Susitna-Watana Hydroelectric Project Document
ARLIS Uniform Cover Page

Title: Susitna Hydroelectric Project conceptual alternatives design report	**SuWa 198**
Author(s) – Personal:	
Author(s) – Corporate: Prepared by HDR Alaska, Inc.	
AEA-identified category, if specified:	
AEA-identified series, if specified:	
Series (ARLIS-assigned report number): Susitna-Watana Hydroelectric Project document number 198	**Existing numbers on document:**
Published by: [Anchorage, Alaska : Alaska Energy Authority, 209]	**Date published:** November 23, 2009
Published for: Prepared for Alaska Energy Authority	**Date or date range of report:**
Volume and/or Part numbers:	**Final or Draft status, as indicated:** Final
Document type:	**Pagination:** [264] p.
Related work(s):	**Pages added/changed by ARLIS:**
Notes:	

All reports in the Susitna-Watana Hydroelectric Project Document series include an ARLIS-produced cover page and an ARLIS-assigned number for uniformity and citability. All reports are posted online at http://www.arlis.org/resources/susitna-watana/

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SUSITNA-WATANA HYDRO

Susitna Hydroelectric Project

Conceptual Alternatives Design Report

Final Draft

Prepared for:
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November 23, 2009

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1 Executive Summary

A hydroelectric project on the Susitna River has been studied for more than 50 years and is again being considered by the State of Alaska as a long term source of energy. In the 1980s, the project was studied extensively by the Alaska Power Authority (APA) and a license application was submitted to the Federal Energy Regulatory Commission (FERC). Developing a workable financing plan proved difficult for a project of this scale. When this existing difficulty was combined with the relatively low cost of gas-fired electricity in the Railbelt and the declining price of oil throughout the 1980s, and its resulting impacts upon the State budget, the APA terminated the project in March 1986.

In 2008, the Alaska State Legislature authorized the Alaska Energy Authority (AEA) to perform an update of the project. That authorization also included a Railbelt Integrated Resource Plan (RIRP) to evaluate the ability of this project and other sources of energy to meet the long term energy demand for the Railbelt region of Alaska. Renewable hydroelectric power is of particular interest to the railbelt because of its potential to provide stable power costs for the region. Of all the renewable resources in the railbelt region, the Susitna projects are the most advanced and best understood.

HDR was contracted by AEA to update the cost estimate, energy estimates and the project development schedule for a Susitna River hydroelectric project. This report summarizes the results of that study. The initial alternatives reviewed were based upon the 1983 FERC license application and subsequent 1985 amendment which presented several project alternatives:

- **Watana.** This alternative consists of the construction of a large storage reservoir on the Susitna River at the Watana site with an 885-foot-high rock fill dam and a six-unit powerhouse with a total installed capacity of 1,200 megawatts (MW).
- **Low Watana Expandable.** This alternative consists of the Watana dam constructed to a lower height of 700 feet and a four-unit powerhouse with a total installed capacity of 600 MW. This alternative contains provisions that would allow for future raising of the dam and expansion of the powerhouse.
- **Devil Canyon.** This alternative consists of the construction of a 646-foot-high concrete dam at the Devil Canyon site with a four-unit powerhouse with a total installed capacity of 680 MW.
- **Watana/Devil Canyon.** This alternative consists of the full-height Watana development and the Devil Canyon development as presented in the 1983 FERC license application. The two dams and powerhouses would be constructed sequentially without delays. The combined Watana/Devil Canyon development would have a total installed capacity of 1,880 MW.
- **Staged Watana/Devil Canyon.** This alternative consists of the Watana development constructed in stages and the Devil Canyon development as presented in the 1985 FERC amendment. In stage one the Watana dam would be constructed to the lower height and the Watana powerhouse would only have 4 out of the 6 turbine generators installed, but would be constructed to the full sized powerhouse. In stage two the Devil Canyon dam and powerhouse would be constructed. In stage three the Watana dam would be raised to

its full height, the existing turbines upgraded for the higher head, and the remaining 2 units installed. At completion, the project would have a total installed capacity of 1,880 MW.

As the RIRP process defined the future railbelt power requirement it became evident that lower cost hydroelectric project alternatives, that were a closer fit to the energy needs of the railbelt, should be sought. As such, the following single dam configurations were also evaluated:

- **Low Watana Non-Expandable.** This alternative consists of the Watana dam constructed to a height of 700 feet, along with a powerhouse containing 4 turbines with a total installed capacity of 600 MW. This alternative has no provisions for future expansion.
- **Lower Low Watana.** This alternative consists of the Watana dam constructed to a height of 650 feet along with a powerhouse containing 3 turbines with a total installed capacity of 390 MW. This alternative has no provisions for future expansion.
- **High Devil Canyon.** This alternative consists of a roller-compacted concrete (RCC) dam constructed to a height of 810 feet, along with a powerhouse containing 4 turbines with a total installed capacity of 800 MW.
- **Watana RCC.** This alternative consists of a RCC Watana dam constructed to a height of 885 feet, along with a powerhouse containing 6 turbines with a total installed capacity of 1,200 megawatts (MW).

The results of this study are summarized in Table 1.

Table 1 - Susitna Summary

Alternative	Dam Type	Dam Height (feet)	Ultimate Capacity (MW)	Firm Capacity, 98% (MW)	Construction Cost ($ Billion)	Energy (GWh/yr)	Schedule (years from start of licensing)
Lower Low Watana	Rockfill	650	390	170	$4.1	2,100	13-14
Low Watana Non-expandable	Rockfill	700	600	245	$4.5	2,600	14-15
Low Watana Expandable	Rockfill	700	600	245	$4.9	2,600	14-15
Watana	Rockfill	885	1,200	380	$6.4	3,600	15-16
Watana RCC	RCC	885	1,200	380	$6.6	3,600	15-16
Devil Canyon	Concrete Arch	646	680	75	$3.6	2,700	14-15
High Devil Canyon	RCC	810	800	345	$5.4	3,900	13-14
Watana/Devil Canyon	Rockfill/Concrete Arch	885/646	1,880	710	$9.6	7,200	15-20
Staged Watana/Devil Canyon	Rockfill/Concrete Arch	885/646	1,880	710	$10.0	7,200	15-24

In all cases, the ability to store water increases the firm capacity over the winter. Projects developed with dams in series allow the water to be used twice. However, because of their locations on the Susitna River, not all projects can be combined. The Devil Canyon site precludes development of the High Devil Canyon site but works well with Watana. The High Devil Canyon site precludes development of Watana but could potentially be paired with other sites located further upstream.

Development of any of the alternatives for the Susitna River will require careful consideration of many factors. Environmental issues, climate change and sedimentation are discussed in this report and the risk associated with these issues is considered manageable. An updated evaluation of seismicity has been done by others and this risk is also considered manageable.

Hydroelectric power has many economic and environmental benefits including long-term rate stabilization. Because the cost of the water (fuel) is essentially free and maintenance costs are minimal, the cost per kilowatt hour is driven largely by the project finance terms and is not subject to fluctuations in fuel cost.

2 Background

The Susitna River has its headwaters in the mountains of the Alaska Range about 90 miles south of Fairbanks. It flows generally southwards for 317 miles before discharging into Cook Inlet just west of Anchorage. Contained entirely within the south central Railbelt region, the Susitna River is situated between the two largest Alaska population centers of Anchorage and Fairbanks.

The Bureau of Reclamation first studied the Susitna River's hydroelectric potential in the early 1950s, with a subsequent review by Corps of Engineers in the 1970s. In 1980, the Alaska Power Authority (APA; now the Alaska Energy Authority) commissioned a comprehensive analysis to determine whether hydroelectric development on the Susitna River was viable. Based on those studies, the APA submitted a license application to the Federal Energy Regulatory Commission (FERC) in 1983 for the Watana/Devil Canyon project on the Susitna River. The license application was amended in 1985 for the construction of the Staged Watana/Devil Canyon project at an estimated cost of $5.4 billion (1985 dollars).

Developing a workable financing plan proved difficult for a project of this scale. When this existing difficulty was combined with the relatively low cost of gas-fired electricity in the Railbelt and the declining price of oil throughout the 1980s, and its resulting impacts upon the State budget, the APA terminated the project in March 1986.

At that point, the State of Alaska had appropriated approximately $227 million to the project from FY79-FY86, of which the project had expended $145 million to fund extensive field work, biological studies, and activities to support the FERC license application. Though the APA concluded that project impacts were manageable, the license application was withdrawn and the project data and reports were archived to be available for reconsideration sometime in the future.

In 2008, the Alaska State Legislature, in the FY 2009 capital budget, authorized the AEA to reevaluate the Susitna Hydro Project as it was conceived in 1985. The authorization also included funding a Railbelt Integrated Resource Plan (RIRP) to evaluate various sources of electrical power to satisfy the long term energy needs for the Railbelt portion of Alaska. A Susitna River hydroelectric project could play a significant role in meeting these needs.

2.1 Project Scope

The scope of this study was to collect and review pertinent information from the original studies and license application from the 1980's and re-estimate the project energy, costs and development schedule.

The initial 1982 FERC license application and subsequent 1985 amendment analyzed several project alternatives:

- **Watana.** This alternative consists of the construction of a large storage reservoir on the Susitna River at the Watana site with an 885-foot-high rock fill dam and a six-unit powerhouse with a total installed capacity of 1,200 megawatts (MW).
- **Low Watana Expandable.** This alternative consists of the Watana dam constructed to a lower height of 700 feet and a four-unit powerhouse with a total installed capacity of 600 MW. This alternative contains provisions that would allow for future raising of the dam and expansion of the powerhouse.

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Preliminary energy, cost, and schedule estimates for the analyzed alternatives are described in the following sections.

3 Preliminary Energy Estimate

3.1 Hydrologic Analysis

At the time the original study was issued in 1983 the hydrologic record contained data from 1950 to 1981. To develop an updated energy estimate for the Susitna hydroelectric project alternatives, a synthesized hydroelectric record for each site was created by a drainage area proration of daily flow data from United States Geological Survey (USGS) gage 1529000 at

Gold Creek. USGS gage 1529000 has a period of record from water year 1950-1996 and 2002-2008.

The hydrology of the upper Susitna Basin is dominated by melt water from snow and glaciers in the spring and summer, and substantial freezing during the winter months. As a result, a majority of the flow occurs between mid-April and mid-October. The following figure shows the average monthly flow at the Watana dam site for each year of record.

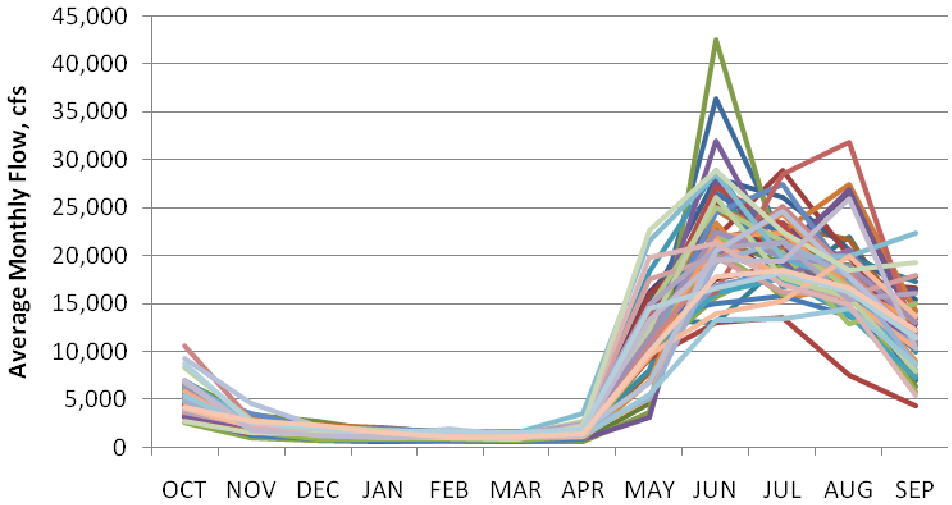

Figure 1 - Susitna River at Watana Hydrologic Variation

The manner in which precipitation and runoff might be affected by the impacts of either natural variability and/or potential climate change is discussed at the end of this report.

3.2 Evaluation of Firm Winter Capacities and Average Annual Energy

The amount of energy that can be produced from hydroelectric projects is a function of the amount of available water and in the case of storage projects, how the available water can be regulated (systematically released). For the RIRP evaluation process, in addition to the average annual energy, the firm capacity attainable during winter months is of particular importance. For hydroelectric projects, the firm capacity is almost always lower than the installed generation capacity for a project. For the purposes of this study work, firm capacity is defined as:

> "The amount of power the project can generate on a continuous basis from Nov. 1 through April 30 with 100% reliability".

The firm capacity is always driven by low periods in the hydrologic cycle. Since the hydrologic cycle varies, it is also desired to know at what level of reliability the project can generate at levels higher than the firm capacity. It should be noted that this is only one manner of regulation. The water can be regulated in a variety of different means in order to achieve other objectives, such as peaking, spinning reserve or backup capacity.

For this study, the average annual energy and winter plant capacities for the alternatives were estimated using a HDR proprietary energy modeling software tool customized for this particular

purpose (Computer Hydro-Electric Operations and Planning Software or (CHEOPS)). Major assumptions used in the modeling efforts are presented below.

3.3 Model Assumptions and Data Sources

- Inflow hydrology was based upon USGS gage #1529000 located at Gold Creek on the Susitna River and scaled by a drainage area correction factor representing each of the dam sites.
- Reservoir capacity and area curves for the Watana and Devil Canyon alternatives were based on information presented in the 1985 FERC application. For the High Devil Canyon project this data was derived from USGS topographical data.
- Tailwater curves for the Watana and Devil Canyon projects were obtained from the 1985 FERC application and estimated for High Devil Canyon.
- Operating reservoir levels were obtained from the 1985 FERC application for the Watana, Low Watana and Devil Canyon projects, from the 1982 Acres feasibility study for the High Devil Canyon project, and estimated for the Lower Low Watana project.
- Environmental flow release constraints were as presented in the 1985 FERC application and scaled according to drainage areas for the various sites.
- Evaporation coefficients were obtained from the 1985 FERC application. Total reservoir evaporation was estimated in the 1985 FERC application to be between one (1) and three (3) inches per month in summer, with negligible evaporation during winter months.
- Equipment performance was based on vendor data obtained in 2008 specifically for the Watana and Devil Canyon projects and was assumed to be representative for the other projects.
- Headloss estimates were based on the water conveyance design from the 1985 FERC application for the Watana and Devil Canyon alternatives and the 1982 Acres feasibility study for the High Devil Canyon alternative.
- The reservoir was assumed to start full at the beginning of the simulation and was allowed to fluctuate over the remaining period of the simulation.
- Generation from Nov. 1 to April 30, “winter,” was at a constant capacity level (“block loaded”).
- Generation from May 1 to Oct. 31, “summer,” was to maximize energy with the objective of the reservoir being full on Nov. 1.
- Rule curves for summer target reservoir elevations were developed for each alternative using a mass balance approach. The ratio of the average monthly inflow volume to the average annual inflow volume during each of the reservoir filling months were used to set target elevations for the reservoir.
- Energy losses of 1.5 percent for un-scheduled outages and 2 percent for transformer losses were applied to the total generation.
- Active storage remained constant over the simulation period. Dead storage in the reservoirs was assumed to be sufficient to contain sedimentation loads.

- No ramping rate restrictions were imposed on either reservoir drawdown or downstream flow.

To determine the firm capacity for the combined Watana and Devil Canyon projects, the regulated flow from Watana was assumed to pass unregulated through Devil Canyon with the Devil Canyon pool at maximum operating level.

Key input parameters related to energy generation are shown in Table 2 below.

Table 2 - Summary of Susitna Project Alternatives

	Lower Low Watana	Low Watana (Both Alternatives)	Watana (Both Alternatives)	Devil Canyon	High Devil Canyon
Dam Type	Rockfill	Rockfill	Rockfill or RCC	Concrete Arch	RCC
Dam Height (ft)	650	700	885	646	810
Gross Head (ft)	495	557	734	605	729
Net Head (Max Flow) (ft)	481	543	729	598	707
Maximum Plant Flow (cfs)	10,700	14,500	22,300	14,000	14,800
Number of Units	3	4	6	4	4
Nameplate Capacity (MW)	390	600	1200	680	800
Maximum Pool Elevation (ft)	1951	2014	2193	1456	1751
Minimum Pool Elevation (ft)	1850	1850	2065	1405	1605
Tailwater Elevation (Max Flow) (ft)	1456	1457	1459	851	1022
Usable Storage (acre-ft)	1,536,200	2,704,800	3,888,50	310,000	2,254,700

3.4 Model Operation

For each alternative, 54 years of daily inflow data was used to determine each alternative's ability to meet a range of winter energy production targets and maximize summer generation. For each day from November through April the flow through the powerhouse was limited to the amount necessary to satisfy a prescribed capacity demand given the available head, environmental flow constraints, and reservoir operational restrictions. During the months of May through September energy production each day was maximized if the reservoir elevation was above the target rule curve. If the reservoir elevation was below the target rule curve then generation was limited to the amount that would allow the downstream environmental flow constraints to be met. The simulation was repeated at various increasing winter load demands until the maximum firm capacity was determined.

To better quantify the effect of storage and extreme low water years on the firm winter capacity, winter load levels in excess of the firm capacity were also evaluated. The results of this analysis

are expressed as a capacity at a given percent exceedance level. For example, a project might have a firm capacity of 250 MW at a 100% exceedance level and a firm capacity of 300 MW at a 98% exceedance level. This would mean that the project could provide 250 MW 100% of the time in the winter over the simulation period or 300 MW 98% of the time over the winter. The large change in firm capacity between the 100% exceedance level and the 98% exceedance level for all alternatives is primarily due to a single low water year in 1970.

The resulting firm capacities and average annual energy production estimates are presented in Figure 2 and partially summarized in Table 3. Detailed input assumptions and results of these energy analyses are provided in Appendix A of this report. The average annual energy production was relatively constant over the range of winter power demand levels that were modeled.

Table 3 - Firm Capacity and Energy Estimates

Alternative	Firm Winter Capacity (MW)	98% Winter Capacity (MW)	Average Annual Energy Production (GWh)
Lower Low Watana	100	170	2,100
Low Watana (both alternatives) *	150	245	2,600
Watana (both alternatives) **	250	380	3,600
Watana/Devil Canyon ***	470	710	7,200
Devil Canyon	50	75	2,700
High Devil Canyon	250	345	3,900

* Low Watana Expandable and Low Watana Non-Expandable have the same energy characteristics.
** Watana Rockfill and Watana RCC have the same energy characteristics.
*** Watana/Devil Canyon and the Staged Watana/Devil Canyon have similar energy characteristics.

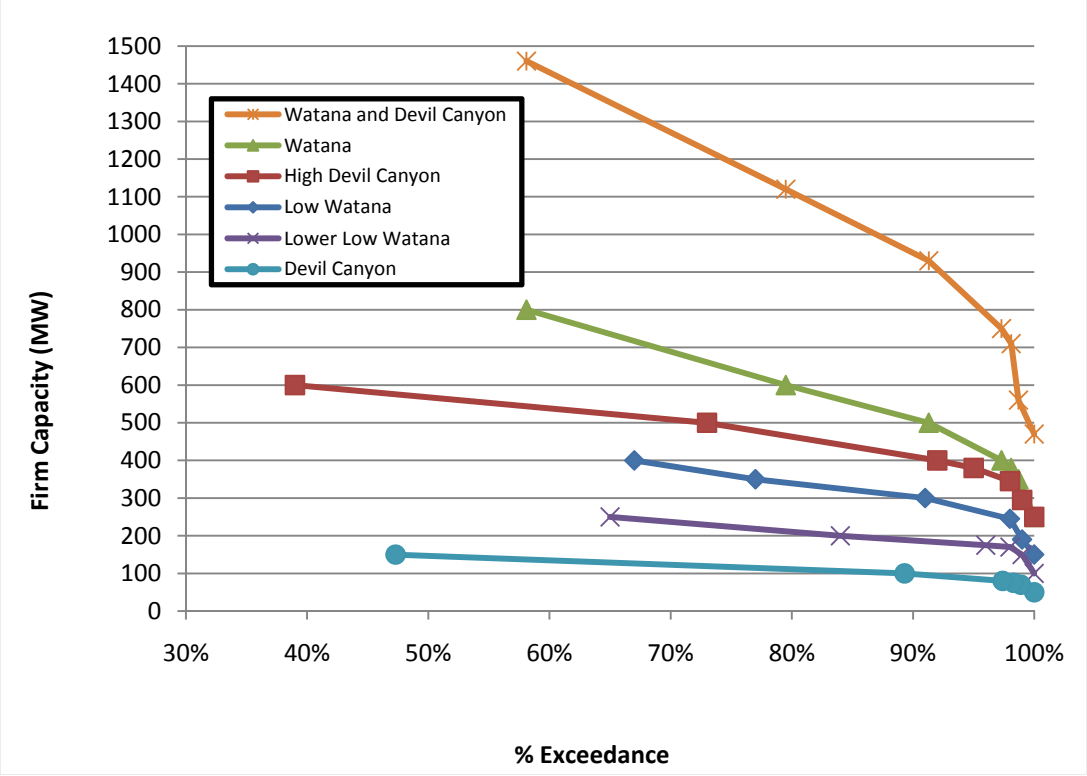

Figure 2 - Firm Capacity

4 Estimates of Probable Project Development Costs

4.1 Original Cost Estimate

In 1982 the cost for developing the complete full Watana/Devil Canyon project was estimated to be $5.0 billion (1982 dollars). In 1985 the cost for developing the staged Watana/Devil Canyon project was $5.4 billion (1985 dollars).

