	0	9.18	3820	3.57	1085	1500	522
53	744	68.61	17346	0.00	5078	0	9.18	3640	0.00	0	1500	0
54	720	60.69	19927	0.00	5100	0	9.18	3673	4.75	1519	1500	702
55	744	26.07	7296	0.00	2520	0	9.18	3072	0.00	0	1500	0
56	744	0.00	0	0.00	0	0	0.80	194	0.00	0	115	0
57	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
58	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
59	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
60	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
61	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
62	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
63	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
64	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
65	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
66	720	0.00	0	0.00	0	0	9.18	3820	4.26	1295	1500	626
67	744	0.00	0	0.00	0	0	9.18	3967	4.17	1301	1500	613
68	744	33.53	8541	0.00	1588	0	1.77	450	0.00	0	255	0
69	720	104.80	25858	0.00	5100	0	4.25	997	0.00	0	624	0
70	744	97.44	20764	0.00	4885	0	0.49	105	0.00	0	71	0
71	720	98.93	19752	0.00	5100	0	0.20	38	0.00	0	28	0
72	744	39.29	7697	0.00	2053	0	0.17	34	0.00	0	25	0
73	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
74	696	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
75	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
76	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
77	744	0.00	0	0.00	0	0	1.11	295	0.00	0	160	0
78	720	116.08	33681	0.00	5100	0	9.18	3820	4.41	1341	1500	650
79	744	12.71	3456	0.00	566	0	9.18	3820	5.09	1671	1500	757
80	744	92.42	23688	0.00	4189	0	9.18	3510	0.00	0	1500	0
81	720	105.93	24806	0.00	4940	0	5.46	1278	0.00	0	815	0
82	744	43.98	9470	0.00	2080	0	7.60	1636	0.00	0	1182	0
83	720	61.83	12134	0.00	2960	0	4.36	856	0.00	0	642	0
84	744	40.16	7744	0.00	1940	0	0.34	65	0.00	0	48	0
85	744	0.00	0	0.00	0	0	0.01	1	0.00	0	1	0
86	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
87	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
88	720	0.00	0	0.00	0	0	0.07	14	0.00	0	10	0
89	744	36.08	9464	0.00	1554	0	1.96	513	0.00	0	283	0
90	720	87.47	23404	0.00	3838	0	9.18	3820	3.89	1183	1500	570

Table H.C-3. NODOS Project, Power Operations, "Pump-Back," Alternative C

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period													
		Optimized Generation (except Sac River)											
		Optimized Genration, MW											
		Sites					TRR						
Plant Capacity, MW		123.00					9.33						
Plant Capacity, cfs		MaxQ=5100 cfs					MaxQ=1500 cfs						
Month	# of Hours	On-Peak, MW	On-Peak, MWh	Off-Peak, MW	On-Peak, cfs	Off-Peak, cfs	On-Peak	On-Peak, MWh	Off-Peak	Off-Peak, MWh	On-Peak, cfs	Off-Peak, cfs
91	744	83.15	22736	0.00	3733	0	9.18	3820	0.92	303	1500	133
92	744	40.92	10549	0.00	1864	0	1.26	324	0.00	0	181	0
93	720	109.03	27268	0.00	5100	0	5.24	1204	0.00	0	779	0
94	744	105.44	27309	0.00	5100	0	7.91	1762	0.00	0	1241	0
95	720	102.03	22247	0.00	5100	0	5.44	1084	0.00	0	811	0
96	744	0.00	0	0.00	0	0	0.36	67	0.00	0	51	0
97	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
98	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
99	744	0.00	0	0.00	0	0	0.18	33	0.00	0	25	0
100	720	0.00	0	0.00	0	0	2.19	476	0.00	0	317	0
101	744	99.28	25998	0.00	4321	0	1.43	375	0.00	0	206	0
102	720	112.81	40225	0.00	5100	0	9.18	3820	4.26	1295	1500	627
103	744	18.14	5165	0.00	838	0	9.18	3820	5.33	1749	1500	794
104	744	106.72	36952	0.00	5100	0	9.18	3964	0.00	0	1500	0
105	720	80.02	18565	0.00	3965	0	1.36	316	0.00	0	196	0
106	744	0.00	0	0.00	0	0	0.01	2	0.00	0	1	0
107	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
108	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
109	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
110	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
111	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
112	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
113	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
114	720	0.00	0	0.00	0	0	0.00	1	0.00	0	1	0
115	744	29.13	8322	0.00	1255	0	0.07	19	0.00	0	9	0
116	744	35.99	9057	0.00	1565	0	0.35	88	0.00	0	50	0
117	720	34.68	8364	0.00	1523	0	3.72	898	0.00	0	544	0
118	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
119	720	22.52	4280	0.00	967	0	3.20	608	0.00	0	466	0
120	744	0.00	0	0.00	0	0	0.22	43	0.00	0	31	0
121	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
122	696	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