The Devil Canyon and High Devil Canyon alternatives were as envisioned in the 1980's. The four rockfill Watana Dam configurations considered in this evaluation are depicted in Figure 3 below.

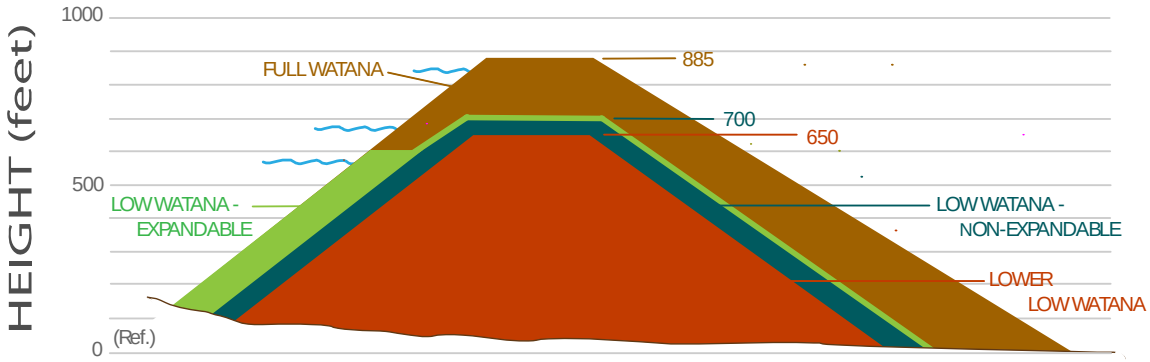

Figure 3 - Watana Dam Configurations

The estimates for the Watana, Low Watana-Expandable, Devil Canyon and Staged Watana-Devil Canyon alternatives were developed in depth in a March 2009 Interim report and were revised to reflect changes primarily in transmission, access and camp costs. Using this information as a base, new estimates were made for the development costs of the Low Watana Non-Expandable and of the Lower Low Watana alternatives. Cost estimates of $5.4 billion for the High Devil Canyon RCC and $6.6 billion for the Watana RCC alternatives were provided by a separate contractor using similar assumptions and are presented here for completeness of information. The following discussion details the basis for the cost estimates for the Watana embankment projects, the assumptions that were used in creating those estimates, and provides a summary of the projected construction costs.

4.2 Expandability

The Low Watana alternative, as proposed in previous studies, included provisions for eventual expansion of the dam from 700 feet to a height of approximately 885 feet and an increase in powerhouse capacity from 800 MW to 1200 MW. The most notable of these provisions are the design of the dam cross section and construction of the powerhouse and water conduits to their ultimate capacity. The two non-expandable alternatives contain no provisions for future expansion.

For the Low Watana Expandable alternative the dam cross-section is expanded on the upstream side to provide the opportunity to later raise the dam. This results in additional fill material due to the wider base. The powerhouse, powerhouse equipment, and water conveyance scheme would be built to house six units, but only four turbines would be initially installed.

For the Low Watana Non-expandable alternative the cross-section is narrower and does not accommodate expansion of the dam at a later time. Similarly the powerhouse and water conduit features are sized for only four turbine/generator units instead of six.

4.3 Quantities

Quantities for the construction cost estimates were based upon detailed estimates developed as part of the 1982 Acres feasibility study for the full sized Watana project and the Devil Canyon project. To estimate the quantities of the smaller Watana alternatives, the full sized Watana quantities were scaled based on the size of the development. As part of a separate report, quantities were developed for the High Devil Canyon alternative based upon a new conceptual design using RCC construction.

Table 4 summarizes the embankment fill volumes that were used for the cost estimates. The dam heights and fill volumes of the Watana and Low Watana Expandable configurations were adopted directly from the 1985 FERC application. The embankment volumes for the Lower Low Watana and Low Watana Non-Expandable alternatives were estimated assuming a 2:1 side slope on the downstream portion of the dam and a 2.4:1 side slope on the upstream portion of the dam as were assumed for the other alternatives. Volume changes were limited to the rock-fill and riprap portion of the dam only. The concrete volumes for the Devil Canyon, Watana RCC, and High Devil Canyon alternatives are shown for comparison.

Table 4 - Estimated Total Fill Volumes

Alternative	Type	Total Fill Volume(cy)
Watana	Rockfill	61,000,000
Low Watana Expandable	Rockfill	32,000,000
Low Watana Non-Expandable	Rockfill	22,000,000
Lower Low Watana	Rockfill	17,000,000
Devil Canyon	Concrete Arch	1,300,000
Watana*	RCC	15,000,000
High Devil Canyon*	RCC	11,600,000

* R&M, 2009.

The quantity estimates for the water conduit layouts and powerhouses for all alternatives were based on the 1985 layout as opposed to the 1983 layout. The 1983 arrangement used a separate penstock for each unit with a very long conveyance scheme. The 1985 arrangement employed a headrace for every two units bifurcating into dedicated penstocks. The total length of

conveyance was less than half that of the 1983 design. To maintain consistency with the energy model, and to further refine the cost estimates, the 1985 configuration was used for this study.

Table 5 summarizes the design features that were assumed in each estimate. The powerhouse and water conveyance systems for Watana and the Low Watana Expandable alternatives were designed to service six units as contemplated in 1983. However, the water conduit layout reflects the 1985 arrangement with three headraces bifurcated into six penstocks and discharged into two tailraces. Low Watana Non-Expandable was assumed to be built to accommodate a four-unit powerhouse with two headraces, four penstocks and a single tailrace. Lower Low Watana was designed for a three-unit powerhouse with one headrace, three penstocks, and one tailrace. The diameters of the water conduits were sized to be consistent with the 1985 design. The powerhouse structures were also scaled accordingly.

Table 5 - Watana Water Conduit and Powerhouse Size Parameters

Item	Lower Low Watana	Low Watana Non-Exandable	Low Watana Expandable	Watana
Number of Units	3	4	4	6
Unit Size (MW)	130	150	150	200
Plant Nameplate Capacity (MW)	390	600	600	1200
# of Headraces	1	2	3	3
Headrace Diameter (ft)	24	24	24	24
# of Penstocks	3	4	6	6
Concrete Lined Penstock Diameter (ft)	18	18	18	18
Steel Penstock Diameter (ft)	15	15	15	15
# of Tailrace Tunnels	1	1	2	2
Tailrace Diameter (ft)	34	34	34	34

4.4 Unit Costs

U.S. Cost, a company specializing in creating cost estimates for large capital infrastructure projects, developed unit prices for the materials detailed in the 1982 estimate in 2008 dollars. This cost data was used to develop the estimates presented in the Interim Report and the same pricing was used in this study. Lump sum items were inflated using a construction cost index.

For the water-to-wire turbine-generator equipment estimates, budget pricing for the Watana alternative was requested directly from manufacturers. The water-to-wire equipment includes turbines, generators, turbine shutoff valves, and other miscellaneous mechanical and electrical equipment, including installation costs. The equipment costs for other smaller alternatives were developed by scaling the Watana vendor quotes on a per kilowatt basis.

4.5 Indirect Costs

A contingency of 20 percent was added to the direct construction costs to reflect level of design and uncertainty in the project.

Project licensing, environmental studies and engineering design were estimated at 7 percent of direct construction costs. Construction management was estimated at 4 percent of the direct construction costs, and has been included as a separate line item.

4.6 Interest During Construction and Financing Costs

Costs associated with interest during construction and project financing are not included in the estimates.

4.7 Changes from 1983 Design

The camps, access roads and transmission, infrastructure assumptions used in the 1983 configuration have been modified as discussed below.

4.7.1 Camps

Reductions were made in the scale of the permanent and construction camps needed to accommodate the workers. These changes were made based on the fact that permanent town facilities were no longer necessary due to advances in remote project operation. It was also assumed that due to modern construction methods, the number of construction personnel could be reduced. It was assumed that 750 people would need to be housed for the Lower Low Watana arrangement, 825 people for Low Watana and 900 people for Watana. In 1983 it was originally assumed that housing would be provided for 3000 people plus families. Budget pricing for the construction camp was provided by vendors.

4.7.2 Access

For all the Watana alternatives, access is assumed to be via the Denali Highway from the north as shown in Figure 4. The route would include the upgrade of 21 miles of the Denali Highway to a construction grade road and the construction of approximately 40 miles of new road to the Watana site. The price per mile of new road has been assumed at $3M/mile which is the current budgetary estimate of the Alaska Department of Transportation and Public Facilities for the road to Bettles and Umiat from the Dalton Highway which is similar in nature to the road that would be required for a Susitna project. Upgrading of the Denali Highway has been assumed to be $1M/mile and local site roads have been estimated at $750k/mile.

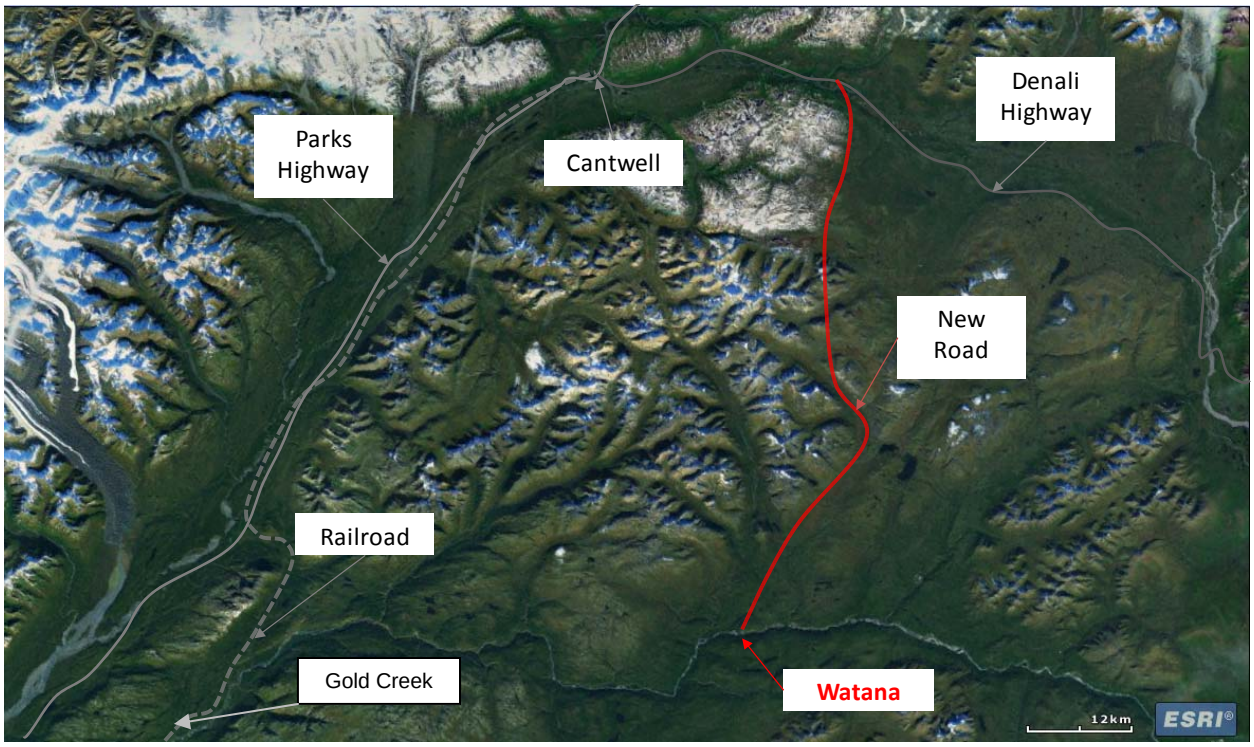

Figure 4 - Proposed Access Route

For the Devil Canyon and High Devil Canyon alternatives, rail access was assumed and will originate on the Parks Hwy near MP 156 and proceed upstream on the south side of the river.

4.7.3 Transmission

A separate study (EPS, 2009) has investigated the transmission lines and interconnection requirements for the entire Alaska railbelt region as part of the RIRP process and the results are incorporated here at the direction of the AEA. This study estimates that a transmission line from the project site to the substation at Gold Creek would cost approximately $4.5M/mile. Substation costs are estimated at $16M per location. No costs have been assumed to increase or modify the regional transmission grid beyond the Gold Creek substation.

4.8 Conclusions

The approach, methodology and assumptions previously described resulted in the estimated project costs detailed below in the summary table.

Table 6 - Alternate Project Configuration Cost Summary Table ($Millions)

FERC Line #	Line Item Name	Lower Low Watana	Low Watana Non-Expandable	Low Watana Expandable	Watana	Watana RCC*	Devil Canyon	High Devil Canyon*	Watana/ Devil Canyon	Staged Watana/ Devil Canyon
71A	Engineering, Env., and Regulatory (7%)	$ 213	$ 236	$ 259	$ 338	$342	$191	$281	$501	$528
330	Land and Land Rights	$ 121	$ 121	$ 121	$ 121	$121	$52	$121	$173	$173
331	Power Plant Structure Improvements	$ 93	$ 115	$ 159	$ 159	$159	$165	$159	$324	$325
332.1-.4	Reservoir, Dams and Tunnels	$ 1,415	$ 1,538	$ 1,718	$ 2,424	$2,307	$900	$1,803	$3,324	$3,485
332.5-.9	Waterways	$ 590	$ 590	$ 677	$ 677	$558	$415	$552	$1,093	$1,191
333	Waterwheels, Turbines and Generators	$ 213	$ 297	$ 297	$ 475	$487	$295	$487	$770	$834
334	Accessory Electrical Equipment	$ 29	$ 41	$ 41	$ 72	$57	$38	$57	$110	$119
335	Misc Power Plant Equipment	$ 17	$ 21	$ 32	$ 32	$32	$29	$32	$61	$61
336	Roads, Rails and Air Facilities	$ 232	$ 232	$ 232	$ 280	$584	$535	$490	$388	$394
350-390	Transmission Features	$ 177	$ 224	$ 224	$ 353	$322	$99	$119	$481	$481
399	Other Tangible Property	$ 12	$ 16	$ 16	$ 20	$12	$16	$12	$36	$42
63	Main Construction Camp	$ 150	$ 180	$ 180	$ 210	$244	$180	$189	$390	$440
71B	Construction Management, 4%	$ 122	$ 135	$ 148	$ 193	$195	$109	$161	$286	$302
Total Subtotal		$ 3,384	$ 3,746	$ 4,104	$ 5,354	$5,420	$3,024	$4,463	$7,937	$8,375
Total Contingency		$ 676	$ 749	$ 821	$ 1,071	$1,155	$605	$954	$1,587	$1,675
Total (Millions of Dollars, rounded)		$ 4,100	$ 4,500	$ 4,900	$6,400	$6,600	$3,600	$5,400	$9,600	$10,000

* R&M (2009)

5 Project Development Schedule

Updated schedules were developed for each of the project alternatives. These schedules extend from approval, through licensing, design, construction, and commissioning. The primary purpose of these schedules is to provide timelines for cash flow and estimated energy revenue to determine economic feasibility. These schedules assume that:

- Construction times are based on 1983 FERC license application.
- The licensing process from start to FERC order is estimated at 7 to 10 or more years. We have set a reasonable target of 8 years for the proposed project analysis, provided that the effort is begun immediately, ambitiously, fully funded, and conducted in parallel with environmental studies, engineering, and with active public outreach and cooperation by stakeholders.
- The FERC License Application will be based on the 1985 application, updated to reflect more than 20 years of regulatory changes and changes in engineering and construction methods.
- Any new environmental studies will be based on data acquired during the studies in the 1980's, updated to reflect present site conditions, public interests, wildlife, and recreational needs.
- Construction will begin immediately upon issuance of the license.
- Roads and staging will be state permitted outside the FERC project and will begin several years before FERC license, including pioneer and permanent roads, airports, bridges, construction camps and staging areas. Building facilities in advance of the project license is the most effective way to trim the projected timeline although there is some uncertainty whether permits could be obtained to construct these facilities before the project license is issued. The schedule for each of the project alternatives would be extended by one to two years if this assumption is not valid.
- Construction of diversion dams and tunnels will begin on issuance of the license, with upstream and downstream coffer dams and tunnels to divert the Susitna River during construction of main dams at Watana/Devil Canyon.
- Spillway construction will follow diversion dam and tunnel construction, and will include site preparation, approach channels, control structures, gates, stoplogs, chute, and flip buckets for main and emergency spillways.
- Dam construction at Watana will follow site preparation, grouting, and installation of a pressure relief system.
- The main dam construction at Devil Canyon will include a thin-arch concrete dam, preceded by site preparation, foundations, abutments, and thrust blocks. Rock-fill saddle dam construction will follow grouting and pressure relief system.
- The powerhouse and transmission will include power intake, tunnels/penstock, surge chamber, tailrace, powerhouse, turbine/generators, mechanical/electrical systems, switchyard, control buildings, and transmission lines.

- Reservoir filling will be based on the latest hydrologic data for inflow and turbine data for outflow.
- Devil Canyon construction will commence immediately upon completion of Watana for the Watana/Devil Canyon alternative.

Table 7 - Power Generation Time Estimates

Alternative	Generation of first power (years)*	Generation of full power (years)*
Lower Low Watana	13	14
Low Watana (both alternatives)	14	15
Watana (both alternatives)	15	16
Devil Canyon	14	15
High Devil Canyon	13	14
Watana/Devil Canyon	15	20
Staged Watana/Devil Canyon	15	24

*From start of licensing

6 Project Development Issues

Development of a hydroelectric project on the Susitna River would face a variety of issues over their design lifetime. The design lifetime for a modern dam is greater than 100 years. The following discussion is not intended to be all inclusive but rather highlight the likely major areas of concern.

6.1 Engineering

The projects being contemplated for the Susitna River would be on the larger end of the scale in the world in terms of size of the dams. Projects of this size have not been undertaken in the United States for many decades. As such, a major engineering effort will be required.

6.2 Siltation

Rivers, by nature, transport the products of erosion to the oceans. Dams interrupt this flow of material. Given time the effective amount of storage in the reservoir behind the dam can diminish. The alternatives investigated here have been designed with dead storage to accommodate bedload and it is not expected that siltation will have any detrimental affect on the energy projected energy production of any of the projects during their design lifetime.

6.3 Seismicity

Seismic (earthquake) events have the potential to effect hydroelectric projects. The main areas of concern are damage from ground shaking, opening of faults along the dam axis, landslides and settlement, and the creation of large waves in the reservoir. The previous studies on seismicity have concluded that these concerns can be designed for and therefore do not pose a significant threat. New analytic methods are now available to evaluate more complex seismic situations and these evaluations, along with the most stringent safety factors would be incorporated into a modern project design (R&M, 2009).

6.4 Climate Change

There has been much discussion about climate change and what the effects of climate change will be on river flows. Analyses of the potential affects of climate change on the Susitna River are included in Appendix D. The annual runoff from the Susitna River basin shows remarkable balance during very disparate climate regimes. The analyses support the consistent supply of water from the basin precipitation to support hydro-power generation regardless of the climate fluctuations. While global climate models suggests additional warming may impact the Arctic and Alaska, it seems very unlikely that these impacts will cause an unbalance in the runoff production of the basin.