123	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
124	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
125	744	0.00	0	0.00	0	0	0.00	1	0.00	0	1	0
126	720	0.00	0	0.00	0	0	0.05	14	0.00	0	7	0
127	744	0.00	0	0.00	0	0	0.01	2	0.00	0	1	0
128	744	30.78	7768	0.00	1328	0	0.09	24	0.00	0	13	0
129	720	0.00	0	0.00	0	0	0.31	73	0.00	0	44	0
130	744	36.97	8095	0.00	1590	0	7.49	1639	0.00	0	1161	0
131	720	0.00	0	0.00	0	0	0.74	146	0.00	0	107	0
132	744	0.00	0	0.00	0	0	2.27	451	0.00	0	329	0
133	744	0.00	0	0.00	0	0	0.13	24	0.00	0	19	0
134	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
135	744	0.00	0	0.00	0	0	0.24	47	0.00	0	35	0
136	720	42.00	8550	0.00	1806	0	4.05	825	0.00	0	595	0
137	744	35.37	8860	0.00	1533	0	1.43	358	0.00	0	206	0
138	720	114.97	31383	0.00	5100	0	9.18	3820	4.41	1341	1500	650
139	744	110.08	43424	0.00	5100	0	9.18	3967	4.42	1380	1500	651
140	744	105.18	28286	0.00	5100	0	6.15	1624	0.00	0	928	0
141	720	101.49	26228	0.00	5100	0	4.95	1201	0.00	0	734	0
142	744	97.90	22678	0.00	5100	0	7.20	1599	0.00	0	1109	0
143	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
144	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
145	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
146	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
147	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
148	720	115.33	22648	0.00	5100	0	0.01	2	0.00	0	1	0
149	744	102.85	25725	0.00	4649	0	0.95	237	0.00	0	137	0
150	720	108.36	40709	0.00	5100	0	9.18	3820	4.60	1400	1500	680
151	744	102.07	39357	0.00	5100	0	9.18	3820	4.53	1486	1500	668
152	744	84.45	22642	0.00	4429	0	1.38	369	0.00	0	198	0
153	720	78.32	19242	0.00	4249	0	0.15	37	0.00	0	22	0
154	744	40.20	8887	0.00	2228	0	0.23	52	0.00	0	34	0
155	720	43.23	8471	0.00	2433	0	0.18	36	0.00	0	26	0
156	744	0.00	0	0.00	0	0	0.01	2	0.00	0	1	0
157	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
158	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
159	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
160	720	0.00	0	0.00	0	0	0.04	8	0.00	0	6	0
161	744	31.99	8081	0.00	1389	0	3.81	962	0.00	0	557	0
162	720	16.58	4298	0.00	724	0	9.18	3820	4.52	1375	1500	667
163	744	113.17	41701	0.00	5100	0	9.18	3820	4.67	1532	1500	690
164	744	73.98	19663	0.00	3446	0	1.44	382	0.00	0	207	0
165	720	105.13	24772	0.00	5039	0	4.10	966	0.00	0	602	0
166	744	41.50	9651	0.00	2020	0	0.51	119	0.00	0	73	0
167	720	101.83	20423	0.00	5071	0	0.39	77	0.00	0	55	0
168	744	41.48	8087	0.00	2093	0	3.40	663	0.00	0	496	0
169	744	0.00	0	0.00	0	0	0.22	42	0.00	0	31	0
170	696	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
171	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
172	720	115.39	22937	0.00	5091	0	0.01	2	0.00	0	1	0
173	744	93.27	23388	0.00	4201	0	1.39	349	0.00	0	201	0
174	720	16.68	4325	0.00	759	0	9.18	3673	4.01	1282	1500	587
175	744	109.02	34042	0.00	5100	0	9.18	2851	0.00	0	1500	0
176	744	91.68	23640	0.00	4438	0	0.55	141	0.00	0	79	0
177	720	87.43	21680	0.00	4355	0	0.01	2	0.00	0	1	0
178	744	92.81	21708	0.00	4767	0	0.00	0	0.00	0	0	0
179	720	96.32	19354	0.00	5100	0	0.00	0	0.00	0	0	0
180	744	42.40	8678	0.00	2282	0	0.00	0	0.00	0	0	0

Table H.C-3. NODOS Project, Power Operations, "Pump-Back," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period													
		Optimized Generation (except Sac River)											
		Optimized Genration, MW											
		Sites					TRR						
Plant Capacity, MW		123.00					9.33						
Plant Capacity, cfs		MaxQ=5100 cfs					MaxQ=1500 cfs						
Month	# of Hours	On-Peak, MW	On-Peak, MWh	Off-Peak, MW	On-Peak, cfs	Off-Peak, cfs	On-Peak	On-Peak, MWh	Off-Peak	Off-Peak, MWh	On-Peak, cfs	Off-Peak, cfs
181	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
182	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
183	744	100.32	19619	0.00	5100	0	1.26	225	0.00	0	181	0
184	720	96.97	23261	0.00	5100	0	9.18	3758	0.00	0	1500	0
185	744	93.13	23270	0.00	5100	0	9.18	3873	0.00	0	1500	0
186	720	88.48	26857	0.00	5100	0	9.18	3673	0.95	303	1500	136
187	744	66.82	18909	0.00	4062	0	0.82	233	0.00	0	118	0
188	744	67.84	17461	0.00	4336	0	0.00	0	0.00	0	0	0
189	720	64.94	15999	0.00	4385	0	0.00	0	0.00	0	0	0
190	744	64.71	14914	0.00	4653	0	0.00	0	0.00	0	0	0
191	720	29.84	5754	0.00	2237	0	0.00	0	0.00	0	0	0
192	744	23.80	4832	0.00	1828	0	0.00	0	0.00	0	0	0
193	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
194	672	62.34	10530	0.00	5100	0	0.00	0	0.00	0	0	0
195	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
196	720	0.00	0	0.00	0	0	1.09	210	0.00	0	157	0
197	744	76.82	22376	0.00	5100	0	9.18	3820	0.14	47	1500	20
198	720	57.92	15592	0.00	4155	0	1.02	273	0.00	0	146	0
199	744	50.86	14430	0.00	3934	0	0.00	0	0.00	0	0	0
200	744	49.13	12700	0.00	4184	0	0.00	0	0.00	0	0	0
201	720	18.46	4611	0.00	1700	0	0.00	0	0.00	0	0	0
202	744	19.15	4294	0.00	1862	0	0.00	0	0.00	0	0	0
203	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
204	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
205	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
206	672	33.15	5700	0.00	2584	0	0.00	0	0.00	0	0	0
207	744	0.00	0	0.00	0	0	1.19	224	0.00	0	171	0
208	720	60.15	12885	0.00	5100	0	9.18	3623	0.00	0	1500	0
209	744	18.31	4650	0.00	1683	0	2.26	575	0.00	0	328	0
210	720	0.00	0	0.00	0	0	9.18	3820	3.49	1062	1500	510
211	744	7.76	2125	0.00	747	0	1.08	295	0.00	0	155	0
212	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
213	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
214	744	10.53	2361	0.00	1019	0	0.00	0	0.00	0	0	0
215	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
216	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
217	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
218	696	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
219	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
220	720	0.00	0	0.00	0	0	9.18	3187	0.00	0	1500	0
221	744	0.00	0	0.00	0	0	9.18	3833	0.00	0	1500	0
222	720	0.00	0	0.00	0	0	9.18	3820	4.50	1369	1500	664
223	744	0.00	0	0.00	0	0	9.18	3820	3.37	1104	1500	491
224	744	52.16	14166	0.00	3726	0	1.18	319	0.00	0	169	0
225	720	25.89	6264	0.00	1937	0	0.00	0	0.00	0	0	0
226	744	58.30	13450	0.00	4648	0	0.00	0	0.00	0	0	0
227	720	57.96	11828	0.00	5100	0	0.00	0	0.00	0	0	0
228	744	22.39	4505	0.00	2132	0	0.00	0	0.00	0	0	0
229	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
230	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
231	744	0.00	0	0.00	0	0	1.29	234	0.00	0	185	0
232	720	34.73	6786	0.00	2264	0	9.18	3241	0.00	0	1500	0
233	744	52.31	13170	0.00	3539	0	7.35	1852	0.00	0	1137	0
234	720	0.00	0	0.00	0	0	9.18	3820	3.34	1015	1500	487
235	744	0.00	0	0.00	0	0	9.18	3820	3.57	1171	1500	522
236	744	54.83	14690	0.00	3978	0	0.80	215	0.00	0	115	0
237	720	57.85	13805	0.00	4540	0	0.00	0	0.00	0	0	0
238	744	55.02	12624	0.00	4750	0	0.00	0	0.00	0	0	0
239	720	28.27	5799	0.00	2670	0	0.00	0	0.00	0	0	0
240	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
241	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
242	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
243	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
244	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
245	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
246	720	0.00	0	0.00	0	0	1.04	268	0.00	0	150	0
247	744	0.00	0	0.00	0	0	9.18	3967	3.36	1048	1500	490
248	744	29.45	7625	0.00	1410	0	1.24	321	0.00	0	178	0
249	720	34.74	8655	0.00	1681	0	0.15	37	0.00	0	21	0
250	744	89.04	20474	0.00	4405	0	0.22	52	0.00	0	32	0
251	720	99.90	19911	0.00	5085	0	0.18	36	0.00	0	26	0
252	744	0.00	0	0.00	0	0	0.01	2	0.00	0	2	0
253	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
254	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
255	744	37.91	7301	0.00	1783	0	1.27	245	0.00	0	183	0
256	720	0.00	0	0.00	0	0	9.18	3820	1.11	336	1500	159
257	744	0.00	0	0.00	0	0	9.18	3485	0.00	0	1500	0
258	720	104.33	36480	0.00	5100	0	9.18	3673	4.94	1581	1500	732
259	744	98.74	32606	0.00	5100	0	9.18	3967	1.58	492	1500	227
260	744	94.07	25323	0.00	5100	0	7.51	1957	0.00	0	1166	0
261	720	74.53	18711	0.00	4198	0	0.45	114	0.00	0	65	0
262	744	81.87	18474	0.00	4797	0	0.00	0	0.00	0	0	0
263	720	46.93	9605	0.00	2827	0	0.00	0	0.00	0	0	0
264	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
265	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
266	696	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
267	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
268	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
269	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
270	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0

Table H.C-3. NODOS Project, Power Operations, "Pump-Back," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period												
		Optimized Generation (except Sac River)										
		Optimized Genration, MW										
		Sites					TRR					
Plant Capacity, MW		123.00					9.33					