Based on this, there is no conclusive evidence to suggest that runoff will be statistically different in the next 50 years from what it has been in the last 50 years.

6.5 Environmental Issues

After the Susitna project was discontinued in 1986 a database of 3,573 documents was created. In September 2008, the 87 most-relevant documents were scanned into HDR's files, of which 18

of the most relevant environmental documents were summarized. A synthesis of the 7 most-pertinent documents was completed. Because not all of the documents were summarized, some relevant information has likely been overlooked; however, most information was included in the synthesis.

These documents contain information on potential impacts of the proposed project and mitigation proposals for those impacts. Specifically, the documents deal with fisheries resources, botanical resources, wildlife resources, and cultural resources in the potential project area. The documents divide the Susitna River Basin into 4 geographic regions:

- Impoundment zones
- Middle Susitna River
- Lower Susitna River
- Access roads and transmission lines

The potential impacts and mitigation options are discussed for each category in each geographic region as much as possible. It is important to note that not all categories will be impacted in all geographic regions. Mitigation for the proposed impacts is divided into the following categories: avoidance, minimization, rectification, reduction, and compensation. Avoidance is always the preferred mitigation, though it is not usually feasible. Compensation is the only mitigation option for many of the impacts.

6.5.1 Fisheries Impacts

The fisheries resources have the highest potential to be impacted by the project. Most of the potential impacts will occur in the middle Susitna River. There will be impacts due to changes in water quality, thermal activity, the water's suspended sediment load, reservoir draw-down fluctuations, impoundment zone inundation, flow regime, and lost fish habitat. Not all impacts to fish populations will be negative. For example, the increase in winter water temperatures could lead to the creation of more overwintering habitat and thus greater fish survival; however, the cooler spring water temperatures will slow fish growth.

In the Watana impoundment zone, 51 river miles will be inundated and transformed into reservoir habitat. An additional 27 miles of tributary streams and 31 lakes will be inundated.

In the Devil Canyon impoundment zone 31 miles of the main river channel will be inundated and an additional 6 miles of tributary streams will be impacted.

Mitigation for these impacts was proposed by compensation through land acquisition, habitat modification, and reservoir stocking.

6.5.2 Botanical Impacts

The project area contains 295 vascular plant species, 11 lichen genera, and 7 moss taxa. Low Watana inundation will permanently remove 16,000 acres of vegetation. Devil Canyon inundation will permanently remove 6,000 acres of vegetation. Watana inundation will permanently remove an additional 16,000 acres of vegetation. There will be a total of 38,000 acres of vegetation permanently removed. Most of the vegetation inundated will be spruce forest. An additional 836 acres of vegetation will be permanently removed due to access road

construction. In the transmission corridor affect on vegetation will be minimal due to intermittent placement of control stations, relay buildings, and towers.

There will be limited botanical impacts downstream from the reservoir(s). These involve changes to the vegetation due to a more stable environment. Due to flow regulation there will no longer be major flooding events, which destroy the riparian vegetation; instead; rather, there will be succession of the riparian vegetation and colonization of new floodplains. The increase in winter water temperatures will decrease the amount of ice scouring that occurs, which will result in effects similar to those caused by the decrease in flooding.

Botanical resource mitigation will consist largely of compensation for permanently removed vegetation.

6.5.3 Wildlife Impacts

Within the Susitna River Basin there are 135 bird species, 16 small-mammal species, and 18 large-mammal and furbearing species. There are currently no known listed endangered species in the project area. There will be 5 classes of potential impacts to terrestrial vertebrates:

Permanent habitat loss, including flooding of habitat and covering with gravel pads or roads.

Temporary habitat loss and habitat alteration resulting from reclaimed and revegetated areas such as borrow pits, temporary right of ways, transmission corridors, and from alteration of climate and hydrology.

Barriers, impediments, and hazards to movement.

Disturbances associated with project construction and operation.

Consequences of increased human access not directly related to project activities.

Mitigation for the proposed impacts involve mostly compensation since there will be permanent habitat loss for most species.

6.5.4 Cultural Resource Impacts

Within the proposed project area, 297 historic and prehistoric archaeological sites were located. An additional 22 sites were already on file. Sites located within 500 feet of the reservoir's maximum extent may be indirectly impacted due to slumping from shoreline erosion. Indirect impacts may also result from vandalism due to increase in access to the sites. The project has the potential to impact 140 sites. None of these sites will occur in the proposed road corridor or transmission lines. The majority of these sites are relatively small prehistoric sites.

Mitigation for the lost cultural resources will mostly occur through data recovery. Preservation would also be used for some sites. Options to consider include construction of protective barriers to minimize erosion, controlled burial, or fencing of the site to restrict access.

Currently, there are a variety of federal, state, and local land use plans that encompass the Susitna Basin.

6.5.5 Carbon Emissions

According to the United Nations working group on carbon emissions from freshwater reservoirs the worst case carbon emissions from a reservoir in a boreal climate is 6.7 grams per square meter per year (United Nations, 2009). For the Watana/Devil Canyon alternative this equates to

465,000 metric tons of carbon per year or 0.065 metric tons per MWhr. The US Department of Energy reports the average carbon emissions due to electric generation for the State of Alaska to be 0.626[1] metric tons per MWhr. Operation of the Susitna project has the potential to eliminate up to 4 million metric tons of carbon production per year.

[1] http://www.eia.doe.gov/cneaf/electricity/st_profiles/alaska.html

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Appendix A:
Energy Analysis Input and Results

For the purposes of this submittal, the appendices have been attached as PDFs.

Complete Scenario Data for Scenario - Lower Low Watana 170MW
Written out on 10/14/2009 1:27:11 PM

System Misc. - 170MW Winter Demand
Description -
Notes -

CarryOver	MaxPeak	ForecastDays	ForecastAcr	WaterYearType
True	False	3	0.035	20

Loadshape Data - Sample
Description - Sample
Notes - Sample Data

IMonth	Period	Duration	Price
1	1	7	1
1	2	0	2
1	3	8	3
1	4	0	2
1	5	8	3
1	6	0	2
1	7	1	1
1	8	10	1
1	9	8	2
1	10	0	1
1	11	0	2
1	12	6	1
2	1	7	1
2	2	0	2
2	3	8	3
2	4	0	2
2	5	8	3
2	6	0	2
2	7	1	1
2	8	10	1
2	9	8	2
2	10	0	1
2	11	0	2
2	12	6	1
3	1	7	1
3	2	0	2
3	3	8	3
3	4	0	2
3	5	8	3
3	6	0	2
3	7	1	1
3	8	10	1
3	9	8	2
3	10	0	1
3	11	0	2
3	12	6	1
4	1	7	1
4	2	0	2
4	3	8	3
4	4	0	2
4	5	8	3
4	6	0	2
4	7	1	1
4	8	10	1
4	9	8	2

4	10	0	1
4	11	0	2
4	12	6	1
5	1	7	1
5	2	0	2
5	3	8	3
5	4	0	2
5	5	8	3
5	6	0	2
5	7	1	1
5	8	10	1
5	9	8	2
5	10	0	1
5	11	0	2
5	12	6	1
6	1	7	1
6	2	0	2
6	3	8	3
6	4	0	2
6	5	8	3
6	6	0	2
6	7	1	1
6	8	10	1
6	9	8	2
6	10	0	1
6	11	0	2
6	12	6	1
7	1	7	1
7	2	0	2
7	3	8	3
7	4	0	2
7	5	8	3
7	6	0	2
7	7	1	1
7	8	10	1
7	9	8	2
7	10	0	1
7	11	0	2
7	12	6	1
8	1	7	1
8	2	0	2
8	3	8	3
8	4	0	2
8	5	8	3
8	6	0	2
8	7	1	1
8	8	10	1
8	9	8	2
8	10	0	1
8	11	0	2
8	12	6	1
9	1	7	1
9	2	0	2
9	3	8	3
9	4	0	2
9	5	8	3
9	6	0	2
9	7	1	1
9	8	10	1
9	9	8	2
9	10	0	1
9	11	0	2
9	12	6	1

		Lower Low Watana 170MW.cof	
10	1	7	1
10	2	0	2
10	3	8	3
10	4	0	2
10	5	8	3
10	6	0	2
10	7	1	1
10	8	10	1
10	9	8	2
10	10	0	1
10	11	0	2
10	12	6	1
11	1	7	1
11	2	0	2
11	3	8	3
11	4	0	2
11	5	8	3
11	6	0	2
11	7	1	1
11	8	10	1
11	9	8	2
11	10	0	1
11	11	0	2
11	12	6	1
12	1	7	1
12	2	0	2
12	3	8	3
12	4	0	2
12	5	8	3
12	6	0	2
12	7	1	1
12	8	10	1
12	9	8	2
12	10	0	1
12	11	0	2
12	12	6	1

Scenario Information for Watana

Physical Setting Conditions, Name - Watana Lite
Description -
Notes -

Res_Storage Data - Watana Reservoir Curve
Description -
Notes - Data from 1985 ammendment to the FERC application for Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Storage	Sedimentation	Sed_File
1400	0	False	
1500	0	False	
1600	85600	False	
1700	450400	False	
1800	1298500	False	
1900	2630700	False	

		Lower Low Watana 170MW.cof	
2000	4336800	False	
2100	6713100	False	
2200	1E+07	False	

Tailwater Data - Watana Tailwater Rating
Description -
Notes - Data from 1985 ammendment to the FERC application Figure B.4.2.3. -DEE 12-11-2008

Flow	Elevation
0	1450
8000	1455
27000	1460
53000	1465
92000	1470
140000	1475
160000	1477

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - None

Elevation	Flow

Outlet2 Data - Watana Lite Spillway Capacity
Description -
Notes -

Elevation	Flow
1951	258000
1954.1	278400

Outlet3 Data - None

Elevation	Flow

Plant_Options Data - Watana Only Plant Options
Description -
Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type
0	0	False	1

Res_Area Data - Watana Reservoir Area
Description -
Notes - Data from the 1985 ammendment to the FERC application Figure B.3.2.1. -DEE 12-11-2008

Elevation	Area	Sedimentation	Sed_File
1500	0	False	
1600	3333	False	
1700	6000	False	
1800	10000	False	
1900	15000	False	

		Lower Low Watana 170MW.cof
2000	21000	False
2100	33333	False
2200	40000	False

Evaporation Data - Watana Evaporation
    Description - BPK 2008-12-16
    Notes - Based on information from table B.3.1.11 from the 1985 ammendment to the FERC application. A reservoir area of 40000 acres has been assumed. -DEE. Modified for units of ft per acre per day.

iMonth	Coeff
5	0.00672
6	0.006667
7	0.006183
8	0.004839
9	0.002778

Operating Setting Conditions, Name - Watana Lite
    Description -
    Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - Watana Only Daily Average Flows
    Description -
    Notes - Based on environmental flow case E-VI from 1985 ammendment to FERC application Table B.3.3.1, taking into account drainage area proation. -DEE 12-11-2008

IDay	Data	OrInflow	Dependent
1	1682	False	False
125	1682	False	False
126	3364	False	False
132	3364	False	False
133	5045	False	False
153	5045	False	False
154	7568	False	False
244	7568	False	False
245	6727	False	False
251	6727	False	False
252	5886	False	False
258	5886	False	False
259	5045	False	False
287	5045	False	False
288	4205	False	False
294	4205	False	False
295	3364	False	False
301	3364	False	False
302	2523	False	False
336	2523	False	False
337	1682	False	False
365	1682	False	False

Target_Elev Data - Watana Lite
    Description -
    Notes -

IDay Elevation

1 1920
121 1850
152 1866
182 1894
213 1916
244 1934
274 1945
305 1950
365 1920

Flood_Elev Data - Watana Lite
Description -
Notes -

IDay Elevation

1 1951
365 1951

Min_Elev Data - Watana I Minimum Elevations
Description -
Notes - Data from 1985 ammendment to FERC application for the Susitna Project Table B.3.2.1. -DEE 12-11-2008

IDay Elevation

1 1850
365 1850

Level_Fluct Data - None

IDay Elevation Hard PercentAbove

Level_Rate Data - None

IDay Rate

Flashboard Data - None

Elevation Flow Trip Reset

Bypass Data - None

IDay Data OrInflow Destination

Ramp_Rate Data - None

IDay UpRampDay UpRampHour DownRampDay DownRampHour Type

Withdrawal Data - None

IDay Withdrawal Return UseProjected FileName

Rec_Flows Data - None

IDay	Data	StartHr	EndHr

Generating Setting Conditions, Name - Watana Lite
Description -
Notes -

Plant_Generation Data - Watana Lite Generation
Description -
Notes -

Unit_No	Head_Loss_ID	Generator_Per	Turbine_Perf_	Gate_Leakage
1	16	7	10	0
2	16	7	10	0
3	16	7	10	0

Head Loss Data, ID = - 16, Name = Watana Lite
Description -
Notes -

Unit_No	Unit_HL	Common_HL	Use_Com2	Max_Unit
1	2.93418E-07	9.01789E-08	0	3
2	2.97559E-07	9.01789E-08	0	3
3	3.0032E-07	9.01789E-08	0	3

Turbine Performance, ID = - 10, Name = Watana Lite
Description -
Notes -

Head	Flow	Eff
405	855	0.701
405	1620	0.851
405	2340	0.921
405	2610	0.926
405	2790	0.921
405	3240	0.891
427.5	878.43	0.7055
427.5	1664.39	0.8555
427.5	2404.12	0.9255
427.5	2681.52	0.9305
427.5	2866.45	0.9255
427.5	3328.78	0.8955
450	901.25	0.71
450	1707.63	0.86
450	2466.58	0.93
450	2751.18	0.935
450	2940.92	0.93
450	3415.26	0.9
475	925.95	0.72
475	1754.42	0.87
475	2534.17	0.94
475	2826.57	0.945
475	3021.51	0.94
475	3508.85	0.91
500	950	0.72
500	1800	0.87

Lower Low Watana 170MW.cof
500 2600 0.94
500 2900 0.945
500 3100 0.94
500 3600 0.91

Generator Performance Data, ID = - 7, Name = Watana Generator Performance
Description -
Notes - Generator efficiency curve based on data for as-built large hydro generators -DEE 12_4_2008

gOutput	Eff	Cap
44	0.9283	230
65	0.95	230
86	0.9608	230
108	0.968	230
130	0.9715	230
143	0.9732	230
156	0.9748	230
165	0.9756	230
174	0.9764	230
200	0.9781	230
219.51	0.9781	230
230	0.9781	230

Maintenance Data - None

IDay	Unit

Min_Unit Data - None

Head	Flow	Eff	CenterLine	Headloss	GeneratorEff	OpStyle

Scenario Information for Devil Canyon

Physical Setting Conditions, Name - No Devil Canyon
Description -
Notes -

Res_Storage Data - Devil Canyon Reservoir Volume
Description -
Notes - Data from 1985 ammendment to the FERC applicationf ro Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Storage	Sedimentation	Sed_File
800	0	False	
900	0	False	
1000	9800	False	
1100	52490	False	
1200	139670	False	
1300	326770	False	
1400	701970	False	

1450 1046350 False

Tailwater Data - Devil Canyon Tailwater Rating
Description -
Notes - Data from 1985 ammendment to the FERC application for the Susitna Project -DEE

Flow	Elevation
0	845
9000	850
26000	855
60000	860
119000	865
200000	870

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - No Dam
Description - BPK 2008-12-16
Notes - Dummy data to allow all inflows to exit through the non-existant dam. Should only be used for reservoir filling scenarios.

Elevation	Flow
1	1000000

Outlet2 Data - No Devil Canyon Spillway Capacity
Description -
Notes -

Elevation	Flow
1401	240000
1401.5	309000

Outlet3 Data - None

Elevation	Flow

Plant_Options Data - No Devil Canyon
Description -
Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type
0	0	False	0

Res_Area Data - Devil Canyon Reservoir Area
Description -
Notes - Data from 1985 ammendment to the FERC application for Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Area	Sedimentation	Sed_File
900	0	False	
1000	100	False	
1100	800	False	
1200	1200	False	

Lower Low Watana 170MW.cof
1300 2200 False
1400 6300 False
1450 7200 False

Evaporation Data - Devil Canyon Evaporation
Description - BPK 2008-12-16
Notes - As per table B.3.1.11 from 1985 ammendment to the FERC application. Assumes reservoir area of 7200 acres. -DEE
Modified for units of ft per acre per day.

iMonth	Coeff
5	0.007258
6	0.0075
7	0.006989
8	0.005108
9	0.003333

Operating Setting Conditions, Name - No Devil Canyon
Description -
Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - None

IDay	Data	OrInflow	Dependent

Target_Elev Data - No Devil Canyon
Description -
Notes -

IDay	Elevation
1	1200
365	1200

Flood_Elev Data - No Devil Canyon Flood Elevations
Description -
Notes -

IDay	Elevation
1	1401
365	1401

Min_Elev Data - Devil Canyon Fill Minimum Elevations
Description -
Notes -

IDay	Elevation
1	890
365	890

Level_Fluct Data - None

Lower Low Watana 170MW.cof

IDay	Elevation	Hard	PercentAbove

Level_Rate Data - None

IDay	Rate

Flashboard Data - None

Elevation	Flow	Trip	Reset

Bypass Data - None

IDay	Data	OrInflow	Destination

Ramp_Rate Data - None

IDay	UpRampDay	UpRampHour	DownRampDay	DownRampHour	Type

Withdrawal Data - None

IDay	Withdrawal	Return	UseProjected	FileName

Rec_Flows Data - None

IDay	Data	StartHr	EndHr

Generating Setting Conditions, Name - No Devil Canyon
Description -
Notes -

Plant_Generation Data - None

Unit_No	Head_Loss_ID	Generator_Per	Turbine_Perf_	Gate_Leakage

Maintenance Data - None

IDay	Unit

Min_Unit Data - None

Head	Flow	Eff	CenterLine	Headloss	GeneratorEff	OpStyle

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Energy Production Estimates
Lower Low Watanat : 170MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By:
Reviewed By:

Summary	171	171	171	162	136	289	363	376	355	206	171	172	
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
units	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**
52-year Average	127,450	115,837	127,230	116,804	100,961	207,857	269,934	279,998	255,879	153,473	123,388	127,631	2,006,443

Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
units	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**
1950	127,412	114,885	127,354	90,163	91,208	172,726	229,001	282,135	211,331	117,276	123,454	127,730	1,814,674
1951	127,425	114,886	127,340	102,768	94,501	183,016	258,489	282,159	272,760	149,411	123,382	127,641	1,963,778
1952	127,455	118,987	127,325	107,297	52,833	182,514	279,755	281,947	273,491	187,029	123,413	127,560	1,989,607
1953	127,375	114,886	127,341	107,410	96,995	237,778	282,060	281,982	273,672	137,464	123,379	127,668	2,038,011
1954	127,452	114,888	127,309	107,774	94,948	209,302	281,877	280,982	268,380	117,936	123,383	127,618	1,981,849
1955	127,467	114,888	127,249	123,068	90,657	184,315	280,314	281,115	269,508	124,293	123,385	127,697	1,973,956
1956	127,408	118,992	127,351	94,692	93,720	234,914	279,982	281,231	273,306	146,101	123,388	127,591	2,028,675
1957	127,437	114,891	127,226	123,100	91,956	221,689	281,507	281,994	273,034	192,795	123,426	127,506	2,086,562
1958	127,408	114,885	127,242	123,158	92,832	195,858	279,040	281,639	197,416	117,503	123,395	127,715	1,908,092
1959	127,452	114,892	127,306	121,406	93,078	194,175	279,566	280,191	267,610	150,442	123,385	127,606	2,007,110
1960	127,460	118,992	127,250	123,106	93,784	178,359	232,384	281,413	272,923	183,715	123,392	127,578	1,990,356
1961	127,487	114,893	127,158	123,150	107,082	236,317	281,224	281,697	274,129	151,931	123,379	127,636	2,076,084
1962	127,477	114,889	127,142	123,153	92,751	227,528	280,980	281,421	273,504	156,999	123,366	127,604	2,056,813
1963	127,434	114,893	127,267	121,425	90,442	227,129	279,634	281,400	265,622	143,139	123,380	127,644	2,029,407
1964	127,422	118,991	127,370	87,931	41,300	234,875	281,536	282,769	232,030	132,359	123,385	127,612	1,917,580
1965	127,403	114,887	127,351	102,186	90,968	184,960	278,170	281,793	272,869	173,673	123,382	127,680	2,005,323
1966	127,466	114,893	127,290	123,089	90,710	210,959	281,427	281,752	266,886	120,956	123,415	127,735	1,996,576
1967	127,474	114,893	127,253	123,060	92,600	217,645	280,942	279,953	269,096	124,355	123,382	127,671	2,008,323
1968	127,506	118,998	127,147	123,163	94,755	234,430	280,871	282,637	228,287	117,034	123,455	127,724	1,986,007
1969	127,413	114,883	127,353	95,358	91,419	168,763	190,461	197,682	143,108	108,290	123,086	127,239	1,615,056
1970	127,433	114,885	127,368	89,991	89,080	171,593	229,164	282,213	231,590	117,700	123,382	127,611	1,832,008
1971	127,426	114,887	127,328	112,366	61,020	174,957	277,164	280,131	267,913	124,537	123,394	127,576	1,918,697
1972	127,474	118,998	127,158	123,158	109,517	263,299	281,569	282,233	255,818	117,525	123,386	127,690	2,057,824
1973	127,416	114,893	127,315	110,241	81,145	179,063	261,749	281,749	223,759	117,261	123,458	127,728	1,875,777
1974	127,420	114,885	127,367	88,609	92,418	180,695	243,687	282,202	255,504	124,163	123,430	127,742	1,888,122
1975	127,481	114,894	127,207	123,119	93,248	229,358	280,630	282,449	273,474	184,392	123,382	127,654	2,087,287
1976	127,430	118,991	127,345	100,877	93,041	189,638	260,489	282,069	186,355	116,730	123,454	127,735	1,854,154
1977	127,487	114,891	127,135	123,208	92,558	229,167	281,549	282,197	273,418	175,374	123,389	127,547	2,077,920
1978	127,443	114,890	127,184	123,126	95,102	176,279	245,098	282,637	214,517	117,421	123,389	127,690	1,874,776
1979	127,472	114,893	127,308	123,024	91,735	194,043	275,848	282,010	255,218	156,711	123,429	127,517	1,999,208
1980	127,400	118,992	127,155	123,200	93,188	201,038	279,907	281,914	272,183	179,676	123,412	127,548	2,055,613
1981	127,441	114,889	127,144	123,167	98,360	204,825	268,783	279,026	270,971	161,518	123,405	127,571	2,027,101
1982	127,432	114,890	127,155	123,180	93,491	197,514	279,561	282,965	273,383	171,723	123,381	127,626	2,042,301
1983	127,509	114,894	127,159	123,180	96,717	216,758	281,554	281,238	267,851	180,237	123,405	127,565	2,068,068
1984	127,456	118,997	127,151	123,151	94,730	202,168	281,245	282,021	231,852	118,057	123,392	127,583	1,957,803
1985	127,454	114,890	127,139	123,167	91,750	194,982	280,530	282,113	273,793	166,513	123,388	127,608	2,033,327
1986	127,446	114,892	127,148	123,188	92,426	176,590	247,417	282,622	273,691	236,469	123,416	127,553	2,052,856
1987	127,415	114,892	127,128	123,117	94,453	193,089	272,813	281,779	262,142	124,154	123,387	127,623	1,971,993
1988	127,451	118,997	127,163	123,165	95,958	229,016	281,012	282,185	266,514	163,347	123,415	127,587	2,065,810
1989	127,465	114,892	127,146	123,135	96,558	211,672	281,432	281,641	273,763	185,285	123,403	127,582	2,073,974
1990	127,446	114,893	127,140	123,410	141,690	269,794	281,427	281,385	271,909	172,428	123,379	127,643	2,162,546
1991	127,481	114,893	127,184	123,112	90,389	171,378	255,140	282,436	270,858	137,534	123,379	127,641	1,951,425
1992	127,485	118,996	127,165	123,094	91,002	171,813	248,877	281,880	237,705	117,407	123,400	127,696	1,896,520
1993	127,512	114,892	127,162	123,162	114,995	251,286	282,266	282,331	272,729	225,414	123,386	127,560	2,172,695
1994	127,450	114,890	127,185	123,087	97,956	225,292	281,914	282,356	223,755	117,285	123,399	127,693	1,972,263
1995	127,508	114,892	127,140	123,145	108,038	221,886	281,097	282,407	273,157	158,671	123,388	127,620	2,068,948
2002	127,479	114,892	127,142	123,194	126,627	192,399	222,475	275,714	273,306	263,832	123,067	128,037	2,098,165
2003	127,372	114,897	127,165	123,217	147,373	194,999	270,169	281,411	263,613	198,790	123,382	127,621	2,100,011
2004	127,451	118,994	127,269	123,041	189,839	257,748	281,599	282,121	222,341	115,850	123,530	127,737	2,097,518
2005	127,489	114,890	127,268	123,102	192,773	268,422	280,230	281,210	271,967	208,136	123,381	127,643	2,246,511
2006	127,458	114,894	127,128	123,174	140,515	211,652	280,797	279,591	267,997	221,473	123,408	127,551	2,145,639
2007	127,464	114,893	127,180	123,239	183,719	218,920	280,132	281,791	273,690	152,303	123,387	127,602	2,134,320

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Average Outflow
Lower Low Watanat : 170MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By: Leanne Andruszkiewicz, EIT. Date: 10/19/09
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs
52-year Average	4,951	5,053	5,339	5,385	4,433	9,975	16,724	18,393	12,505	5,809	4,709	4,784

Monthly Outflow Volume

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
units	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft
1950	305,208	285,431	335,231	252,561	252,342	437,988	535,843	1,016,938	480,958	260,070	282,590	299,402	4,744,561
1951	305,266	285,674	335,324	288,240	253,389	444,522	701,334	1,017,422	1,064,700	333,996	278,869	293,491	5,602,228
1952	304,706	284,181	331,906	299,312	151,678	456,721	1,119,537	1,081,771	743,268	419,019	277,526	291,297	5,760,923
1953	305,059	285,298	334,422	300,862	253,394	574,059	1,044,246	1,065,600	789,576	303,068	279,195	294,579	5,829,359
1954	305,004	284,557	332,706	301,046	253,449	498,494	921,317	1,349,641	695,076	260,184	278,537	292,744	5,772,755
1955	304,438	282,807	328,071	339,824	253,445	458,501	1,180,043	1,331,563	754,590	274,454	279,859	295,717	6,083,311
1956	305,224	285,869	334,910	264,913	252,216	793,462	1,607,658	1,268,766	917,353	326,848	278,268	291,988	6,927,475
1957	304,570	282,930	327,820	339,569	253,472	529,687	1,138,537	1,062,048	990,824	438,385	277,264	288,999	6,234,105
1958	304,080	282,423	327,558	339,272	253,347	468,523	930,343	1,173,440	447,002	260,102	280,445	296,311	5,362,847
1959	304,806	283,743	330,309	337,578	253,448	464,633	1,032,185	1,612,248	880,138	331,659	278,374	292,354	6,401,476
1960	304,397	282,948	327,981	339,792	253,450	438,121	588,262	1,219,868	1,026,309	423,338	278,100	291,439	5,774,005
1961	303,950	280,852	323,078	328,892	272,685	767,846	1,270,670	1,142,819	675,720	342,273	278,953	293,246	6,280,983
1962	304,448	282,436	326,518	336,739	253,432	1,109,578	1,336,947	1,217,690	811,996	350,587	278,244	292,395	6,901,011
1963	293,842	275,779	314,599	320,627	316,824	268,146	667,155	1,783,662	1,098,016	640,281	283,000	288,523	6,550,453
1964	305,178	285,669	335,196	246,190	120,526	1,096,704	1,186,509	850,487	531,154	292,990	278,291	293,011	5,821,907
1965	305,258	285,627	334,804	285,992	253,475	450,628	1,157,645	1,106,713	953,492	425,310	279,544	294,904	6,133,392
1966	304,928	283,935	329,801	340,673	253,476	510,608	911,677	1,128,313	632,994	267,320	281,270	297,347	5,542,341
1967	304,826	283,561	329,062	340,934	253,434	521,289	1,364,308	1,686,748	881,403	274,458	279,555	294,358	6,813,938
1968	304,411	282,106	324,361	332,630	253,398	767,422	1,366,148	888,030	523,487	260,018	282,527	299,372	5,883,909
1969	305,474	286,448	336,824	267,704	253,485	437,896	462,731	464,046	339,821	260,180	301,458	327,232	4,043,301
1970	305,349	286,088	336,229	252,360	247,555	438,001	537,283	966,399	532,014	260,177	278,838	292,458	4,732,750
1971	304,699	284,106	331,543	313,018	174,485	446,848	922,375	1,649,748	770,476	274,512	278,047	291,460	6,041,316
1972	304,078	281,297	323,108	331,374	279,282	1,190,119	1,177,199	997,321	680,155	260,130	279,872	295,366	6,399,302
1973	305,014	284,577	331,852	307,178	229,414	450,141	616,429	977,632	529,111	260,096	282,633	299,319	4,873,396
1974	305,333	285,944	336,033	248,546	253,438	437,875	568,760	745,007	646,866	274,464	281,750	297,712	4,681,729
1975	304,811	283,413	328,242	339,345	253,394	671,781	1,432,944	938,070	813,345	417,515	278,538	294,345	6,355,741
1976	305,284	285,916	335,104	282,613	253,378	460,742	609,205	1,030,791	420,602	259,893	282,101	296,551	4,822,181
1977	304,468	282,460	326,203	336,400	253,440	855,010	1,182,524	1,003,193	639,977	394,999	277,672	290,656	6,147,002
1978	304,180	281,902	325,141	334,309	253,387	437,838	572,443	840,519	488,039	260,069	280,044	295,210	4,673,081
1979	304,924	283,945	330,159	341,488	253,444	466,191	1,203,661	1,057,872	584,483	349,225	277,261	289,589	5,742,243
1980	304,385	283,154	327,764	339,053	253,444	486,132	1,551,964	1,083,864	673,587	405,583	277,594	290,892	6,277,417
1981	304,421	281,427	324,128	332,999	253,363	485,722	1,445,632	1,957,992	728,791	363,859	277,721	291,574	7,047,630
1982	304,564	282,900	327,581	338,557	253,390	475,786	1,048,738	789,785	890,980	388,095	278,672	292,848	5,671,897
1983	304,002	281,068	322,822	331,547	253,398	515,177	948,338	1,266,625	716,252	403,746	277,669	291,258	5,911,904
1984	304,238	281,832	323,884	331,959	253,357	488,827	1,093,903	1,054,746	529,286	260,196	278,131	291,669	5,492,029
1985	304,309	282,145	325,333	334,074	253,469	469,009	1,133,879	1,029,931	783,587	375,066	278,187	292,523	5,861,512
1986	304,606	282,933	327,248	338,516	253,470	437,580	592,253	892,177	667,175	643,032	277,425	291,009	5,307,425
1987	304,587	283,111	327,348	337,598	253,370	463,970	1,203,372	1,124,614	715,380	274,897	278,176	293,122	5,859,543
1988	304,714	283,652	328,218	339,209	253,408	647,760	1,328,233	1,010,490	740,058	363,360	277,921	291,949	6,168,970
1989	304,327	281,857	324,305	332,699	253,422	505,382	1,129,623	1,157,618	772,185	426,155	277,686	291,879	6,057,138
1990	304,500	282,540	325,507	332,899	347,371	1,374,066	1,215,801	1,227,049	1,326,452	393,872	278,956	293,402	7,702,415
1991	304,413	282,106	325,154	334,406	253,513	437,669	597,825	927,921	642,479	303,084	278,899	293,332	4,980,801
1992	304,378	282,261	324,925	332,704	253,513	437,769	709,746	1,093,157	579,438	260,110	280,535	295,224	5,153,760
1993	304,529	282,213	325,375	334,083	292,247	597,253	980,484	969,227	1,069,361	528,312	277,762	291,035	6,251,882
1994	304,200	281,647	324,779	333,093	253,355	714,950	1,083,836	960,884	546,471	260,046	280,496	295,096	5,638,852
1995	304,530	282,287	325,347	333,528	272,694	526,419	1,303,205	950,255	957,638	357,047	278,193	293,100	6,184,244
2002	304,563	282,711	326,706	337,575	351,015	485,497	518,839	1,206,280	911,999	654,892	311,034	295,545	5,986,657
2003	304,173	281,358	322,366	331,720	409,451	487,114	1,281,696	1,224,775	810,964	454,256	278,592	292,852	6,479,318
2004	304,608	283,477	328,913	339,105	485,710	878,517	1,169,091	1,027,852	505,072	259,754	284,590	300,357	6,167,046
2005	304,690	283,252	328,733	339,707	490,890	1,568,075	1,552,087	1,274,403	1,282,641	508,467	278,641	293,660	8,505,246
2006	304,741	283,183	327,426	337,706	383,242	512,041	1,203,451	1,786,877	719,309	596,691	277,745	290,784	7,023,195
2007	304,016	280,815	322,035	328,548	481,218	520,515	1,034,556	1,117,178	781,335	337,494	278,330	292,271	6,078,310

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Average Reservoir Elevation
Lower Low Watanat : 170MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By: Leanne Andruszkiewicz, EIT. Date: 10/19/09
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
52-year Average	1,914	1,900	1,883	1,864	1,868	1,916	1,946	1,950	1,949	1,948	1,943	1,933

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
1950	1,912	1,897	1,877	1,855	1,859	1,894	1,931	1,951	1,948	1,945	1,937	1,923
1951	1,912	1,897	1,877	1,855	1,869	1,910	1,941	1,951	1,951	1,949	1,944	1,934
1952	1,913	1,899	1,880	1,858	1,851	1,899	1,949	1,951	1,950	1,950	1,948	1,938
1953	1,913	1,897	1,877	1,856	1,878	1,933	1,951	1,951	1,951	1,949	1,944	1,932
1954	1,913	1,898	1,879	1,857	1,871	1,922	1,950	1,951	1,950	1,949	1,945	1,935
1955	1,914	1,901	1,883	1,862	1,856	1,901	1,950	1,951	1,951	1,948	1,942	1,930
1956	1,912	1,896	1,877	1,856	1,868	1,933	1,951	1,951	1,951	1,949	1,946	1,937
1957	1,913	1,901	1,883	1,863	1,861	1,925	1,951	1,951	1,951	1,950	1,948	1,943
1958	1,914	1,901	1,884	1,863	1,864	1,916	1,947	1,951	1,947	1,946	1,941	1,929
1959	1,913	1,899	1,881	1,860	1,863	1,916	1,948	1,951	1,950	1,949	1,945	1,936
1960	1,914	1,901	1,883	1,863	1,867	1,906	1,933	1,951	1,951	1,950	1,946	1,938
1961	1,915	1,904	1,888	1,873	1,886	1,931	1,951	1,951	1,951	1,948	1,944	1,935
1962	1,914	1,901	1,884	1,865	1,864	1,930	1,951	1,951	1,951	1,949	1,946	1,936
1963	1,933	1,912	1,899	1,880	1,858	1,871	1,934	1,951	1,951	1,950	1,949	1,944
1964	1,912	1,897	1,877	1,855	1,850	1,931	1,951	1,951	1,949	1,949	1,946	1,935
1965	1,912	1,897	1,877	1,856	1,857	1,909	1,949	1,951	1,951	1,949	1,943	1,931
1966	1,913	1,899	1,881	1,862	1,857	1,918	1,950	1,951	1,950	1,947	1,939	1,927
1967	1,913	1,900	1,882	1,861	1,862	1,924	1,951	1,951	1,951	1,948	1,943	1,932
1968	1,914	1,902	1,887	1,869	1,871	1,933	1,951	1,951	1,948	1,944	1,937	1,923
1969	1,912	1,896	1,875	1,855	1,858	1,886	1,910	1,924	1,918	1,913	1,903	1,884
1970	1,912	1,896	1,876	1,855	1,858	1,892	1,931	1,951	1,949	1,947	1,944	1,936
1971	1,913	1,899	1,880	1,858	1,850	1,890	1,947	1,951	1,950	1,949	1,946	1,938
1972	1,914	1,903	1,888	1,870	1,884	1,944	1,951	1,951	1,950	1,946	1,942	1,931
1973	1,913	1,898	1,880	1,858	1,854	1,897	1,940	1,950	1,948	1,945	1,937	1,923
1974	1,912	1,896	1,876	1,855	1,862	1,911	1,935	1,950	1,949	1,947	1,938	1,926
1975	1,913	1,900	1,883	1,863	1,866	1,930	1,951	1,951	1,951	1,950	1,945	1,932
1976	1,912	1,896	1,877	1,856	1,864	1,910	1,941	1,951	1,946	1,944	1,938	1,928
1977	1,914	1,901	1,885	1,866	1,864	1,930	1,951	1,951	1,950	1,949	1,947	1,939
1978	1,914	1,902	1,886	1,868	1,872	1,902	1,936	1,951	1,948	1,946	1,942	1,931
1979	1,913	1,899	1,881	1,861	1,860	1,914	1,948	1,951	1,949	1,949	1,948	1,941
1980	1,914	1,900	1,883	1,864	1,866	1,915	1,951	1,951	1,950	1,949	1,947	1,939
1981	1,914	1,903	1,887	1,869	1,883	1,920	1,947	1,951	1,951	1,949	1,947	1,938
1982	1,913	1,901	1,883	1,864	1,867	1,915	1,948	1,951	1,951	1,949	1,945	1,935
1983	1,915	1,903	1,889	1,870	1,878	1,924	1,950	1,951	1,950	1,949	1,947	1,938
1984	1,914	1,902	1,887	1,870	1,871	1,916	1,950	1,951	1,948	1,949	1,946	1,937
1985	1,914	1,902	1,886	1,868	1,862	1,914	1,950	1,951	1,951	1,950	1,946	1,936
1986	1,913	1,901	1,884	1,864	1,863	1,903	1,938	1,951	1,950	1,950	1,948	1,939
1987	1,913	1,900	1,884	1,865	1,870	1,914	1,947	1,951	1,950	1,949	1,946	1,935
1988	1,913	1,900	1,883	1,863	1,874	1,930	1,951	1,951	1,950	1,949	1,947	1,937
1989	1,914	1,902	1,887	1,869	1,878	1,922	1,951	1,951	1,951	1,950	1,947	1,937
1990	1,914	1,901	1,886	1,870	1,900	1,949	1,951	1,951	1,951	1,949	1,944	1,934
1991	1,914	1,902	1,886	1,867	1,857	1,891	1,939	1,951	1,950	1,949	1,944	1,934
1992	1,914	1,902	1,886	1,869	1,859	1,892	1,938	1,951	1,949	1,946	1,941	1,931
1993	1,914	1,902	1,886	1,868	1,885	1,936	1,951	1,951	1,951	1,950	1,947	1,939
1994	1,914	1,902	1,886	1,869	1,882	1,929	1,951	1,951	1,949	1,945	1,941	1,931
1995	1,914	1,901	1,886	1,869	1,889	1,926	1,951	1,951	1,951	1,950	1,946	1,935
2002	1,914	1,901	1,884	1,865	1,858	1,896	1,927	1,949	1,951	1,950	1,950	1,945
2003	1,914	1,903	1,889	1,870	1,861	1,900	1,946	1,951	1,950	1,949	1,945	1,935
2004	1,913	1,900	1,882	1,863	1,890	1,942	1,951	1,951	1,946	1,941	1,933	1,921
2005	1,913	1,900	1,882	1,863	1,893	1,948	1,951	1,951	1,951	1,950	1,945	1,934
2006	1,913	1,900	1,883	1,865	1,864	1,915	1,950	1,951	1,950	1,950	1,947	1,939
2007	1,914	1,904	1,890	1,873	1,882	1,923	1,949	1,951	1,951	1,948	1,946	1,936

Complete Scenario Data for Scenario - Low Watana 245MW Winter Load
Written out on 10/14/2009 1:26:43 PM