Plant Capacity, cfs		MaxQ=5100 cfs					MaxQ=1500 cfs					
Month	# of Hours	On-Peak, MW	On-Peak, MWh	Off-Peak, MW	On-Peak, cfs	Off-Peak, cfs	On-Peak	On-Peak, MWh	Off-Peak	Off-Peak, MWh	On-Peak, cfs	Off-Peak, cfs
271	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
272	744	0.00	0	0.00	0	0	0.01	2	0.00	0	1	0
273	720	39.49	9833	0.00	1699	0	0.51	126	0.00	0	73	0
274	744	115.77	29580	0.00	5100	0	7.53	1681	0.00	0	1168	0
275	720	112.68	25157	0.00	5100	0	5.51	1138	0.00	0	823	0
276	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
277	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
278	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
279	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
280	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
281	744	0.00	0	0.00	0	0	0.04	10	0.00	0	6	0
282	720	0.00	0	0.00	0	0	2.14	566	0.00	0	309	0
283	744	114.00	31223	0.00	4997	0	9.18	3820	3.87	1271	1500	567
284	744	41.12	11119	0.00	1832	0	7.08	1915	0.00	0	1088	0
285	720	111.58	29405	0.00	5100	0	5.22	1292	0.00	0	776	0
286	744	108.05	27368	0.00	5100	0	7.61	1690	0.00	0	1185	0
287	720	104.87	23057	0.00	5100	0	4.52	940	0.00	0	667	0
288	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
289	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
290	672	44.93	7777	0.00	1930	0	0.00	0	0.00	0	0	0
291	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
292	720	0.00	0	0.00	0	0	0.07	14	0.00	0	10	0
293	744	39.25	9773	0.00	1688	0	1.54	383	0.00	0	222	0
294	720	115.88	30744	0.00	5100	0	9.18	2951	0.00	0	1500	0
295	744	111.21	41959	0.00	5100	0	9.18	3820	4.17	1369	1500	613
296	744	71.02	19229	0.00	3373	0	2.50	677	0.00	0	363	0
297	720	104.21	25922	0.00	5100	0	4.71	1125	0.00	0	697	0
298	744	100.48	26170	0.00	5100	0	7.51	1739	0.00	0	1165	0
299	720	97.04	20826	0.00	5100	0	3.19	666	0.00	0	465	0
300	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
301	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
302	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
303	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
304	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
305	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
306	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
307	744	0.00	0	0.00	0	0	0.00	1	0.00	0	1	0
308	744	30.56	7977	0.00	1318	0	0.09	24	0.00	0	13	0
309	720	0.00	0	0.00	0	0	0.43	107	0.00	0	62	0
310	744	39.67	9216	0.00	1706	0	7.02	1630	0.00	0	1077	0
311	720	0.00	0	0.00	0	0	0.69	139	0.00	0	99	0
312	744	0.00	0	0.00	0	0	3.32	688	0.00	0	484	0
313	744	0.00	0	0.00	0	0	0.18	37	0.00	0	26	0
314	696	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
315	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
316	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
317	744	0.00	0	0.00	0	0	0.25	59	0.00	0	35	0
318	720	23.25	6178	0.00	999	0	4.35	1155	0.00	0	640	0
319	744	114.72	44921	0.00	5100	0	9.18	3967	3.53	1100	1500	515
320	744	46.49	12154	0.00	2125	0	1.52	397	0.00	0	219	0
321	720	108.60	28380	0.00	5100	0	4.80	1196	0.00	0	710	0
322	744	104.95	27788	0.00	5100	0	7.52	1754	0.00	0	1168	0
323	720	101.55	21904	0.00	5100	0	4.62	935	0.00	0	681	0
324	744	0.00	0	0.00	0	0	0.29	60	0.00	0	41	0
325	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
326	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
327	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
328	720	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
329	744	0.00	0	0.00	0	0	1.42	344	0.00	0	205	0
330	720	114.02	30329	0.00	4975	0	9.18	3820	4.26	1295	1500	626
331	744	111.93	46332	0.00	5100	0	9.18	3967	5.01	1562	1500	743
332	744	106.26	33580	0.00	5100	0	9.18	3820	0.77	254	1500	112
333	720	39.50	9862	0.00	1940	0	1.04	260	0.00	0	150	0
334	744	95.91	21612	0.00	4828	0	0.23	52	0.00	0	33	0
335	720	95.91	20290	0.00	4972	0	0.36	75	0.00	0	51	0
336	744	36.55	7652	0.00	1921	0	3.49	731	0.00	0	510	0
337	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
338	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
339	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
340	720	70.99	14394	0.00	3069	0	0.01	2	0.00	0	1	0
341	744	97.37	23550	0.00	4292	0	1.24	300	0.00	0	179	0
342	720	0.00	0	0.00	0	0	9.18	3820	4.41	1341	1500	650
343	744	0.00	0	0.00	0	0	9.18	3967	5.01	1562	1500	743
344	744	110.95	37580	0.00	5100	0	9.18	3820	1.05	345	1500	151
345	720	106.59	27640	0.00	5100	0	5.13	1284	0.00	0	763	0
346	744	103.07	25765	0.00	5100	0	7.50	1696	0.00	0	1164	0
347	720	41.59	8835	0.00	2096	0	3.44	731	0.00	0	502	0
348	744	34.23	7200	0.00	1740	0	0.28	59	0.00	0	40	0
349	744	0.00	0	0.00	0	0	0.00	1	0.00	0	0	0
350	672	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0
351	744	0.00	0	0.00	0	0	1.56	313	0.00	0	226	0
352	720	111.64	23536	0.00	5100	0	9.18	3820	2.42	734	1500	350
353	744	108.17	30984	0.00	5100	0	9.18	3782	0.00	0	1500	0
354	720	103.69	33849	0.00	5100	0	9.18	3820	2.13	647	1500	308
355	744	97.74	37197	0.00	5100	0	9.18	3820	4.67	1533	1500	691
356	744	92.10	26094	0.00	5100	0	8.07	2198	0.00	0	1270	0
357	720	87.78	22203	0.00	5100	0	5.06	1220	0.00	0	752	0
358	744	83.17	21860	0.00	5100	0	7.37	1736	0.00	0	1139	0
359	720	78.59	17399	0.00	5100	0	4.14	883	0.00	0	608	0
360	744	0.00	0	0.00	0	0	0.00	0	0.00	0	0	0

Table H.C-3. NODOS Project, Power Operations, "Pump-Back," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period										
		Pump Back Operations, MW								
		With Pump cycle			With Gen Cycle			Pure Pump Back		
Plant Capacity, MW		123.00			123.00			123.00		
Plant Capacity, cfs		MaxQ=5100 cfs			MaxQ=5100 cfs			MaxQ=5100 cfs		
Month	# of Hours	On-Peak	On-Peak, MWh	PumpBack Q cfs	On-Peak	On-Peak, MWh	PumpBack Q cfs	On-Peak	On-Peak, MWh	PumpBack Q cfs
1	744	0.00	0	0	0.00	0	0	0.00	0	0
2	672	51.61	16049	2226	0.00	0	0	0.00	0	0
3	744	0.00	0	0	0.00	0	0	118.32	35905	5100
4	720	0.00	0	0	0.00	0	0	118.34	34870	5100
5	744	0.00	0	0	91.65	33991	3959	0.00	0	0
6	720	0.00	0	0	0.00	0	0	0.00	0	0
7	744	0.00	0	0	0.00	0	0	112.55	33216	5100
8	744	0.00	0	0	82.05	25251	3734	0.00	0	0
9	720	0.00	0	0	1.96	518	91	0.00	0	0
10	744	0.00	0	0	70.16	16733	3329	0.00	0	0
11	720	0.00	0	0	0.00	0	0	0.00	0	0
12	744	117.71	26633	5100	0.00	0	0	0.00	0	0
13	744	0.00	0	0	0.00	0	0	118.39	24019	5100
14	672	0.00	0	0	0.00	0	0	118.39	17722	5100
15	744	0.00	0	0	0.00	0	0	118.39	23223	5100
16	720	0.00	0	0	0.00	0	0	118.41	27197	5100
17	744	0.00	0	0	0.00	0	0	118.34	36952	5100
18	720	0.00	0	0	106.45	31919	4597	0.00	0	0
19	744	0.00	0	0	81.00	23044	3521	0.00	0	0
20	744	117.06	30336	5100	0.00	0	0	0.00	0	0
21	720	0.00	0	0	43.21	9898	1883	0.00	0	0
22	744	0.00	0	0	72.76	17424	3214	0.00	0	0
23	720	0.00	0	0	0.00	0	0	0.00	0	0
24	744	0.00	0	0	87.23	17476	3972	0.00	0	0
25	744	0.00	0	0	0.00	0	0	111.82	24228	5100
26	696	0.00	0	0	0.00	0	0	0.00	0	0
27	744	118.37	27002	5100	0.00	0	0	0.00	0	0
28	720	0.00	0	0	0.00	0	0	118.40	30783	5100
29	744	0.00	0	0	0.00	0	0	118.24	37268	5100
30	720	0.00	0	0	62.04	17703	2688	0.00	0	0
31	744	0.00	0	0	0.00	0	0	0.00	0	0
32	744	113.64	29327	5100	0.00	0	0	0.00	0	0
33	720	0.00	0	0	0.00	0	0	0.00	0	0
34	744	0.00	0	0	63.44	14561	2921	0.00	0	0
35	720	0.00	0	0	0.00	0	0	0.00	0	0
36	744	0.00	0	0	62.19	12168	2967	0.00	0	0
37	744	0.00	0	0	0.00	0	0	106.12	21699	5100
38	672	0.00	0	0	0.00	0	0	106.12	16857	5100
39	744	64.59	12765	3023	0.00	0	0	0.00	0	0
40	720	0.00	0	0	50.80	12968	2352	0.00	0	0
41	744	0.00	0	0	31.64	9945	1496	0.00	0	0
42	720	0.00	0	0	0.00	0	0	0.00	0	0
43	744	0.00	0	0	0.00	0	0	0.00	0	0
44	744	0.00	0	0	59.76	14918	3194	0.00	0	0
45	720	0.00	0	0	59.96	14411	3253	0.00	0	0
46	744	0.00	0	0	34.29	8226	1895	0.00	0	0
47	720	0.00	0	0	47.15	9352	2659	0.00	0	0
48	744	0.00	0	0	4.54	909	262	0.00	0	0
49	744	0.00	0	0	0.00	0	0	86.32	16425	5100
50	672	0.00	0	0	0.00	0	0	0.00	0	0
51	744	0.00	0	0	0.00	0	0	0.00	0	0
52	720	0.00	0	0	0.00	0	0	0.00	0	0
53	744	0.00	0	0	0.30	75	22	0.00	0	0
54	720	0.00	0	0	0.00	0	0	0.00	0	0
55	744	0.00	0	0	26.69	7470	2580	0.00	0	0
56	744	0.00	0	0	0.00	0	0	51.71	12550	5100
57	720	0.00	0	0	0.00	0	0	51.80	12177	5100
58	744	0.00	0	0	0.00	0	0	51.69	11311	5100
59	720	0.00	0	0	0.00	0	0	51.71	9538	5100
60	744	29.78	5764	2614	0.00	0	0	0.00	0	0
61	744	0.00	0	0	0.00	0	0	0.00	0	0
62	672	0.00	0	0	0.00	0	0	0.00	0	0
63	744	0.00	0	0	0.00	0	0	0.00	0	0
64	720	21.65	4453	1078	0.00	0	0	0.00	0	0
65	744	62.20	15993	2967	0.00	0	0	0.00	0	0
66	720	0.00	0	0	0.00	0	0	108.19	29377	5100
67	744	0.00	0	0	0.00	0	0	107.90	29540	5100
68	744	0.00	0	0	74.02	18855	3512	0.00	0	0
69	720	0.00	0	0	0.00	0	0	0.00	0	0
70	744	0.00	0	0	4.31	918	215	0.00	0	0
71	720	0.00	0	0	0.00	0	0	0.00	0	0
72	744	0.00	0	0	58.24	11408	3047	0.00	0	0
73	744	0.00	0	0	0.00	0	0	0.00	0	0
74	696	37.40	5655	1771	0.00	0	0	0.00	0	0
75	744	0.00	0	0	0.00	0	0	0.00	0	0
76	720	117.98	26279	5100	0.00	0	0	0.00	0	0
77	744	0.00	0	0	0.00	0	0	118.26	31364	5100
78	720	0.00	0	0	0.00	0	0	0.00	0	0
79	744	0.00	0	0	101.38	27565	4534	0.00	0	0
80	744	0.00	0	0	20.16	5168	911	0.00	0	0