System Misc. - 245Mw Winter Demand
Description -
Notes -

CarryOver	MaxPeak	ForecastDays	ForecastAcr	WaterYearType
True	False	3	0.035	23

Loadshape Data - Sample
Description - Sample
Notes - Sample Data

IMonth	Period	Duration	Price
1	1	7	1
1	2	0	2
1	3	8	3
1	4	0	2
1	5	8	3
1	6	0	2
1	7	1	1
1	8	10	1
1	9	8	2
1	10	0	1
1	11	0	2
1	12	6	1
2	1	7	1
2	2	0	2
2	3	8	3
2	4	0	2
2	5	8	3
2	6	0	2
2	7	1	1
2	8	10	1
2	9	8	2
2	10	0	1
2	11	0	2
2	12	6	1
3	1	7	1
3	2	0	2
3	3	8	3
3	4	0	2
3	5	8	3
3	6	0	2
3	7	1	1
3	8	10	1
3	9	8	2
3	10	0	1
3	11	0	2
3	12	6	1
4	1	7	1
4	2	0	2
4	3	8	3
4	4	0	2
4	5	8	3
4	6	0	2
4	7	1	1
4	8	10	1
4	9	8	2

4	10	0	1
4	11	0	2
4	12	6	1
5	1	7	1
5	2	0	2
5	3	8	3
5	4	0	2
5	5	8	3
5	6	0	2
5	7	1	1
5	8	10	1
5	9	8	2
5	10	0	1
5	11	0	2
5	12	6	1
6	1	7	1
6	2	0	2
6	3	8	3
6	4	0	2
6	5	8	3
6	6	0	2
6	7	1	1
6	8	10	1
6	9	8	2
6	10	0	1
6	11	0	2
6	12	6	1
7	1	7	1
7	2	0	2
7	3	8	3
7	4	0	2
7	5	8	3
7	6	0	2
7	7	1	1
7	8	10	1
7	9	8	2
7	10	0	1
7	11	0	2
7	12	6	1
8	1	7	1
8	2	0	2
8	3	8	3
8	4	0	2
8	5	8	3
8	6	0	2
8	7	1	1
8	8	10	1
8	9	8	2
8	10	0	1
8	11	0	2
8	12	6	1
9	1	7	1
9	2	0	2
9	3	8	3
9	4	0	2
9	5	8	3
9	6	0	2
9	7	1	1
9	8	10	1
9	9	8	2
9	10	0	1
9	11	0	2
9	12	6	1

10	1	7	1
10	2	0	2
10	3	8	3
10	4	0	2
10	5	8	3
10	6	0	2
10	7	1	1
10	8	10	1
10	9	8	2
10	10	0	1
10	11	0	2
10	12	6	1
11	1	7	1
11	2	0	2
11	3	8	3
11	4	0	2
11	5	8	3
11	6	0	2
11	7	1	1
11	8	10	1
11	9	8	2
11	10	0	1
11	11	0	2
11	12	6	1
12	1	7	1
12	2	0	2
12	3	8	3
12	4	0	2
12	5	8	3
12	6	0	2
12	7	1	1
12	8	10	1
12	9	8	2
12	10	0	1
12	11	0	2
12	12	6	1

Scenario Information for Watana

Physical Setting Conditions, Name - Watana I Only Settings
Description -
Notes -

Res_Storage Data - Watana Reservoir Curve
Description -
Notes - Data from 1985 ammendment to the FERC application for Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Storage	Sedimentation	Sed_File
1400	0	False	
1500	0	False	
1600	85600	False	
1700	450400	False	
1800	1298500	False	
1900	2630700	False	

2000	4336800	False
2100	6713100	False
2200	1E+07	False

Tailwater Data - Watana Tailwater Rating
Description -
Notes - Data from 1985 ammendment to the FERC application Figure B.4.2.3. -DEE 12-11-2008

Flow	Elevation
0	1450
8000	1455
27000	1460
53000	1465
92000	1470
140000	1475
160000	1477

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - None

Elevation	Flow

Outlet2 Data - Watana I Spillway Capacity
Description -
Notes - Based on minimum and maximum operating limits from 1985 ammendment to the FERC application for the Susitna Project.

Elevation	Flow
2014	258000
2017.1	278400

Outlet3 Data - None

Elevation	Flow

Plant_Options Data - Watana Only Plant Options
Description -
Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type
0	0	False	1

Res_Area Data - Watana Reservoir Area
Description -
Notes - Data from the 1985 ammendment to the FERC application Figure B.3.2.1. -DEE 12-11-2008

Elevation	Area	Sedimentation	Sed_File
1500	0	False	
1600	3333	False	
1700	6000	False	
1800	10000	False	

1900	15000	False	
2000	21000	False	
2100	33333	False	
2200	40000	False	

Evaporation Data - Watana Evaporation
Description - BPK 2008-12-16
Notes - Based on information from table B.3.1.11 from the 1985 ammendment to the FERC application. A reservoir area of 40000 acres has been assumed. -DEE. Modified for units of ft per acre per day.

iMonth	Coeff
5	0.00672
6	0.006667
7	0.006183
8	0.004839
9	0.002778

Operating Setting Conditions, Name - Low Watana 4 Turbines Winter
Description -
Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - Watana Only Daily Average Flows
Description -
Notes - Based on environmental flow case E-VI from 1985 ammendment to FERC application Table B.3.3.1, taking into account drainage area proation. -DEE 12-11-2008

IDay	Data	OrInflow	Dependent
1	1682	False	False
125	1682	False	False
126	3364	False	False
132	3364	False	False
133	5045	False	False
153	5045	False	False
154	7568	False	False
244	7568	False	False
245	6727	False	False
251	6727	False	False
252	5886	False	False
258	5886	False	False
259	5045	False	False
287	5045	False	False
288	4205	False	False
294	4205	False	False
295	3364	False	False
301	3364	False	False
302	2523	False	False
336	2523	False	False
337	1682	False	False
365	1682	False	False

Target_Elev Data - Low Watana 4 Turbines Winter
Description -

Notes -

IDay	Elevation
1	1959
121	1850
152	1878
182	1921
213	1957
244	1989
274	2006
305	2013
365	1959

Flood_Elev Data - Watana I Flood Elevation
Description -
Notes - Data from 1985 ammendment to FERC application for the Susitna Project Table B.3.2.1. -DEE 12-11-2008

IDay	Elevation
1	2014
365	2014

Min_Elev Data - Watana I Minimum Elevations
Description -
Notes - Data from 1985 ammendment to FERC application for the Susitna Project Table B.3.2.1. -DEE 12-11-2008

IDay	Elevation
1	1850
365	1850

Level_Fluct Data - None

IDay	Elevation	Hard	PercentAbove

Level_Rate Data - None

IDay	Rate

Flashboard Data - None

Elevation	Flow	Trip	Reset

Bypass Data - None

IDay	Data	OrInflow	Destination

Ramp_Rate Data - None

IDay	UpRampDay	UpRampHour	DownRampDay	DownRampHour	Type

Withdrawal Data - None

IDay	Withdrawal	Return	UseProjected	FileName

Rec_Flows Data - None

IDay	Data	StartHr	EndHr

Generating Setting Conditions, Name - Watana I Generating Settings
Description -
Notes - 11-20-2008 DEE

Plant_Generation Data - Watana I Plant Generation
Description -
Notes - 4 units with a design head of 540 feet. -DEE 12_16_2008

Unit_No	Head_Loss_ID	Generator_Per	Turbine_Perf_	Gate_Leakage
1	4	7	1	0
2	4	7	1	0
3	4	7	1	0
4	4	7	1	0

Head Loss Data, ID = - 4, Name = Watana I Headloss
Description -
Notes - Headloss as calculated using Susitna Headloss Calculations.xls spreadsheet built by David Elwood and checked by Leanne Andruszkiewicz. -DEE 12_3_2008

Unit_No	Unit_HL	Common_HL	Use_Com2	Max_Unit
1	2.93398E-07	1.8997E-07	0	4
2	2.97539E-07	1.8997E-07	0	4
3	3.00314E-07	1.97959E-07	1	4
4	3.03765E-07	1.97959E-07	1	4

Turbine Performance, ID = - 1, Name = Watana I Turbine Efficiency
Description -
Notes - Based on the efficiency curve at the design head of 540 feet from 1985 ammendment to the FERC Application exhibit B-4-11. Assumed a 2 percent efficiency loss for every 100 foot reduction in head. -DEE 12_3_2008

Head	Flow	Eff
405	822.72	0.693
405	1558.85	0.843
405	2251.67	0.913
405	2511.47	0.918
405	2684.68	0.913
405	3117.69	0.883
472.5	888.64	0.7065
472.5	1683.75	0.8565
472.5	2432.08	0.9265
472.5	2712.7	0.9315
472.5	2899.78	0.9265
472.5	3367.49	0.8965
540	950	0.72
540	1800	0.87
540	2600	0.94
540	2900	0.945
540	3100	0.94
540	3600	0.91

552	960.5	0.72
552	1819.89	0.87
552	2628.73	0.94
552	2932.05	0.945
552	3134.26	0.94
552	3639.78	0.91
564	970.88	0.72
564	1839.57	0.87
564	2657.15	0.94
564	2963.74	0.945
564	3168.14	0.94
564	3679.13	0.91

Generator Performance Data, ID = - 7, Name = Watana Generator Performance
Description -
Notes - Generator efficiency curve based on data for as-built large hydro generators -DEE 12_4_2008

gOutput	Eff	Cap
44	0.9283	230
65	0.95	230
86	0.9608	230
108	0.968	230
130	0.9715	230
143	0.9732	230
156	0.9748	230
165	0.9756	230
174	0.9764	230
200	0.9781	230
219.51	0.9781	230
230	0.9781	230

Maintenance Data - None

IDay	Unit

Min_Unit Data - None

Head	Flow	Eff	CenterLine	Headloss	GeneratorEff	OpStyle

Scenario Information for Devil Canyon

Physical Setting Conditions, Name - No Devil Canyon
Description -
Notes -

Res_Storage Data - Devil Canyon Reservoir Volume
Description -
Notes - Data from 1985 ammendment to the FERC applicationf ro Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Storage	Sedimentation	Sed_File

800	0	False
900	0	False
1000	9800	False
1100	52490	False
1200	139670	False
1300	326770	False
1400	701970	False
1450	1046350	False

Tailwater Data - Devil Canyon Tailwater Rating
    Description -
    Notes - Data from 1985 ammendment to the FERC application for the Susitna Project -DEE

Flow	Elevation
0	845
9000	850
26000	855
60000	860
119000	865
200000	870

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - No Dam
    Description - BPK 2008-12-16
    Notes - Dummy data to allow all inflows to exit through the non-existant dam. Should only be used for reservoir filling scenarios.

Elevation	Flow
1	1000000

Outlet2 Data - No Devil Canyon Spillway Capacity
    Description -
    Notes -

Elevation	Flow
1401	240000
1401.5	309000

Outlet3 Data - None

Elevation	Flow

Plant_Options Data - No Devil Canyon
    Description -
    Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type
0	0	False	0

Res_Area Data - Devil Canyon Reservoir Area
    Description -
    Notes - Data from 1985 ammendment to the FERC application for Susitna Figure

B.3.2.1. -DEE 12-11-2008

Elevation	Area	Sedimentation	Sed_File
900	0	False	
1000	100	False	
1100	800	False	
1200	1200	False	
1300	2200	False	
1400	6300	False	
1450	7200	False	

Evaporation Data - Devil Canyon Evaporation
Description - BPK 2008-12-16
Notes - As per table B.3.1.11 from 1985 ammendment to the FERC application. Assumes reservoir area of 7200 acres. -DEE
Modified for units of ft per acre per day.

iMonth	Coeff
5	0.007258
6	0.0075
7	0.006989
8	0.005108
9	0.003333

Operating Setting Conditions, Name - No Devil Canyon
Description -
Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - None

IDay	Data	OrInflow	Dependent

Target_Elev Data - No Devil Canyon
Description -
Notes -

IDay	Elevation
1	1200
365	1200

Flood_Elev Data - No Devil Canyon Flood Elevations
Description -
Notes -

IDay	Elevation
1	1401
365	1401

Min_Elev Data - Devil Canyon Fill Minimum Elevations
Description -
Notes -

IDay Elevation

1 890
365 890

Level_Fluct Data - None

IDay Elevation Hard PercentAbove

Level_Rate Data - None

IDay Rate

Flashboard Data - None

Elevation Flow Trip Reset

Bypass Data - None

IDay Data OrInflow Destination

Ramp_Rate Data - None

IDay UpRampDay UpRampHour DownRampDay DownRampHour Type

Withdrawal Data - None

IDay Withdrawal Return UseProjected FileName

Rec_Flows Data - None

IDay Data StartHr EndHr

Generating Setting Conditions, Name - No Devil Canyon
Description -
Notes -

Plant_Generation Data - None

Unit_No Head_Loss_ID Generator_Per Turbine_Perf_ Gate_Leakage

Maintenance Data - None

IDay Unit

Min_Unit Data - None

Head Flow Eff CenterLine Headloss
GeneratorEff OpStyle

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Energy Production Estimates
Low Watana Development : 245MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By: Leanne Andruszkiewicz, EIT. Date: 10/19/09
Reviewed By:

Summary	245	245	247	234	275	352	405	449	408	200	251	250	
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
units	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**
52-year Average	182,110	166,408	183,585	168,202	204,818	253,175	301,598	333,787	293,604	148,839	180,504	186,019	2,602,648

Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
units	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**	**MWh**
1950	186,740	168,786	187,092	172,555	87,244	166,093	192,985	240,124	159,858	122,910	178,860	185,992	2,049,240
1951	186,800	169,026	187,038	59,543	131,564	201,408	192,948	209,524	320,654	130,408	180,624	187,197	2,156,734
1952	183,820	174,869	186,835	181,087	156,471	228,870	301,964	341,446	294,376	145,179	180,437	187,110	2,562,464
1953	185,329	167,497	186,902	181,101	249,263	279,850	316,809	340,416	331,881	129,324	180,709	186,955	2,736,035
1954	183,993	168,885	186,860	181,182	228,647	256,264	295,249	326,642	263,442	127,203	181,041	186,493	2,585,903
1955	184,068	168,888	186,868	181,195	194,488	227,535	304,850	344,734	376,726	132,598	180,864	186,503	2,669,317
1956	184,441	174,888	186,895	181,202	218,827	264,105	342,520	419,616	407,256	174,670	180,397	187,356	2,922,173
1957	184,917	167,604	186,929	180,978	235,297	271,860	315,188	341,931	377,738	213,104	180,484	186,671	2,842,700
1958	187,141	165,915	186,893	180,824	251,027	273,978	312,274	364,733	239,137	126,437	181,389	184,489	2,654,236
1959	186,232	168,690	187,092	181,056	170,719	244,308	286,809	315,302	385,760	161,636	180,406	187,416	2,655,427
1960	184,572	174,012	186,852	181,065	237,445	237,449	211,878	322,216	335,024	158,730	180,433	187,311	2,596,988
1961	185,903	166,407	186,937	180,945	257,622	283,508	362,295	418,610	370,467	163,104	180,540	187,312	2,943,651
1962	184,117	168,411	186,835	181,074	232,843	279,311	407,066	420,575	388,156	164,629	180,400	187,330	2,980,748
1963	184,790	167,777	186,878	181,033	236,089	273,990	362,397	420,562	377,318	135,276	180,516	187,279	2,893,906
1964	183,990	174,921	186,811	181,133	147,700	277,066	389,445	381,464	260,483	127,559	180,810	186,683	2,678,064
1965	184,324	168,854	186,847	181,261	190,606	244,866	297,420	331,595	335,098	181,978	180,624	187,110	2,670,581
1966	183,888	168,897	186,891	181,105	221,548	256,906	297,227	324,064	171,191	127,043	181,343	184,551	2,484,654
1967	186,251	168,736	187,116	181,014	168,791	252,632	301,334	381,195	390,136	145,939	180,753	187,091	2,730,987
1968	183,688	174,963	186,715	181,124	233,847	273,069	342,669	382,631	257,282	126,386	181,219	184,050	2,707,643
1969	186,918	168,779	187,153	165,891	87,269	162,356	182,989	189,119	136,787	103,516	181,213	155,514	1,907,503
1970	13,945	11,737	13,125	17,669	85,087	165,026	192,640	216,269	160,843	124,222	181,052	183,872	1,365,486
1971	186,710	168,611	187,127	181,011	91,063	191,371	291,949	365,046	370,059	130,635	180,399	187,455	2,531,437
1972	184,914	173,332	186,914	180,839	251,754	317,377	409,286	418,539	358,499	127,911	180,823	186,689	2,976,877
1973	184,211	168,868	186,860	181,206	157,356	225,296	242,205	209,340	161,678	124,114	179,848	184,910	2,205,893
1974	187,027	168,885	187,137	85,026	120,568	204,942	190,222	202,569	154,823	120,532	177,955	186,957	1,986,641
1975	186,903	169,084	187,117	37,018	120,360	254,697	312,177	342,849	334,875	140,219	180,402	187,296	2,452,996
1976	184,035	174,914	186,904	181,103	227,703	248,729	213,914	241,991	158,666	121,245	177,999	186,075	2,303,279
1977	186,869	168,800	187,222	126,850	97,573	257,474	316,568	342,029	269,274	128,251	180,452	187,235	2,448,596
1978	185,913	166,532	186,952	180,894	248,286	253,859	255,056	211,875	158,538	121,988	179,116	185,239	2,334,249
1979	186,964	168,809	187,201	116,803	105,861	242,694	287,823	326,226	163,042	127,407	180,311	187,470	2,280,609
1980	184,738	173,850	186,912	181,048	237,501	260,612	326,859	417,240	357,301	163,244	180,444	187,054	2,856,802
1981	185,885	166,320	186,982	180,914	256,376	270,206	324,832	417,127	386,254	144,722	180,495	187,093	2,887,206
1982	185,748	166,756	186,942	180,854	244,387	265,825	308,493	322,958	266,659	133,746	180,366	187,462	2,630,194
1983	185,000	167,297	186,985	180,863	247,035	269,366	307,334	334,051	313,391	136,935	180,485	187,101	2,695,843
1984	186,036	172,331	186,958	180,917	247,998	266,724	313,812	341,715	249,524	127,332	180,985	186,909	2,641,240
1985	183,743	168,950	186,745	181,143	224,179	252,000	301,494	329,850	256,195	128,456	180,372	187,426	2,580,553
1986	184,430	168,158	186,864	181,043	233,972	248,643	233,393	209,933	160,741	157,695	180,476	186,994	2,332,342
1987	186,069	166,507	186,957	180,885	248,625	266,257	311,331	391,020	331,683	128,144	180,553	187,223	2,765,255
1988	183,833	174,954	186,781	181,134	237,688	270,273	324,307	364,345	345,064	144,341	180,448	187,248	2,780,416
1989	185,330	167,014	186,962	180,886	249,321	269,249	314,208	347,055	351,328	190,000	180,460	187,195	2,809,008
1990	185,238	167,211	186,931	181,107	267,358	354,319	418,642	420,354	406,209	218,722	180,356	187,427	3,173,873
1991	184,623	167,815	186,953	180,861	229,218	239,795	244,647	210,534	161,123	126,585	181,360	185,335	2,298,849
1992	185,009	174,872	186,879	181,308	153,406	169,788	283,327	279,515	162,811	125,442	181,177	184,127	2,267,661
1993	186,474	168,729	187,026	181,141	225,013	260,952	288,178	228,097	317,683	174,686	180,446	187,002	2,585,429
1994	186,420	166,065	186,978	180,882	258,338	282,816	334,709	382,416	274,094	126,790	181,366	185,642	2,746,515
1995	184,797	168,841	186,908	181,274	238,126	256,057	305,786	333,437	329,448	135,241	180,466	187,291	2,687,670
2002	186,775	168,697	187,167	181,010	140,946	186,123	191,584	263,298	311,575	231,419	181,451	187,596	2,417,642
2003	187,355	166,674	185,440	180,888	257,558	273,640	346,545	420,282	385,799	194,447	180,424	187,322	2,966,376
2004	185,005	173,602	186,930	180,922	264,681	306,936	406,130	415,751	281,993	126,641	181,301	184,357	2,894,249
2005	186,328	168,677	187,095	180,977	239,907	320,013	417,994	420,181	406,393	256,342	180,441	187,244	3,151,592
2006	184,833	167,727	186,990	180,883	240,619	269,541	323,263	404,466	381,622	250,645	180,505	186,968	2,958,061
2007	186,626	165,797	187,014	180,771	265,374	289,080	328,048	410,080	361,466	153,908	180,406	187,354	2,895,923

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Average Outflow
Low Watana Development : 245MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By: Leanne Andruszkiewicz, EIT. Date: 10/19/09
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs
52-year Average	6,719	6,966	7,382	7,378	8,810	10,419	11,149	12,524	10,888	5,116	6,263	6,532