81	720	0.00	0	0	3.45	808	160	0.00	0	0
82	744	0.00	0	0	63.77	13731	3020	0.00	0	0
83	720	0.00	0	0	44.73	8779	2140	0.00	0	0
84	744	0.00	0	0	65.31	12594	3160	0.00	0	0
85	744	0.00	0	0	0.00	0	0	0.00	0	0
86	672	0.00	0	0	0.00	0	0	0.00	0	0
87	744	0.00	0	0	0.00	0	0	118.39	22538	5100
88	720	0.00	0	0	0.00	0	0	118.41	23979	5100
89	744	0.00	0	0	82.14	21545	3546	0.00	0	0
90	720	0.00	0	0	28.84	7715	1262	0.00	0	0

Table H.C-3. NODOS Project, Power Operations, "Pump-Back," Alternative C (Cont.)

		NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period								
		Pump Back Operations, MW								
		With Pump cycle			With Gen Cycle			Pure Pump Back		
Plant Capacity, MW		123.00			123.00			123.00		
Plant Capacity, cfs		MaxQ=5100 cfs			MaxQ=5100 cfs			MaxQ=5100 cfs		
Month	# of Hours	On-Peak	On-Peak, MWh	PumpBack Q cfs	On-Peak	On-Peak, MWh	PumpBack Q cfs	On-Peak	On-Peak, MWh	PumpBack Q cfs
91	744	0.00	0	0	30.53	8348	1367	0.00	0	0
92	744	0.00	0	0	70.97	18295	3236	0.00	0	0
93	720	0.00	0	0	0.00	0	0	0.00	0	0
94	744	0.00	0	0	0.00	0	0	0.00	0	0
95	720	0.00	0	0	0.00	0	0	0.00	0	0
96	744	0.00	0	0	0.00	0	0	100.55	18718	5100
97	744	0.00	0	0	0.00	0	0	0.00	0	0
98	672	0.00	0	0	0.00	0	0	0.00	0	0
99	744	95.41	18075	4152	0.00	0	0	0.00	0	0
100	720	0.00	0	0	0.00	0	0	118.42	25780	5100
101	744	0.00	0	0	17.97	4706	779	0.00	0	0
102	720	0.00	0	0	0.00	0	0	0.00	0	0
103	744	0.00	0	0	91.90	26158	4262	0.00	0	0
104	744	0.00	0	0	0.00	0	0	0.00	0	0
105	720	0.00	0	0	22.98	5333	1135	0.00	0	0
106	744	0.00	0	0	0.00	0	0	101.46	22892	5100
107	720	0.00	0	0	0.00	0	0	101.47	20045	5100
108	744	0.00	0	0	0.00	0	0	0.00	0	0
109	744	0.00	0	0	0.00	0	0	0.00	0	0
110	672	118.01	19007	5100	0.00	0	0	0.00	0	0
111	744	0.00	0	0	0.00	0	0	118.43	21487	5100
112	720	0.00	0	0	0.00	0	0	118.45	24925	5100
113	744	0.00	0	0	0.00	0	0	118.54	29803	5100
114	720	0.00	0	0	0.00	0	0	118.54	31824	5100
115	744	0.00	0	0	89.03	25433	3845	0.00	0	0
116	744	0.00	0	0	81.13	20414	3535	0.00	0	0
117	720	0.00	0	0	81.30	19606	3577	0.00	0	0
118	744	111.02	25316	4826	0.00	0	0	0.00	0	0
119	720	0.00	0	0	96.02	18245	4133	0.00	0	0
120	744	0.00	0	0	0.00	0	0	118.39	23505	5100
121	744	0.00	0	0	0.00	0	0	118.48	22043	5100
122	696	0.00	0	0	0.00	0	0	118.48	18349	5100
123	744	0.00	0	0	0.00	0	0	118.48	22796	5100
124	720	0.00	0	0	0.00	0	0	118.49	25175	5100
125	744	0.00	0	0	0.00	0	0	118.43	30376	5100
126	720	0.00	0	0	0.00	0	0	118.26	31548	5100
127	744	0.00	0	0	0.00	0	0	118.32	33758	5100
128	744	0.00	0	0	87.19	22001	3772	0.00	0	0
129	720	118.12	28386	5100	0.00	0	0	0.00	0	0
130	744	0.00	0	0	81.45	17835	3510	0.00	0	0
131	720	118.46	23255	5100	0.00	0	0	0.00	0	0
132	744	0.00	0	0	0.00	0	0	118.53	23522	5100
133	744	0.00	0	0	0.00	0	0	118.53	22136	5100
134	672	0.00	0	0	0.00	0	0	118.53	18531	5100
135	744	0.00	0	0	0.00	0	0	118.53	22646	5100
136	720	0.00	0	0	76.49	15569	3294	0.00	0	0
137	744	0.00	0	0	82.15	20579	3567	0.00	0	0
138	720	0.00	0	0	0.00	0	0	0.00	0	0
139	744	0.00	0	0	0.00	0	0	0.00	0	0
140	744	0.00	0	0	0.00	0	0	0.00	0	0
141	720	0.00	0	0	0.00	0	0	0.00	0	0
142	744	0.00	0	0	0.00	0	0	0.00	0	0
143	720	0.00	0	0	0.00	0	0	0.00	0	0
144	744	0.00	0	0	0.00	0	0	0.00	0	0
145	744	0.00	0	0	0.00	0	0	111.76	20366	5100
146	672	93.63	14687	4185	0.00	0	0	0.00	0	0
147	744	116.47	21510	5100	0.00	0	0	0.00	0	0
148	720	0.00	0	0	0.00	0	0	0.00	0	0
149	744	0.00	0	0	10.02	2505	451	0.00	0	0
150	720	0.00	0	0	0.00	0	0	0.00	0	0
151	744	0.00	0	0	0.00	0	0	0.00	0	0
152	744	0.00	0	0	12.86	3447	671	0.00	0	0
153	720	0.00	0	0	15.76	3872	851	0.00	0	0
154	744	0.00	0	0	51.78	11447	2872	0.00	0	0
155	720	0.00	0	0	47.39	9286	2667	0.00	0	0
156	744	0.00	0	0	0.00	0	0	89.59	17327	5100
157	744	0.00	0	0	0.00	0	0	0.00	0	0
158	672	0.00	0	0	0.00	0	0	0.00	0	0
159	744	0.00	0	0	0.00	0	0	0.00	0	0
160	720	116.91	23091	5100	0.00	0	0	0.00	0	0
161	744	0.00	0	0	85.31	21551	3711	0.00	0	0
162	720	0.00	0	0	99.92	25898	4376	0.00	0	0
163	744	0.00	0	0	0.00	0	0	0.00	0	0
164	744	0.00	0	0	35.56	9452	1654	0.00	0	0
165	720	0.00	0	0	1.28	302	61	0.00	0	0
166	744	0.00	0	0	63.22	14701	3080	0.00	0	0
167	720	0.00	0	0	0.59	117	29	0.00	0	0
168	744	0.00	0	0	59.55	11609	3007	0.00	0	0
169	744	101.06	19436	5100	0.00	0	0	0.00	0	0
170	696	0.00	0	0	0.00	0	0	0.00	0	0
171	744	0.00	0	0	0.00	0	0	0.00	0	0
172	720	0.00	0	0	0.21	43	9	0.00	0	0
173	744	0.00	0	0	20.02	5019	899	0.00	0	0
174	720	0.00	0	0	95.12	24662	4341	0.00	0	0
175	744	0.00	0	0	0.00	0	0	0.00	0	0
176	744	0.00	0	0	13.74	3542	662	0.00	0	0