Monthly Outflow Volume

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
units	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft
1950	438,527	412,847	489,313	503,007	252,597	440,319	465,338	529,076	339,861	260,180	398,431	433,448	4,962,943
1951	452,448	432,598	530,074	181,018	379,149	531,086	465,338	465,279	663,980	264,682	368,691	398,478	5,132,819
1952	417,788	396,231	457,096	473,906	440,582	584,646	686,661	712,671	604,214	293,891	363,776	388,677	5,820,140
1953	409,392	389,100	450,035	459,551	635,802	655,905	696,763	712,044	678,505	262,452	369,379	400,475	6,119,404
1954	421,054	398,522	460,441	480,718	619,559	638,670	682,266	703,011	544,532	260,196	373,965	403,831	5,986,764
1955	422,889	399,008	460,058	478,597	546,469	585,442	688,551	732,090	791,364	269,426	371,223	403,212	6,148,328
1956	424,799	402,243	465,885	491,674	611,602	644,079	747,629	1,051,137	973,640	353,669	365,803	392,592	6,924,752
1957	411,540	389,389	449,064	456,714	624,956	650,003	695,588	713,016	794,083	433,999	362,647	381,922	6,362,920
1958	399,137	377,547	438,433	442,027	637,292	651,802	693,679	766,613	492,846	260,196	381,553	413,479	5,954,602
1959	434,256	407,508	475,908	507,960	484,959	629,401	676,209	686,135	872,248	328,170	366,736	395,067	6,264,555
1960	413,154	391,482	450,844	460,252	626,620	600,420	502,723	700,197	692,731	321,830	365,071	390,140	5,915,463
1961	407,146	383,651	442,888	444,481	642,322	658,369	782,195	924,018	772,181	331,090	367,846	396,751	6,552,938
1962	415,147	392,538	451,514	459,916	623,034	654,440	888,927	1,144,121	905,729	333,647	365,636	392,958	7,027,607
1963	395,602	373,698	433,664	437,234	480,762	623,676	676,626	825,154	1,107,425	757,539	257,488	380,760	6,749,628
1964	417,955	397,143	458,455	477,994	420,551	652,390	847,271	807,833	535,122	260,196	371,128	402,011	6,048,051
1965	423,804	401,067	464,135	487,851	539,712	629,771	683,458	706,355	692,769	369,198	368,521	399,243	6,165,884
1966	419,442	396,906	457,033	470,340	614,052	638,724	683,654	701,458	356,326	260,196	381,009	413,238	5,792,378
1967	434,307	407,524	474,953	505,497	481,116	635,669	686,181	1,024,924	975,730	296,390	369,839	399,770	6,691,901
1968	418,322	395,424	452,912	461,496	623,713	650,774	739,258	812,841	529,034	260,196	384,079	417,753	6,145,803
1969	440,169	415,187	494,538	487,164	253,123	440,319	465,338	465,338	340,233	260,103	480,119	456,071	4,997,702
1970	42,581	35,704	39,965	54,094	247,474	440,319	465,338	476,205	340,045	260,196	387,390	416,117	3,205,427
1971	436,165	409,205	480,575	515,794	269,692	508,792	679,838	788,290	776,918	265,110	366,910	394,544	5,891,831
1972	411,622	388,540	446,819	450,903	637,646	715,265	890,442	896,974	753,332	260,196	370,861	402,187	6,624,787
1973	423,160	399,973	461,894	483,438	445,936	580,295	574,043	465,211	340,217	260,196	393,670	427,974	5,256,008
1974	448,618	425,555	517,128	256,117	345,020	535,727	465,338	465,338	340,130	260,196	407,843	440,896	4,907,905
1975	459,187	441,538	540,667	112,575	344,474	637,119	693,437	713,642	689,064	283,832	365,177	395,479	5,676,192
1976	417,120	396,624	457,737	474,386	618,949	632,818	508,778	532,557	340,233	260,106	402,058	432,919	5,474,286
1977	449,426	423,875	509,621	377,832	283,178	638,841	696,505	713,094	556,101	260,196	364,906	389,117	5,662,693
1978	406,880	384,295	443,701	447,278	635,194	636,991	604,237	467,693	340,233	260,148	397,528	429,784	5,453,963
1979	448,499	423,535	510,746	348,750	305,382	628,077	675,600	700,370	340,547	260,196	367,448	394,257	5,403,405
1980	412,396	390,848	450,203	457,864	626,761	641,769	715,842	896,025	737,656	330,717	363,705	387,431	6,411,216
1981	406,977	383,443	442,888	445,960	641,360	649,401	722,947	1,685,670	832,174	293,165	363,515	387,904	7,255,403
1982	407,517	385,498	445,454	449,885	632,131	645,849	691,116	686,867	552,637	270,986	366,161	394,364	5,928,465
1983	411,288	387,935	446,484	450,669	634,157	648,571	690,436	707,858	640,915	277,180	363,747	387,850	6,047,089
1984	406,281	383,813	442,518	445,194	634,940	646,384	694,679	712,893	513,377	260,196	372,779	401,560	5,914,613
1985	419,769	396,314	454,803	465,083	616,108	635,331	686,313	705,261	532,767	260,196	366,078	394,801	5,932,824
1986	413,791	391,529	450,593	458,838	623,949	632,906	555,615	465,262	340,068	320,780	362,850	386,229	5,402,409
1987	405,841	384,068	443,799	447,500	635,431	646,338	692,793	835,556	678,903	260,196	367,591	397,949	6,195,963
1988	417,756	395,926	454,750	466,443	626,753	648,871	701,495	762,153	720,052	292,448	364,703	390,944	6,242,295
1989	409,653	386,749	445,553	448,959	635,956	648,329	694,937	720,648	720,784	385,003	364,400	390,628	6,251,599
1990	410,042	387,638	446,390	448,775	649,325	782,543	1,003,820	1,227,147	1,342,348	448,433	366,227	394,881	7,907,567
1991	412,917	390,103	448,860	454,376	620,296	625,754	581,501	465,335	340,113	260,196	379,833	409,688	5,388,971
1992	428,590	402,963	464,048	482,245	433,591	444,371	669,509	612,560	340,196	260,196	385,135	415,087	5,338,491
1993	434,858	407,110	472,278	497,392	616,510	642,324	672,567	502,023	657,626	354,233	363,337	386,218	6,006,475
1994	404,247	381,456	441,159	443,283	642,932	657,786	708,367	812,679	561,739	260,196	378,718	408,238	6,100,800
1995	427,515	401,875	462,924	479,365	627,097	638,487	689,245	707,611	679,955	274,326	366,812	396,860	6,152,072
2002	437,641	409,941	479,224	510,498	405,460	492,285	465,338	578,597	645,466	469,690	383,978	395,210	5,673,328
2003	395,945	373,045	430,854	434,559	642,445	651,467	754,555	1,125,628	920,542	394,433	365,150	391,991	6,880,613
2004	411,129	389,824	449,508	455,506	647,350	678,567	888,294	895,033	585,582	260,196	382,908	414,110	6,458,007
2005	434,495	407,406	475,014	503,822	628,107	721,055	1,256,789	1,274,282	1,282,948	535,935	364,499	392,016	8,276,368
2006	411,920	389,865	449,232	454,785	629,042	648,584	700,792	1,375,566	834,379	508,283	363,365	385,694	7,151,508
2007	403,248	379,763	438,678	439,780	648,207	662,488	703,974	886,831	748,964	312,055	365,629	392,623	6,382,239

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Average Reservoir Elevation
Low Watana Development : 245MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By: Leanne Andruszkiewicz, EIT. Date: 10/19/09
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs
52-year Average	1,963	1,944	1,923	1,899	1,889	1,924	1,963	1,990	2,001	2,002	1,997	1,982

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft
1950	1,947	1,925	1,900	1,866	1,859	1,894	1,932	1,972	1,986	1,986	1,974	1,953
1951	1,930	1,907	1,876	1,851	1,863	1,898	1,932	1,968	2,000	2,007	2,002	1,987
1952	1,968	1,947	1,925	1,900	1,870	1,907	1,958	1,996	2,004	2,009	2,008	1,995
1953	1,976	1,956	1,933	1,910	1,909	1,945	1,972	1,995	2,006	2,007	2,001	1,985
1954	1,965	1,944	1,922	1,896	1,887	1,919	1,951	1,982	2,000	2,003	1,997	1,982
1955	1,963	1,944	1,922	1,897	1,873	1,905	1,961	1,992	2,010	2,007	2,000	1,982
1956	1,961	1,939	1,917	1,889	1,876	1,928	1,983	2,013	2,013	2,009	2,005	1,992
1957	1,974	1,955	1,935	1,912	1,894	1,936	1,971	1,996	2,010	2,011	2,009	2,001
1958	1,986	1,968	1,948	1,926	1,911	1,939	1,968	2,002	2,000	1,999	1,991	1,972
1959	1,952	1,932	1,909	1,879	1,867	1,906	1,942	1,978	2,012	2,008	2,004	1,990
1960	1,973	1,953	1,932	1,909	1,897	1,913	1,938	1,978	2,000	2,009	2,006	1,994
1961	1,979	1,962	1,942	1,923	1,919	1,949	1,992	2,011	2,010	2,008	2,003	1,989
1962	1,971	1,952	1,932	1,909	1,891	1,945	2,002	2,014	2,012	2,009	2,005	1,992
1963	1,990	1,972	1,953	1,931	1,907	1,898	1,943	1,995	2,014	2,010	2,008	2,002
1964	1,968	1,946	1,924	1,897	1,866	1,943	1,998	2,004	2,002	2,004	2,000	1,983
1965	1,962	1,941	1,918	1,891	1,871	1,907	1,953	1,986	2,000	2,008	2,002	1,986
1966	1,967	1,947	1,925	1,902	1,879	1,920	1,953	1,979	1,996	2,002	1,991	1,973
1967	1,952	1,932	1,910	1,880	1,867	1,916	1,957	2,003	2,012	2,007	2,001	1,986
1968	1,968	1,949	1,930	1,908	1,893	1,938	1,986	2,004	2,002	1,999	1,988	1,968
1969	1,945	1,922	1,897	1,863	1,858	1,885	1,910	1,923	1,918	1,912	1,896	1,862
1970	1,850	1,850	1,850	1,850	1,858	1,892	1,932	1,971	1,989	1,991	1,985	1,970
1971	1,951	1,929	1,906	1,874	1,852	1,890	1,948	1,993	2,009	2,007	2,003	1,991
1972	1,974	1,956	1,937	1,916	1,912	1,969	2,003	2,011	2,009	2,006	2,000	1,983
1973	1,963	1,942	1,920	1,894	1,870	1,904	1,941	1,967	1,991	1,990	1,979	1,958
1974	1,936	1,912	1,883	1,853	1,861	1,901	1,926	1,953	1,972	1,977	1,965	1,945
1975	1,923	1,900	1,870	1,850	1,861	1,918	1,968	1,997	2,003	2,009	2,006	1,990
1976	1,969	1,947	1,925	1,900	1,886	1,911	1,939	1,972	1,982	1,980	1,971	1,954
1977	1,934	1,913	1,888	1,857	1,857	1,921	1,972	1,996	2,001	2,008	2,006	1,995
1978	1,979	1,961	1,941	1,920	1,908	1,916	1,941	1,970	1,982	1,983	1,975	1,957
1979	1,936	1,914	1,887	1,856	1,858	1,904	1,944	1,983	1,994	2,004	2,003	1,991
1980	1,974	1,954	1,933	1,911	1,897	1,924	1,977	2,010	2,009	2,009	2,008	1,996
1981	1,979	1,962	1,942	1,921	1,917	1,934	1,971	2,013	2,012	2,009	2,008	1,996
1982	1,978	1,960	1,939	1,917	1,904	1,930	1,964	1,987	1,998	2,008	2,004	1,991
1983	1,975	1,957	1,938	1,917	1,907	1,933	1,963	1,989	2,006	2,009	2,008	1,996
1984	1,979	1,961	1,943	1,922	1,908	1,931	1,969	1,996	2,002	2,003	1,998	1,984
1985	1,966	1,948	1,927	1,906	1,882	1,915	1,957	1,985	1,998	2,008	2,004	1,991
1986	1,972	1,953	1,933	1,910	1,893	1,911	1,938	1,968	1,989	2,007	2,009	1,997
1987	1,980	1,961	1,941	1,920	1,909	1,930	1,967	2,004	2,008	2,007	2,003	1,987
1988	1,968	1,948	1,928	1,905	1,897	1,935	1,980	2,003	2,008	2,009	2,006	1,994
1989	1,976	1,958	1,939	1,918	1,909	1,933	1,970	1,999	2,009	2,010	2,007	1,994
1990	1,976	1,957	1,938	1,919	1,929	1,986	2,012	2,014	2,014	2,010	2,004	1,990
1991	1,973	1,955	1,935	1,913	1,887	1,901	1,940	1,969	1,990	2,000	1,992	1,976
1992	1,958	1,938	1,918	1,895	1,869	1,899	1,941	1,975	1,994	1,995	1,987	1,971
1993	1,952	1,932	1,912	1,885	1,883	1,924	1,947	1,972	2,000	2,009	2,008	1,997
1994	1,981	1,964	1,944	1,924	1,919	1,948	1,989	2,003	2,004	2,001	1,994	1,978
1995	1,959	1,940	1,919	1,897	1,897	1,919	1,962	1,988	2,001	2,008	2,004	1,988
2002	1,949	1,929	1,907	1,877	1,863	1,896	1,929	1,970	1,999	2,009	2,012	2,004
2003	1,989	1,973	1,956	1,935	1,918	1,938	1,985	2,014	2,012	2,009	2,006	1,993
2004	1,975	1,955	1,934	1,912	1,926	1,971	2,001	2,009	2,005	2,000	1,990	1,972
2005	1,952	1,932	1,910	1,881	1,899	1,969	2,012	2,014	2,014	2,012	2,007	1,993
2006	1,974	1,955	1,935	1,913	1,900	1,934	1,979	2,008	2,011	2,010	2,008	1,998
2007	1,982	1,966	1,948	1,928	1,927	1,954	1,983	2,006	2,009	2,008	2,005	1,992

Complete Scenario Data for Scenario - Full Watana 380MW
Written out on 10/15/2009 1:20:43 PM

System Misc. - 380MW Winter Demand
    Description -
    Notes -

CarryOver	MaxPeak	ForecastDays	ForecastAcr	WaterYearType
True	False	3	0.035	31

Loadshape Data - Sample
    Description - Sample
    Notes - Sample Data

IMonth	Period	Duration	Price
1	1	7	1
1	2	0	2
1	3	8	3
1	4	0	2
1	5	8	3
1	6	0	2
1	7	1	1
1	8	10	1
1	9	8	2
1	10	0	1
1	11	0	2
1	12	6	1
2	1	7	1
2	2	0	2
2	3	8	3
2	4	0	2
2	5	8	3
2	6	0	2
2	7	1	1
2	8	10	1
2	9	8	2
2	10	0	1
2	11	0	2
2	12	6	1
3	1	7	1
3	2	0	2
3	3	8	3
3	4	0	2
3	5	8	3
3	6	0	2
3	7	1	1
3	8	10	1
3	9	8	2
3	10	0	1
3	11	0	2
3	12	6	1
4	1	7	1
4	2	0	2
4	3	8	3
4	4	0	2
4	5	8	3
4	6	0	2
4	7	1	1
4	8	10	1
4	9	8	2

4	10	0	1
4	11	0	2
4	12	6	1
5	1	7	1
5	2	0	2
5	3	8	3
5	4	0	2
5	5	8	3
5	6	0	2
5	7	1	1
5	8	10	1
5	9	8	2
5	10	0	1
5	11	0	2
5	12	6	1
6	1	7	1
6	2	0	2
6	3	8	3
6	4	0	2
6	5	8	3
6	6	0	2
6	7	1	1
6	8	10	1
6	9	8	2
6	10	0	1
6	11	0	2
6	12	6	1
7	1	7	1
7	2	0	2
7	3	8	3
7	4	0	2
7	5	8	3
7	6	0	2
7	7	1	1
7	8	10	1
7	9	8	2
7	10	0	1
7	11	0	2
7	12	6	1
8	1	7	1
8	2	0	2
8	3	8	3
8	4	0	2
8	5	8	3
8	6	0	2
8	7	1	1
8	8	10	1
8	9	8	2
8	10	0	1
8	11	0	2
8	12	6	1
9	1	7	1
9	2	0	2
9	3	8	3
9	4	0	2
9	5	8	3
9	6	0	2
9	7	1	1
9	8	10	1
9	9	8	2
9	10	0	1
9	11	0	2
9	12	6	1

10	1	7	1
10	2	0	2
10	3	8	3
10	4	0	2
10	5	8	3
10	6	0	2
10	7	1	1
10	8	10	1
10	9	8	2
10	10	0	1
10	11	0	2
10	12	6	1
11	1	7	1
11	2	0	2
11	3	8	3
11	4	0	2
11	5	8	3
11	6	0	2
11	7	1	1
11	8	10	1
11	9	8	2
11	10	0	1
11	11	0	2
11	12	6	1
12	1	7	1
12	2	0	2
12	3	8	3
12	4	0	2
12	5	8	3
12	6	0	2
12	7	1	1
12	8	10	1
12	9	8	2
12	10	0	1
12	11	0	2
12	12	6	1

Scenario Information for Watana

Physical Setting Conditions, Name - Full Watana Only Settings
Description -
Notes -

Res_Storage Data - Watana Reservoir Curve
Description -
Notes - Data from 1985 ammendment to the FERC application for Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Storage	Sedimentation	Sed_File
1400	0	False	
1500	0	False	
1600	85600	False	
1700	450400	False	
1800	1298500	False	
1900	2630700	False	

2000	4336800	False
2100	6713100	False
2200	1E+07	False

Tailwater Data - Watana Tailwater Rating
Description -
Notes - Data from 1985 ammendment to the FERC application Figure B.4.2.3. -DEE 12-11-2008

Flow	Elevation
0	1450
8000	1455
27000	1460
53000	1465
92000	1470
140000	1475
160000	1477

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - None

Elevation	Flow

Outlet2 Data - Full Watana Spillway Capacity
Description -
Notes - Based on minimum and maximum operating limits of the spillway from the 1985 ammendment to the FERC application. -DEE 12-11-2008

Elevation	Flow
2193	220000
2199.3	259600

Outlet3 Data - None

Elevation	Flow

Plant_Options Data - Watana Only Plant Options
Description -
Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type
0	0	False	1

Res_Area Data - Watana Reservoir Area
Description -
Notes - Data from the 1985 ammendment to the FERC application Figure B.3.2.1. -DEE 12-11-2008

Elevation	Area	Sedimentation	Sed_File
1500	0	False	
1600	3333	False	
1700	6000	False	
1800	10000	False	

1900	15000	False
2000	21000	False
2100	33333	False
2200	40000	False

Evaporation Data - Watana Evaporation
    Description - BPK 2008-12-16
    Notes - Based on information from table B.3.1.11 from the 1985 ammendment to the FERC application. A reservoir area of 40000 acres has been assumed. -DEE. Modified for units of ft per acre per day.

iMonth	Coeff
5	0.00672
6	0.006667
7	0.006183
8	0.004839
9	0.002778

Operating Setting Conditions, Name - Full Watana Winter Optimization
Description -
Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - Watana Only Daily Average Flows
    Description -
    Notes - Based on environmental flow case E-VI from 1985 ammendment to FERC application Table B.3.3.1, taking into account drainage area proation. -DEE 12-11-2008

IDay	Data	OrInflow	Dependent
1	1682	False	False
125	1682	False	False
126	3364	False	False
132	3364	False	False
133	5045	False	False
153	5045	False	False
154	7568	False	False
244	7568	False	False
245	6727	False	False
251	6727	False	False
252	5886	False	False
258	5886	False	False
259	5045	False	False
287	5045	False	False
288	4205	False	False
294	4205	False	False
295	3364	False	False
301	3364	False	False
302	2523	False	False
336	2523	False	False
337	1682	False	False
365	1682	False	False

Target_Elev Data - Full Watana Winter Optimization
    Description -

Notes -

IDay	Elevation
1	2150
121	2065
152	2087
182	2120
213	2147
244	2170
274	2185
305	2192
365	2150

Flood_Elev Data - Full Watana Flood Elevation

Description -

Notes - Data from 1985 ammendment to the FERC application for Susitna Table B.3.2.1. -DEE 12-11-2008

IDay	Elevation
1	2193
365	2193

Min_Elev Data - Full Watana Minimum Elevations

Description -

Notes - Data from 1985 ammendment to the FERC application for Susitna Table B.3.2.1. -DEE 12-11-2008

IDay	Elevation
1	2065
365	2065

Level_Fluct Data - None

IDay	Elevation	Hard	PercentAbove

Level_Rate Data - None

IDay	Rate

Flashboard Data - None

Elevation	Flow	Trip	Reset

Bypass Data - None

IDay	Data	OrInflow	Destination

Ramp_Rate Data - None

IDay	UpRampDay	UpRampHour	DownRampDay	DownRampHour	Type

Withdrawal Data - None

IDay	Withdrawal	Return	UseProjected	FileName

Rec_Flows Data - None

IDay	Data	StartHr	EndHr

Generating Setting Conditions, Name - Full Watana Generating Settings
Description -
Notes -

Plant_Generation Data - Full Watana Plant Generation
Description -
Notes - Full size Watana with 6 turbines rated at 680 feet of head. -DEE 12_3_2008

Unit_No	Head_Loss_ID	Generator_Per	Turbine_Perf_	Gate_Leakage
1	6	7	4	0
2	6	7	4	0
3	6	7	4	0
4	6	7	4	0
5	6	7	4	0
6	6	7	4	0

Head Loss Data, ID = - 6, Name = Watana III Headloss
Description -
Notes - Headloss as calculated using Susitna Headloss Calculations.xls spreadsheet built by David Elwood and checked by Leanne Andruszkiewicz -DEE 12_3_2008. 8.1ft common HL.

Unit_No	Unit_HL	Common_HL	Use_Com2	Max_Unit
1	2.93411E-07	1.5839E-08	0	6
2	2.97552E-07	1.5839E-08	0	6
3	3.00324E-07	1.5839E-08	0	6
4	3.03776E-07	1.5839E-08	0	6
5	2.97909E-07	0	1	6
6	3.06497E-07	0	1	6

Turbine Performance, ID = - 4, Name = Full Watana Turbine Efficiency
Description -
Notes - Based on the turbine efficiency curves from the 1985 ammendment to the FERC application with a design head of 680 feet. Assumed a 2% loss in efficiency for every 100 feet of headloss. -DEE 12-11-2008

Head	Flow	Eff
555	1174.45	0.686
555	1626.16	0.836
555	2348.9	0.906
555	2619.93	0.911
555	2800.62	0.906
555	3252.33	0.876
600	1221.14	0.704
600	1690.81	0.854
600	2442.27	0.924
600	2724.08	0.929
600	2911.94	0.924
600	3381.61	0.894
680	1300	0.72

680	1800	0.87
680	2600	0.94
680	2900	0.945
680	3100	0.94
680	3600	0.91
710	1328.37	0.72
710	1839.28	0.87
710	2656.73	0.94
710	2963.28	0.945
710	3167.64	0.94
710	3678.55	0.91
740	1356.14	0.72
740	1877.73	0.87
740	2712.28	0.94
740	3025.24	0.945
740	3233.87	0.94
740	3755.47	0.91

Generator Performance Data, ID = - 7, Name = Watana Generator Performance
Description -
Notes - Generator efficiency curve based on data for as-built large hydro generators -DEE 12_4_2008

gOutput	Eff	Cap
44	0.9283	230
65	0.95	230
86	0.9608	230
108	0.968	230
130	0.9715	230
143	0.9732	230
156	0.9748	230
165	0.9756	230
174	0.9764	230
200	0.9781	230
219.51	0.9781	230
230	0.9781	230

Maintenance Data - None

IDay	Unit

Min_Unit Data - None

Head	Flow	Eff	CenterLine	Headloss	GeneratorEff	OpStyle

Scenario Information for Devil Canyon

Physical Setting Conditions, Name - No Devil Canyon
Description -
Notes -

Res_Storage Data - Devil Canyon Reservoir Volume

Description -
Notes - Data from 1985 ammendment to the FERC applicationf ro Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Storage	Sedimentation	Sed_File
800	0	False	
900	0	False	
1000	9800	False	
1100	52490	False	
1200	139670	False	
1300	326770	False	
1400	701970	False	
1450	1046350	False	

Tailwater Data - Devil Canyon Tailwater Rating
Description -
Notes - Data from 1985 ammendment to the FERC application for the Susitna Project -DEE

Flow	Elevation
0	845
9000	850
26000	855
60000	860
119000	865
200000	870

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - No Dam
Description - BPK 2008-12-16
Notes - Dummy data to allow all inflows to exit through the non-existant dam. Should only be used for reservoir filling scenarios.

Elevation	Flow
1	1000000

Outlet2 Data - No Devil Canyon Spillway Capacity
Description -
Notes -

Elevation	Flow
1401	240000
1401.5	309000

Outlet3 Data - None

Elevation	Flow

Plant_Options Data - No Devil Canyon
Description -
Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type

0	0	False	0

Res_Area Data - Devil Canyon Reservoir Area
Description -
Notes - Data from 1985 ammendment to the FERC application for Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Area	Sedimentation	Sed_File
900	0	False	
1000	100	False	
1100	800	False	
1200	1200	False	
1300	2200	False	
1400	6300	False	
1450	7200	False	

Evaporation Data - Devil Canyon Evaporation
Description - BPK 2008-12-16
Notes - As per table B.3.1.11 from 1985 ammendment to the FERC application. Assumes reservoir area of 7200 acres. -DEE
Modified for units of ft per acre per day.

iMonth	Coeff
5	0.007258
6	0.0075
7	0.006989
8	0.005108
9	0.003333

Operating Setting Conditions, Name - No Devil Canyon
Description -
Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - None

IDay	Data	OrInflow	Dependent

Target_Elev Data - No Devil Canyon
Description -
Notes -

IDay	Elevation
1	1200
365	1200

Flood_Elev Data - No Devil Canyon Flood Elevations
Description -
Notes -

IDay	Elevation
1	1401

365 1401

Min_Elev Data - Devil Canyon Fill Minimum Elevations
Description -
Notes -

IDay	Elevation
1	890
365	890

Level_Fluct Data - None

IDay	Elevation	Hard	PercentAbove

Level_Rate Data - None

IDay	Rate

Flashboard Data - None

Elevation	Flow	Trip	Reset

Bypass Data - None

IDay	Data	OrInflow	Destination

Ramp_Rate Data - None

IDay	UpRampDay	UpRampHour	DownRampDay	DownRampHour	Type

Withdrawal Data - None

IDay	Withdrawal	Return	UseProjected	FileName

Rec_Flows Data - None

IDay	Data	StartHr	EndHr

Generating Setting Conditions, Name - No Devil Canyon
Description -
Notes -

Plant_Generation Data - None

Unit_No	Head_Loss_ID	Generator_Per	Turbine_Perf_	Gate_Leakage

Maintenance Data - None

IDay	Unit

Min_Unit Data - None

Head	Flow	Eff	CenterLine	Headloss	GeneratorEff	OpStyle

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Energy Production Estimates
Watana Development : 380MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By: Leanne Andruszkiewicz, EIT. Date: 10/19/09
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
units	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh
52-year Average	280,383	254,278	278,933	260,554	498,137	443,139	369,905	325,660	237,315	169,247	275,288	284,429	3,677,268

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
units	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh
1950	284,518	256,870	283,172	273,936	503,555	251,831	276,237	287,118	212,584	162,807	275,546	283,767	3,351,940
1951	283,175	255,950	284,669	172,246	168,149	252,269	276,096	285,224	215,461	167,521	275,323	284,533	2,920,616
1952	284,707	265,622	283,178	274,060	343,581	310,428	305,753	331,519	219,709	170,147	275,259	284,514	3,348,476
1953	284,527	257,048	284,211	274,053	597,274	605,277	312,151	291,495	217,898	168,386	275,307	284,531	3,852,158
1954	284,600	256,821	283,173	273,943	571,692	375,583	280,278	291,207	218,283	168,043	275,316	284,536	3,563,475
1955	284,549	257,133	283,153	273,992	502,328	324,959	344,524	329,626	237,491	170,756	275,252	284,519	3,568,281
1956	284,523	266,413	283,691	274,040	584,400	600,771	541,254	380,691	231,298	171,946	275,192	284,486	4,178,705
1957	284,529	256,992	284,839	274,405	598,019	609,793	377,896	293,586	220,229	171,861	275,251	284,468	3,931,869
1958	284,516	256,995	284,559	275,265	607,544	608,815	335,947	334,154	217,603	166,679	275,322	284,514	3,931,912
1959	284,911	255,709	283,154	274,879	496,754	266,927	280,417	348,081	316,471	171,184	275,236	284,507	3,538,230
1960	284,534	266,159	284,891	273,985	596,096	436,237	278,633	290,742	218,923	170,915	275,238	284,509	3,660,863
1961	284,539	256,991	284,899	274,486	608,821	612,639	514,075	320,731	219,649	169,801	275,277	284,531	4,106,439
1962	284,533	257,142	284,036	274,056	584,300	603,956	616,364	305,141	247,925	171,372	275,223	284,499	4,188,546
1963	284,531	256,984	284,996	273,960	595,524	608,429	648,221	346,332	220,452	169,986	275,267	284,525	4,249,205
1964	284,521	266,502	283,471	274,027	449,201	604,345	540,696	292,604	216,182	166,248	275,328	284,513	3,937,636
1965	284,790	255,737	283,132	275,125	375,338	276,174	283,741	294,558	220,297	172,207	275,272	284,488	3,280,858
1966	284,529	256,984	285,045	274,031	592,951	601,427	311,919	292,021	217,540	167,364	275,316	284,519	3,843,645
1967	285,090	255,672	283,170	274,595	514,257	330,658	283,099	569,983	318,106	170,895	275,251	284,521	3,845,296
1968	284,536	266,182	284,725	274,021	593,012	606,684	476,352	293,795	217,077	166,200	275,317	284,608	4,022,510
1969	284,170	255,774	283,025	275,802	248,031	249,281	270,131	273,763	199,182	151,758	274,990	284,125	3,050,031
1970	74,687	19,474	21,669	27,409	134,799	248,054	273,385	283,782	210,746	161,761	275,639	283,906	2,015,311
1971	283,186	255,667	284,741	225,928	92,729	247,873	280,207	365,364	226,823	170,773	275,251	284,516	2,993,057
1972	284,538	266,165	285,081	274,024	604,928	630,184	653,935	295,580	219,351	168,722	275,301	284,531	4,242,339
1973	284,547	257,060	283,160	273,978	458,180	295,597	280,237	287,438	213,995	163,890	275,317	284,577	3,357,974
1974	283,168	255,701	284,554	254,194	181,399	263,322	273,404	280,329	208,342	160,468	275,054	283,185	3,003,118
1975	283,098	257,127	283,945	60,901	165,803	377,564	330,989	293,957	218,560	170,035	275,258	284,520	3,001,757
1976	284,521	266,505	283,471	274,039	581,149	392,158	278,415	287,623	212,296	162,326	275,594	283,891	3,581,990
1977	283,191	255,700	284,623	274,743	138,639	506,215	282,998	292,373	216,921	167,789	275,319	284,541	3,263,055
1978	284,519	257,525	283,155	274,044	580,625	294,498	277,261	285,450	210,795	161,618	275,762	283,475	3,468,728
1979	283,180	255,867	284,787	188,934	138,514	273,119	281,293	293,920	217,693	167,984	275,318	284,539	2,945,147
1980	284,522	266,616	283,319	274,044	579,248	404,386	463,759	311,836	219,605	170,088	275,262	284,515	3,817,201
1981	284,536	256,985	284,805	274,003	601,747	498,034	480,669	692,260	282,270	171,079	275,218	284,493	4,386,099
1982	284,531	256,987	284,988	274,099	598,468	585,838	283,107	291,972	216,785	168,783	275,299	284,538	3,805,396
1983	284,528	257,334	283,608	274,057	586,471	455,218	281,402	291,187	218,601	169,043	275,285	284,534	3,661,268
1984	284,534	266,316	284,182	274,054	587,532	457,483	283,036	292,923	217,444	167,117	275,328	284,538	3,674,488
1985	284,690	256,625	283,187	273,981	524,460	313,042	282,940	292,849	218,402	169,497	275,281	284,531	3,459,487
1986	284,528	257,241	283,759	274,053	581,396	350,378	278,289	286,457	212,862	165,602	275,332	284,533	3,534,429
1987	284,756	256,430	283,187	273,946	563,912	295,944	280,711	294,349	219,247	169,011	275,292	284,531	3,481,315
1988	284,516	266,735	283,077	274,037	583,618	548,910	302,780	293,780	219,297	169,428	275,278	284,530	3,785,985
1989	284,534	257,105	284,236	274,057	592,435	520,254	282,841	293,593	219,391	170,390	275,251	284,514	3,738,603
1990	284,534	256,991	284,769	274,032	614,223	641,876	678,840	456,607	538,587	176,936	275,245	284,480	4,767,122
1991	284,529	256,997	284,685	274,902	596,749	441,021	282,572	290,373	215,480	166,346	275,325	284,521	3,653,500
1992	285,117	264,799	283,185	274,048	352,331	252,123	279,241	290,579	216,096	165,651	275,328	284,562	3,223,060
1993	284,521	255,764	283,151	274,813	562,894	375,632	277,926	286,272	215,618	168,292	275,299	284,538	3,544,721
1994	284,531	257,221	283,826	274,076	592,256	595,180	312,983	291,347	215,852	165,328	275,328	284,601	3,832,530
1995	284,435	255,776	283,138	275,047	550,988	253,482	282,464	292,312	218,420	169,849	275,272	284,525	3,425,709
2002	284,492	257,216	283,150	274,009	568,549	299,386	275,647	286,343	216,604	169,474	275,257	284,490	3,474,616
2003	284,529	257,005	284,630	275,038	603,519	596,003	492,980	345,069	243,814	171,694	275,186	284,486	4,113,953
2004	284,529	266,168	284,912	274,273	621,789	637,700	663,099	297,203	218,559	167,036	275,320	284,520	4,275,109
2005	285,021	255,679	283,168	274,353	583,743	618,419	674,918	523,328	494,320	212,752	275,081	284,464	4,765,244
2006	284,523	256,996	284,671	274,975	605,861	611,510	515,600	520,497	324,996	185,537	274,950	284,449	4,424,564
2007	284,512	257,001	284,523	275,824	643,341	626,352	513,366	294,981	220,260	170,463	275,256	284,518	4,130,396

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Average Outflow
Watana Development : 380MW November-April Demand
By: HDR
By: David Elwood, EIT. Date: 9/30/09
Checked By: Leanne Andruszkiewicz, EIT. Date: 10/19/09
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs
52-year Average	7,409	7,410	7,595	7,460	13,892	12,681	9,889	8,592	6,269	4,283	7,291	7,429

Monthly Outflow Volume

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
units	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft
1950	462,376	423,543	475,470	469,784	895,084	440,319	465,338	465,338	340,233	260,196	449,774	470,391	5,617,846
1951	478,653	441,783	506,644	316,548	305,182	440,319	465,338	465,338	340,218	260,075	438,465	458,164	4,916,727
1952	464,190	424,358	477,372	471,929	614,741	536,439	501,676	523,864	340,134	260,193	431,970	451,162	5,498,028
1953	456,849	418,098	469,267	460,924	1,018,832	1,020,391	515,011	465,338	340,135	260,042	436,919	456,870	6,318,676
1954	462,892	423,725	475,644	469,802	1,005,497	652,267	465,338	465,338	340,131	260,011	437,150	456,630	5,914,425
1955	462,096	423,176	473,729	467,639	889,635	561,301	567,185	520,618	364,845	260,196	432,539	452,429	5,875,387
1956	458,348	420,108	470,537	463,459	1,012,152	1,017,974	888,098	601,138	355,266	260,196	429,453	448,396	6,825,125
1957	453,691	414,573	465,393	455,371	1,019,268	1,022,645	621,147	465,338	340,229	260,196	428,420	446,387	6,392,660
1958	451,163	412,264	462,207	453,630	1,024,160	1,022,221	552,936	528,648	340,233	260,196	440,488	460,716	6,408,861
1959	467,645	426,251	481,104	477,846	895,014	464,309	465,338	552,807	487,357	260,196	430,980	450,080	5,858,927
1960	455,241	416,145	467,537	457,138	1,018,261	746,816	465,338	465,338	340,146	260,196	431,025	449,875	5,973,056
1961	454,688	415,118	465,878	454,882	1,024,761	1,024,096	840,206	506,240	340,092	260,192	433,849	453,157	6,673,159
1962	458,416	419,255	469,704	461,166	1,012,161	1,019,405	1,000,405	481,092	381,148	260,196	430,408	449,547	6,842,904
1963	450,217	411,288	460,734	452,724	516,945	1,014,412	1,056,917	1,040,392	470,903	338,524	263,261	448,432	6,924,748
1964	458,940	420,845	471,090	464,750	791,877	1,019,413	879,688	465,338	340,233	260,196	440,727	460,665	6,473,759
1965	467,890	427,260	482,515	480,244	676,461	480,266	465,880	465,338	340,195	260,196	429,560	448,973	5,424,778
1966	454,566	415,548	467,026	455,994	1,016,699	1,018,321	514,923	465,338	340,233	260,196	439,885	460,139	6,308,868
1967	467,334	425,470	480,013	475,710	924,346	574,147	465,970	894,767	489,721	260,196	432,164	451,568	6,341,406
1968	456,797	417,433	468,382	457,765	1,016,649	1,021,036	780,346	465,338	340,233	260,196	442,016	462,942	6,589,133
1969	469,628	430,657	486,518	487,961	449,737	440,319	465,338	465,338	340,233	260,196	478,463	511,342	5,285,730
1970	139,737	36,066	40,132	54,311	247,633	440,319	465,338	465,338	340,233	260,196	450,568	469,797	3,409,667
1971	476,714	438,862	502,259	413,111	174,305	440,319	465,338	578,721	348,408	260,196	431,710	450,632	4,980,575
1972	455,570	416,087	467,248	455,893	1,022,711	1,032,768	1,050,251	466,313	340,077	260,086	436,145	456,035	6,859,183
1973	461,977	423,213	474,117	468,191	813,302	511,915	465,338	465,338	340,186	260,196	446,820	468,502	5,599,096
1974	474,744	437,438	499,706	462,689	329,667	460,853	465,338	465,338	340,233	260,196	454,132	475,477	5,125,812
1975	484,667	450,754	514,294	113,264	301,421	656,849	543,217	465,338	340,101	260,194	432,867	452,897	5,015,862
1976	458,921	420,868	471,023	464,385	1,010,534	680,124	465,338	465,338	340,233	260,196	450,217	469,624	5,956,800
1977	476,292	437,952	499,242	498,196	253,473	876,271	465,338	465,338	340,233	260,134	436,713	455,712	5,464,894
1978	460,777	422,262	471,205	464,434	1,010,267	513,134	465,338	465,338	340,233	260,196	451,491	470,754	5,795,429
1979	479,100	441,542	505,831	346,429	253,427	474,926	465,338	465,338	340,111	259,990	436,017	454,754	4,922,802
1980	460,012	421,681	471,114	464,265	1,009,538	700,383	759,429	491,689	340,151	260,196	432,121	451,085	6,261,664
1981	456,486	416,773	467,920	457,204	1,021,162	847,759	787,421	1,088,065	433,949	260,196	430,026	449,129	7,116,089
1982	454,523	415,323	466,589	455,686	1,019,513	995,610	465,398	465,338	340,124	260,065	435,598	454,979	6,228,746
1983	459,949	420,892	470,296	462,597	1,013,277	781,957	465,338	465,338	340,135	260,073	434,106	453,304	6,027,262
1984	458,462	419,239	469,491	460,285	1,013,848	789,168	465,338	465,338	340,233	260,196	439,042	458,371	6,039,011
1985	464,041	423,937	475,559	468,664	932,119	544,887	465,338	465,338	340,088	260,157	434,176	453,631	5,727,933
1986	459,070	420,161	470,210	462,477	1,010,655	608,348	465,338	465,338	340,115	260,196	439,045	458,517	5,859,469
1987	464,669	424,348	476,714	470,095	998,089	516,158	465,338	465,338	340,108	260,106	435,127	454,915	5,771,005
1988	460,520	422,493	471,438	464,967	1,011,753	939,788	496,403	465,338	340,084	260,125	433,647	452,993	6,219,550
1989	458,255	418,883	469,302	459,981	1,016,393	891,413	465,338	465,338	340,089	260,195	431,755	451,107	6,128,050
1990	456,488	417,102	468,167	456,872	1,027,390	1,038,582	1,081,230	720,960	825,833	267,091	428,935	447,971	7,636,621
1991	453,095	413,884	463,958	454,441	1,018,695	759,717	465,338	465,338	340,233	260,196	440,967	460,699	5,996,560
1992	467,486	425,430	479,368	472,704	629,843	440,319	465,338	465,338	340,233	260,196	442,490	462,380	5,351,124
1993	468,545	427,647	482,023	477,673	1,000,741	651,678	465,338	465,338	340,233	260,094	435,089	454,140	5,928,539
1994	459,198	420,000	470,008	461,610	1,016,297	1,015,135	515,641	465,338	340,233	260,196	443,031	463,010	6,329,696
1995	469,043	428,422	482,885	478,989	978,652	440,319	465,338	465,338	340,097	260,189	433,486	453,169	5,695,925
2002	462,010	423,213	473,283	466,878	1,003,866	523,122	465,338	465,338	340,174	260,124	430,490	448,199	5,762,036
2003	453,172	413,755	463,318	454,140	1,022,147	1,012,026	808,538	544,663	374,824	260,196	429,393	448,537	6,684,709
2004	453,865	414,949	466,007	455,319	1,031,197	1,036,581	1,063,986	468,854	340,233	260,196	440,423	460,439	6,892,049
2005	467,366	425,595	480,174	475,031	1,011,642	1,026,852	1,079,121	825,267	759,131	321,135	427,707	447,164	7,746,186
2006	452,629	413,628	463,791	454,366	1,023,236	1,023,583	844,396	816,450	499,621	280,337	426,839	445,621	7,144,496
2007	450,430	411,180	460,252	451,687	1,063,626	1,031,111	838,298	465,338	340,201	260,196	432,063	451,202	6,655,584