177	720	0.00	0	0	15.01	3723	745	0.00	0	0
178	744	0.00	0	0	6.52	1525	333	0.00	0	0
179	720	0.00	0	0	0.00	0	0	0.00	0	0
180	744	0.00	0	0	52.33	10708	2818	0.00	0	0

Table H.C-3. NODOS Project, Power Operations, "Pump-Back," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period										
		Pump Back Operations, MW								
		With Pump cycle			With Gen Cycle			Pure Pump Back		
Plant Capacity, MW		123.00			123.00			123.00		
Plant Capacity, cfs		MaxQ=5100 cfs			MaxQ=5100 cfs			MaxQ=5100 cfs		
Month	# of Hours	On-Peak	On-Peak, MWh	PumpBack Q cfs	On-Peak	On-Peak, MWh	PumpBack Q cfs	On-Peak	On-Peak, MWh	PumpBack Q cfs
181	744	0.00	0	0	0.00	0	0	0.00	0	0
182	672	0.00	0	0	0.00	0	0	101.85	16660	5100
183	744	0.00	0	0	0.00	0	0	0.00	0	0
184	720	0.00	0	0	0.00	0	0	0.00	0	0
185	744	0.00	0	0	0.00	0	0	0.00	0	0
186	720	0.00	0	0	0.00	0	0	0.00	0	0
187	744	0.00	0	0	17.15	4852	1038	0.00	0	0
188	744	0.00	0	0	12.02	3094	764	0.00	0	0
189	720	0.00	0	0	10.65	2625	715	0.00	0	0
190	744	0.00	0	0	6.26	1442	447	0.00	0	0
191	720	0.00	0	0	38.14	7357	2863	0.00	0	0
192	744	0.00	0	0	42.50	8628	3272	0.00	0	0
193	744	0.00	0	0	0.00	0	0	65.02	12235	5100
194	672	0.00	0	0	0.00	0	0	0.00	0	0
195	744	0.00	0	0	0.00	0	0	0.00	0	0
196	720	79.25	15231	5100	0.00	0	0	0.00	0	0
197	744	0.00	0	0	0.00	0	0	0.00	0	0
198	720	0.00	0	0	13.25	3567	945	0.00	0	0
199	744	0.00	0	0	15.15	4297	1166	0.00	0	0
200	744	0.00	0	0	10.82	2797	916	0.00	0	0
201	720	0.00	0	0	36.78	9188	3400	0.00	0	0
202	744	0.00	0	0	33.21	7445	3238	0.00	0	0
203	720	0.00	0	0	0.00	0	0	51.30	10368	5100
204	744	0.00	0	0	0.00	0	0	51.40	10365	5100
205	744	17.27	3270	1464	0.00	0	0	0.00	0	0
206	672	0.00	0	0	32.27	5549	2516	0.00	0	0
207	744	0.00	0	0	0.00	0	0	63.68	11979	5100
208	720	0.00	0	0	0.00	0	0	0.00	0	0
209	744	0.00	0	0	37.06	9412	3417	0.00	0	0
210	720	0.00	0	0	0.00	0	0	53.44	14280	5100
211	744	0.00	0	0	44.83	12279	4353	0.00	0	0
212	744	0.00	0	0	0.00	0	0	52.33	14072	5100
213	720	0.00	0	0	0.00	0	0	53.12	13251	5100
214	744	0.00	0	0	41.90	9398	4081	0.00	0	0
215	720	0.00	0	0	0.00	0	0	51.31	10505	5100
216	744	0.00	0	0	0.00	0	0	51.40	9908	5100
217	744	0.00	0	0	0.00	0	0	51.47	10392	5100
218	696	0.00	0	0	0.00	0	0	51.47	8596	5100
219	744	0.00	0	0	0.00	0	0	0.00	0	0
220	720	0.00	0	0	0.00	0	0	74.29	13652	5100
221	744	0.00	0	0	0.00	0	0	74.22	18465	5100
222	720	0.00	0	0	0.00	0	0	74.05	19938	5100
223	744	0.00	0	0	0.00	0	0	73.82	20281	5100
224	744	0.00	0	0	19.31	5244	1374	0.00	0	0
225	720	0.00	0	0	42.18	10205	3163	0.00	0	0
226	744	0.00	0	0	5.72	1319	452	0.00	0	0
227	720	0.00	0	0	0.00	0	0	0.00	0	0
228	744	0.00	0	0	31.12	6263	2968	0.00	0	0
229	744	0.00	0	0	0.00	0	0	51.68	10410	5100
230	672	25.24	4430	2178	0.00	0	0	0.00	0	0
231	744	0.00	0	0	0.00	0	0	0.00	0	0
232	720	0.00	0	0	43.48	8496	2836	0.00	0	0
233	744	0.00	0	0	23.14	5827	1561	0.00	0	0
234	720	0.00	0	0	0.00	0	0	73.15	18731	5100
235	744	0.00	0	0	0.00	0	0	72.86	20686	5100
236	744	0.00	0	0	15.54	4163	1122	0.00	0	0
237	720	0.00	0	0	7.19	1715	560	0.00	0	0
238	744	0.00	0	0	4.08	937	350	0.00	0	0
239	720	0.00	0	0	25.75	5282	2430	0.00	0	0
240	744	54.87	10762	5100	0.00	0	0	0.00	0	0
241	744	18.22	3630	1457	0.00	0	0	0.00	0	0
242	672	9.33	1571	641	0.00	0	0	0.00	0	0
243	744	0.00	0	0	0.00	0	0	0.00	0	0
244	720	61.66	12334	3363	0.00	0	0	0.00	0	0
245	744	42.02	10327	2171	0.00	0	0	0.00	0	0
246	720	0.00	0	0	0.00	0	0	0.00	0	0
247	744	0.00	0	0	0.00	0	0	106.74	30403	5100
248	744	0.00	0	0	76.89	19906	3690	0.00	0	0
249	720	0.00	0	0	70.51	17567	3419	0.00	0	0
250	744	0.00	0	0	14.12	3246	695	0.00	0	0
251	720	0.00	0	0	0.29	57	15	0.00	0	0
252	744	100.32	20345	5100	0.00	0	0	0.00	0	0
253	744	0.00	0	0	0.00	0	0	100.75	20962	5100
254	672	0.00	0	0	0.00	0	0	0.00	0	0
255	744	0.00	0	0	70.43	13562	3317	0.00	0	0
256	720	0.00	0	0	0.00	0	0	107.50	21604	5100
257	744	0.00	0	0	0.00	0	0	107.39	26099	5100
258	720	0.00	0	0	0.00	0	0	0.00	0	0
259	744	0.00	0	0	0.00	0	0	0.00	0	0
260	744	0.00	0	0	0.00	0	0	0.00	0	0
261	720	0.00	0	0	16.08	4036	902	0.00	0	0
262	744	0.00	0	0	5.21	1175	303	0.00	0	0
263	720	0.00	0	0	37.77	7731	2273	0.00	0	0
264	744	0.00	0	0	0.00	0	0	83.46	17150	5100
265	744	0.00	0	0	0.00	0	0	0.00	0	0
266	696	0.00	0	0	0.00	0	0	0.00	0	0
267	744	0.00	0	0	0.00	0	0	0.00	0	0
268	720	74.13	14680	3311	0.00	0	0	0.00	0	0
269	744	117.66	27733	5100	0.00	0	0	0.00	0	0
270	720	0.00	0	0	0.00	0	0	118.49	31685	5100

Table H.C-3. NODOS Project, Power Operations, "Pump-Back," Alternative C (Cont.)

NODOS Project- Alternative C -CALSIM Model Run-Median Deliveries, 30-year Planning Period										
		Pump Back Operations, MW								
		With Pump cycle			With Gen Cycle			Pure Pump Back		
Plant Capacity, MW		123.00			123.00			123.00		
Plant Capacity, cfs		MaxQ=5100 cfs			MaxQ=5100 cfs			MaxQ=5100 cfs		
Month	# of Hours	On-Peak	On-Peak, MWh	PumpBack Q cfs	On-Peak	On-Peak, MWh	PumpBack Q cfs	On-Peak	On-Peak, MWh	PumpBack Q cfs
271	744	118.69	32591	5100	0.00	0	0	0.00	0	0
272	744	0.00	0	0	0.00	0	0	118.67	32172	5100
273	720	0.00	0	0	78.95	19656	3401	0.00	0	0
274	744	0.00	0	0	0.00	0	0	0.00	0	0
275	720	0.00	0	0	0.00	0	0	0.00	0	0
276	744	0.00	0	0	0.00	0	0	0.00	0	0
277	744	0.00	0	0	0.00	0	0	118.62	23092	5100
278	672	0.00	0	0	0.00	0	0	118.62	20383	5100
279	744	0.00	0	0	0.00	0	0	118.62	22845	5100
280	720	0.00	0	0	0.00	0	0	118.63	22549	5100
281	744	0.00	0	0	0.00	0	0	118.56	29457	5100
282	720	0.00	0	0	0.00	0	0	118.38	31368	5100
283	744	0.00	0	0	2.36	646	103	0.00	0	0
284	744	0.00	0	0	73.26	19810	3268	0.00	0	0
285	720	0.00	0	0	0.00	0	0	0.00	0	0
286	744	0.00	0	0	0.00	0	0	0.00	0	0
287	720	0.00	0	0	0.00	0	0	0.00	0	0
288	744	0.00	0	0	0.00	0	0	0.00	0	0
289	744	18.69	3804	815	0.00	0	0	0.00	0	0
290	672	0.00	0	0	73.68	12754	3170	0.00	0	0
291	744	118.60	23012	5100	0.00	0	0	0.00	0	0
292	720	0.00	0	0	0.00	0	0	118.64	22677	5100
293	744	0.00	0	0	79.21	19725	3412	0.00	0	0
294	720	0.00	0	0	0.00	0	0	0.00	0	0
295	744	0.00	0	0	0.00	0	0	0.00	0	0
296	744	0.00	0	0	36.44	9866	1727	0.00	0	0
297	720	0.00	0	0	0.00	0	0	0.00	0	0
298	744	0.00	0	0	0.00	0	0	0.00	0	0
299	720	0.00	0	0	0.00	0	0	0.00	0	0
300	744	0.00	0	0	0.00	0	0	0.00	0	0
301	744	0.00	0	0	0.00	0	0	0.00	0	0
302	672	0.00	0	0	0.00	0	0	0.00	0	0
303	744	118.56	22303	5100	0.00	0	0	0.00	0	0
304	720	0.00	0	0	0.00	0	0	118.59	23686	5100
305	744	0.00	0	0	0.00	0	0	118.51	29583	5100
306	720	118.67	30302	5100	0.00	0	0	0.00	0	0
307	744	0.00	0	0	0.00	0	0	118.41	33734	5100
308	744	0.00	0	0	87.49	22840	3782	0.00	0	0
309	720	118.20	29401	5100	0.00	0	0	0.00	0	0
310	744	0.00	0	0	78.78	18303	3394	0.00	0	0
311	720	118.28	23845	5100	0.00	0	0	0.00	0	0
312	744	0.00	0	0	0.00	0	0	118.56	24576	5100
313	744	0.00	0	0	0.00	0	0	118.51	24408	5100
314	696	0.00	0	0	0.00	0	0	118.51	20799	5100
315	744	0.00	0	0	0.00	0	0	118.51	22455	5100
316	720	0.00	0	0	0.00	0	0	118.63	23824	5100
317	744	0.00	0	0	0.00	0	0	118.54	28545	5100
318	720	0.00	0	0	95.21	25295	4101	0.00	0	0
319	744	0.00	0	0	0.00	0	0	0.00	0	0
320	744	0.00	0	0	65.03	16998	2975	0.00	0	0
321	720	0.00	0	0	0.00	0	0	0.00	0	0
322	744	0.00	0	0	0.00	0	0	0.00	0	0
323	720	0.00	0	0	0.00	0	0	0.00	0	0
324	744	0.00	0	0	0.00	0	0	100.35	20908	5100
325	744	0.00	0	0	0.00	0	0	0.00	0	0
326	672	0.00	0	0	0.00	0	0	0.00	0	0
327	744	117.26	23227	5100	0.00	0	0	0.00	0	0
328	720	0.00	0	0	0.00	0	0	118.71	23956	5100
329	744	0.00	0	0	0.00	0	0	118.60	28621	5100
330	720	0.00	0	0	2.87	764	125	0.00	0	0
331	744	0.00	0	0	0.00	0	0	0.00	0	0
332	744	0.00	0	0	0.00	0	0	0.00	0	0
333	720	0.00	0	0	64.27	16047	3160	0.00	0	0
334	744	0.00	0	0	5.44	1226	272	0.00	0	0
335	720	0.00	0	0	2.49	526	128	0.00	0	0
336	744	0.00	0	0	60.40	12644	3179	0.00	0	0
337	744	27.64	5544	1408	0.00	0	0	0.00	0	0
338	672	0.00	0	0	0.00	0	0	0.00	0	0
339	744	0.00	0	0	0.00	0	0	0.00	0	0
340	720	0.00	0	0	47.04	9537	2031	0.00	0	0
341	744	0.00	0	0	18.39	4448	808	0.00	0	0
342	720	0.00	0	0	0.00	0	0	114.08	30382	5100
343	744	0.00	0	0	0.00	0	0	113.78	31287	5100
344	744	0.00	0	0	0.00	0	0	0.00	0	0
345	720	0.00	0	0	0.00	0	0	0.00	0	0
346	744	0.00	0	0	0.00	0	0	0.00	0	0
347	720	0.00	0	0	59.57	12654	3004	0.00	0	0
348	744	0.00	0	0	65.97	13876	3360	0.00	0	0
349	744	0.00	0	0	0.00	0	0	0.00	0	0
350	672	107.78	20088	5100	0.00	0	0	0.00	0	0
351	744	65.83	13198	3012	0.00	0	0	0.00	0	0
352	720	0.00	0	0	0.00	0	0	0.00	0	0
353	744	0.00	0	0	0.00	0	0	0.00	0	0
354	720	0.00	0	0	0.00	0	0	0.00	0	0
355	744	0.00	0	0	0.00	0	0	0.00	0	0
356	744	0.00	0	0	0.00	0	0	0.00	0	0
357	720	0.00	0	0	0.00	0	0	0.00	0	0
358	744	0.00	0	0	0.00	0	0	0.00	0	0
359	720	0.00	0	0	0.00	0	0	0.00	0	0
360	744	0.00	0	0	0.00	0	0	0.00	0	0