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Average Reservoir Elevation
Watana Development : 380MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By: Leanne Andruszkiewicz, EIT. Date: 10/19/09
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
52-year Average	2,144	2,133	2,121	2,109	2,098	2,109	2,129	2,149	2,163	2,169	2,166	2,156

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
1950	2,144	2,132	2,119	2,106	2,088	2,097	2,117	2,139	2,147	2,147	2,140	2,128
1951	2,115	2,102	2,085	2,067	2,074	2,098	2,117	2,135	2,157	2,167	2,162	2,152
1952	2,141	2,129	2,116	2,103	2,082	2,102	2,132	2,157	2,170	2,178	2,176	2,166
1953	2,155	2,143	2,130	2,118	2,112	2,119	2,130	2,149	2,165	2,171	2,166	2,155
1954	2,143	2,131	2,119	2,106	2,095	2,103	2,125	2,148	2,166	2,169	2,165	2,155
1955	2,144	2,133	2,121	2,109	2,090	2,102	2,132	2,155	2,176	2,180	2,175	2,164
1956	2,152	2,139	2,127	2,114	2,103	2,116	2,135	2,158	2,176	2,185	2,181	2,172
1957	2,161	2,150	2,139	2,127	2,112	2,122	2,133	2,154	2,172	2,185	2,184	2,176
1958	2,166	2,155	2,144	2,132	2,119	2,121	2,132	2,156	2,163	2,163	2,158	2,147
1959	2,135	2,124	2,111	2,098	2,082	2,100	2,125	2,150	2,176	2,182	2,178	2,168
1960	2,158	2,147	2,135	2,123	2,111	2,109	2,122	2,147	2,168	2,181	2,178	2,169
1961	2,159	2,149	2,138	2,128	2,119	2,124	2,137	2,157	2,170	2,176	2,172	2,162
1962	2,151	2,141	2,129	2,118	2,103	2,118	2,141	2,158	2,176	2,183	2,179	2,170
1963	2,168	2,158	2,147	2,135	2,122	2,111	2,122	2,140	2,160	2,173	2,177	2,172
1964	2,150	2,138	2,126	2,113	2,091	2,119	2,139	2,151	2,158	2,162	2,158	2,147
1965	2,134	2,122	2,110	2,095	2,080	2,101	2,132	2,156	2,172	2,186	2,181	2,171
1966	2,159	2,148	2,137	2,125	2,109	2,116	2,129	2,150	2,163	2,166	2,159	2,148
1967	2,136	2,125	2,113	2,100	2,083	2,103	2,130	2,160	2,176	2,181	2,176	2,165
1968	2,155	2,144	2,133	2,122	2,109	2,120	2,136	2,154	2,161	2,161	2,155	2,143
1969	2,130	2,117	2,104	2,088	2,077	2,091	2,105	2,112	2,109	2,106	2,097	2,079
1970	2,065	2,065	2,065	2,065	2,070	2,088	2,111	2,132	2,141	2,143	2,139	2,129
1971	2,117	2,105	2,089	2,071	2,065	2,088	2,125	2,155	2,176	2,180	2,177	2,167
1972	2,157	2,147	2,136	2,125	2,117	2,135	2,147	2,157	2,169	2,172	2,167	2,156
1973	2,144	2,133	2,121	2,108	2,088	2,102	2,125	2,140	2,152	2,152	2,145	2,133
1974	2,120	2,107	2,092	2,073	2,071	2,097	2,111	2,125	2,135	2,138	2,131	2,119
1975	2,107	2,093	2,075	2,065	2,072	2,103	2,133	2,155	2,167	2,178	2,174	2,163
1976	2,150	2,138	2,126	2,113	2,101	2,104	2,121	2,140	2,146	2,145	2,139	2,129
1977	2,118	2,107	2,093	2,075	2,070	2,104	2,131	2,151	2,161	2,168	2,166	2,157
1978	2,147	2,136	2,125	2,113	2,101	2,100	2,119	2,135	2,142	2,142	2,137	2,126
1979	2,114	2,102	2,086	2,068	2,070	2,100	2,127	2,154	2,164	2,169	2,168	2,159
1980	2,148	2,137	2,125	2,113	2,100	2,105	2,134	2,158	2,170	2,178	2,176	2,166
1981	2,155	2,145	2,134	2,123	2,115	2,113	2,132	2,162	2,176	2,182	2,180	2,170
1982	2,159	2,149	2,137	2,125	2,113	2,114	2,131	2,150	2,161	2,172	2,168	2,159
1983	2,148	2,138	2,127	2,116	2,105	2,108	2,127	2,148	2,166	2,174	2,171	2,162
1984	2,151	2,141	2,130	2,119	2,105	2,107	2,131	2,152	2,163	2,165	2,161	2,152
1985	2,141	2,130	2,119	2,107	2,088	2,102	2,131	2,152	2,166	2,175	2,171	2,161
1986	2,150	2,139	2,128	2,116	2,101	2,103	2,121	2,138	2,148	2,160	2,161	2,151
1987	2,140	2,129	2,117	2,105	2,091	2,100	2,126	2,155	2,169	2,173	2,169	2,159
1988	2,147	2,136	2,124	2,112	2,103	2,111	2,133	2,154	2,169	2,175	2,172	2,163
1989	2,152	2,141	2,130	2,119	2,109	2,110	2,130	2,154	2,169	2,179	2,176	2,166
1990	2,155	2,145	2,134	2,124	2,123	2,142	2,152	2,159	2,178	2,187	2,183	2,173
1991	2,162	2,152	2,141	2,130	2,111	2,107	2,130	2,146	2,157	2,162	2,157	2,147
1992	2,136	2,125	2,114	2,102	2,083	2,097	2,123	2,147	2,158	2,159	2,154	2,144
1993	2,133	2,122	2,110	2,098	2,089	2,103	2,120	2,137	2,157	2,171	2,169	2,160
1994	2,150	2,139	2,128	2,117	2,109	2,112	2,131	2,148	2,157	2,158	2,153	2,143
1995	2,131	2,120	2,109	2,097	2,089	2,100	2,130	2,151	2,167	2,177	2,173	2,162
2002	2,144	2,133	2,122	2,110	2,093	2,099	2,116	2,138	2,161	2,176	2,179	2,172
2003	2,162	2,152	2,142	2,130	2,116	2,115	2,133	2,158	2,176	2,184	2,181	2,172
2004	2,161	2,149	2,138	2,126	2,128	2,140	2,147	2,157	2,166	2,165	2,158	2,147
2005	2,136	2,125	2,113	2,100	2,103	2,128	2,150	2,160	2,177	2,188	2,185	2,174
2006	2,163	2,152	2,141	2,130	2,118	2,123	2,136	2,160	2,177	2,187	2,186	2,178
2007	2,168	2,158	2,148	2,137	2,130	2,132	2,137	2,157	2,172	2,179	2,176	2,166

Complete Scenario Data for Scenario - Full Watana with Devil Canyon
Written out on 10/19/2009 3:43:13 PM

System Misc. - Susitna System Settings
    Description -
    Notes - Assumes a 2% transformer loss and a 1.5% annual outage based on conversations with Stephen Spain and Bill Holeck. -DEE 12_8_2008

CarryOver	MaxPeak	ForecastDays	ForecastAcr	WaterYearType
True	False	3	0.035	0

Loadshape Data - Sample
    Description - Sample
    Notes - Sample Data

IMonth	Period	Duration	Price
1	1	7	1
1	2	0	2
1	3	8	3
1	4	0	2
1	5	8	3
1	6	0	2
1	7	1	1
1	8	10	1
1	9	8	2
1	10	0	1
1	11	0	2
1	12	6	1
2	1	7	1
2	2	0	2
2	3	8	3
2	4	0	2
2	5	8	3
2	6	0	2
2	7	1	1
2	8	10	1
2	9	8	2
2	10	0	1
2	11	0	2
2	12	6	1
3	1	7	1
3	2	0	2
3	3	8	3
3	4	0	2
3	5	8	3
3	6	0	2
3	7	1	1
3	8	10	1
3	9	8	2
3	10	0	1
3	11	0	2
3	12	6	1
4	1	7	1
4	2	0	2
4	3	8	3
4	4	0	2
4	5	8	3
4	6	0	2
4	7	1	1
4	8	10	1

4	9	8	2
4	10	0	1
4	11	0	2
4	12	6	1
5	1	7	1
5	2	0	2
5	3	8	3
5	4	0	2
5	5	8	3
5	6	0	2
5	7	1	1
5	8	10	1
5	9	8	2
5	10	0	1
5	11	0	2
5	12	6	1
6	1	7	1
6	2	0	2
6	3	8	3
6	4	0	2
6	5	8	3
6	6	0	2
6	7	1	1
6	8	10	1
6	9	8	2
6	10	0	1
6	11	0	2
6	12	6	1
7	1	7	1
7	2	0	2
7	3	8	3
7	4	0	2
7	5	8	3
7	6	0	2
7	7	1	1
7	8	10	1
7	9	8	2
7	10	0	1
7	11	0	2
7	12	6	1
8	1	7	1
8	2	0	2
8	3	8	3
8	4	0	2
8	5	8	3
8	6	0	2
8	7	1	1
8	8	10	1
8	9	8	2
8	10	0	1
8	11	0	2
8	12	6	1
9	1	7	1
9	2	0	2
9	3	8	3
9	4	0	2
9	5	8	3
9	6	0	2
9	7	1	1
9	8	10	1
9	9	8	2
9	10	0	1
9	11	0	2

9	12	6	1
10	1	7	1
10	2	0	2
10	3	8	3
10	4	0	2
10	5	8	3
10	6	0	2
10	7	1	1
10	8	10	1
10	9	8	2
10	10	0	1
10	11	0	2
10	12	6	1
11	1	7	1
11	2	0	2
11	3	8	3
11	4	0	2
11	5	8	3
11	6	0	2
11	7	1	1
11	8	10	1
11	9	8	2
11	10	0	1
11	11	0	2
11	12	6	1
12	1	7	1
12	2	0	2
12	3	8	3
12	4	0	2
12	5	8	3
12	6	0	2
12	7	1	1
12	8	10	1
12	9	8	2
12	10	0	1
12	11	0	2
12	12	6	1

Scenario Information for Watana

Physical Setting Conditions, Name - Full Watana with Devil Canyon Settings
Description -
Notes -

Res_Storage Data - Watana Reservoir Curve
Description -
Notes - Data from 1985 ammendment to the FERC application for Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Storage	Sedimentation	Sed_File
1400	0	False	
1500	0	False	
1600	85600	False	
1700	450400	False	
1800	1298500	False	

1900	2630700	False
2000	4336800	False
2100	6713100	False
2200	1E+07	False

Tailwater Data - Watana Tailwater Rating
Description -
Notes - Data from 1985 ammendment to the FERC application Figure B.4.2.3. -DEE 12-11-2008

Flow	Elevation
0	1450
8000	1455
27000	1460
53000	1465
92000	1470
140000	1475
160000	1477

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - None

Elevation	Flow

Outlet2 Data - Full Watana Spillway Capacity
Description -
Notes - Based on minimum and maximum operating limits of the spillway from the 1985 ammendment to the FERC application. -DEE 12-11-2008

Elevation	Flow
2193	220000
2199.3	259600

Outlet3 Data - None

Elevation	Flow

Plant_Options Data - Full Watana Plant Options
Description -
Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type
0	0	False	1

Res_Area Data - Watana Reservoir Area
Description -
Notes - Data from the 1985 ammendment to the FERC application Figure B.3.2.1. -DEE 12-11-2008

Elevation	Area	Sedimentation	Sed_File
1500	0	False	
1600	3333	False	
1700	6000	False	

1800	10000	False
1900	15000	False
2000	21000	False
2100	33333	False
2200	40000	False

Evaporation Data - Watana Evaporation
Description - BPK 2008-12-16
Notes - Based on information from table B.3.1.11 from the 1985 ammendment to the FERC application. A reservoir area of 40000 acres has been assumed. -DEE. Modified for units of ft per acre per day.

iMonth	Coeff
5	0.00672
6	0.006667
7	0.006183
8	0.004839
9	0.002778

Operating Setting Conditions, Name - Full Watana with Devil Canyon
Description -
Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - None

IDay	Data	OrInflow	Dependent

Target_Elev Data - Full Watana with Devil Canyon Rev1
Description -
Notes -

IDay	Elevation
1	2140
32	2125
60	2110
91	2090
121	2065
152	2074
182	2114
213	2150
244	2178
274	2185
305	2170
335	2155
365	2140

Flood_Elev Data - Full Watana Flood Elevation
Description -
Notes - Data from 1985 ammendment to the FERC application for Susitna Table B.3.2.1. -DEE 12-11-2008

IDay	Elevation

1 2193
365 2193

Min_Elev Data - Full Watana Minimum Elevations
Description -
Notes - Data from 1985 ammendment to the FERC application for Susitna Table B.3.2.1. -DEE 12-11-2008

IDay	Elevation
1	2065
365	2065

Level_Fluct Data - None

IDay	Elevation	Hard	PercentAbove

Level_Rate Data - None

IDay	Rate

Flashboard Data - None

Elevation	Flow	Trip	Reset

Bypass Data - None

IDay	Data	OrInflow	Destination

Ramp_Rate Data - None

IDay	UpRampDay	UpRampHour	DownRampDay	DownRampHour	Type

Withdrawal Data - None

IDay	Withdrawal	Return	UseProjected	FileName

Rec_Flows Data - None

IDay	Data	StartHr	EndHr

Generating Setting Conditions, Name - Full Watana Generating Settings
Description -
Notes -

Plant_Generation Data - Full Watana Plant Generation
Description -
Notes - Full size Watana with 6 turbines rated at 680 feet of head. -DEE 12_3_2008

Unit_No	Head_Loss_ID	Generator_Per	Turbine_Perf_	Gate_Leakage
1	6	7	4	0

2	6	7	4	0
3	6	7	4	0
4	6	7	4	0
5	6	7	4	0
6	6	7	4	0

Head Loss Data, ID = - 6, Name = Watana III Headloss
Description -
Notes - Headloss as calculated using Susitna Headloss Calculations.xls spreadsheet built by David Elwood and checked by Leanne Andruszkiewicz -DEE 12_3_2008. 8.1ft common HL.

Unit_No	Unit_HL	Common_HL	Use_Com2	Max_Unit
1	2.93411E-07	1.5839E-08	0	6
2	2.97552E-07	1.5839E-08	0	6
3	3.00324E-07	1.5839E-08	0	6
4	3.03776E-07	1.5839E-08	0	6
5	2.97909E-07	0	1	6
6	3.06497E-07	0	1	6

Turbine Performance, ID = - 4, Name = Full Watana Turbine Efficiency
Description -
Notes - Based on the turbine efficiency curves from the 1985 ammendment to the FERC application with a design head of 680 feet. Assumed a 2% loss in efficiency for every 100 feet of headloss. -DEE 12-11-2008

Head	Flow	Eff
555	1174.45	0.686
555	1626.16	0.836
555	2348.9	0.906
555	2619.93	0.911
555	2800.62	0.906
555	3252.33	0.876
600	1221.14	0.704
600	1690.81	0.854
600	2442.27	0.924
600	2724.08	0.929
600	2911.94	0.924
600	3381.61	0.894
680	1300	0.72
680	1800	0.87
680	2600	0.94
680	2900	0.945
680	3100	0.94
680	3600	0.91
710	1328.37	0.72
710	1839.28	0.87
710	2656.73	0.94
710	2963.28	0.945
710	3167.64	0.94
710	3678.55	0.91
740	1356.14	0.72
740	1877.73	0.87
740	2712.28	0.94
740	3025.24	0.945
740	3233.87	0.94
740	3755.47	0.91

Generator Performance Data, ID = - 7, Name = Watana Generator Performance
Description -
Notes - Generator efficiency curve based on data for as-built large hydro

generators -DEE 12_4_2008

gOutput	Eff	Cap
44	0.9283	230
65	0.95	230
86	0.9608	230
108	0.968	230
130	0.9715	230
143	0.9732	230
156	0.9748	230
165	0.9756	230
174	0.9764	230
200	0.9781	230
219.51	0.9781	230
230	0.9781	230

Maintenance Data - None

IDay	Unit

Min_Unit Data - None

Head	Flow	Eff	CenterLine	Headloss	GeneratorEff	OpStyle

Scenario Information for Devil Canyon

Physical Setting Conditions, Name - Devil Canyon
Description -
Notes -

Res_Storage Data - Devil Canyon Reservoir Volume
Description -
Notes - Data from 1985 ammendment to the FERC applicationf ro Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Storage	Sedimentation	Sed_File
800	0	False	
900	0	False	
1000	9800	False	
1100	52490	False	
1200	139670	False	
1300	326770	False	
1400	701970	False	
1450	1046350	False	

Tailwater Data - Devil Canyon Tailwater Rating
Description -
Notes - Data from 1985 ammendment to the FERC application for the Susitna Project -DEE

Flow	Elevation

0	845
9000	850
26000	855
60000	860
119000	865
200000	870

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - None

Elevation	Flow

Outlet2 Data - Devil Canyon Spillway Capacity
    Description -
    Notes - Data based on the minimum and maximum operating limits for the Devil Canyon spillway. -DEE 12-11-2008

Elevation	Flow
1456	240000
1465.6	309000

Outlet3 Data - None

Elevation	Flow

Plant_Options Data - Devil Canyon Plant Options
    Description -
    Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type
0	0	False	3

Res_Area Data - Devil Canyon Reservoir Area
    Description -
    Notes - Data from 1985 ammendment to the FERC application for Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Area	Sedimentation	Sed_File
900	0	False	
1000	100	False	
1100	800	False	
1200	1200	False	
1300	2200	False	
1400	6300	False	
1450	7200	False	

Evaporation Data - Devil Canyon Evaporation
    Description - BPK 2008-12-16
    Notes - As per table B.3.1.11 from 1985 ammendment to the FERC application. Assumes reservoir area of 7200 acres. -DEE
Modified for units of ft per acre per day.

iMonth	Coeff

5	0.007258
6	0.0075
7	0.006989
8	0.005108
9	0.003333

Operating Setting Conditions, Name - Devil Canyon
Description -
Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - Devil Canyon Minimum Environmental Flow
Description -
Notes - Data based on 1985 ammendment to the FERC application for Susitna environmental flow case E-VI prorated from Gold Creek gauge to Devil Canyon. -DEE 12-11-2008

IDay	Data	OrInflow	Dependent
1	1886	False	False
7	1886	False	False
14	1886	False	False
21	1886	False	False
28	1886	False	False
35	1886	False	False
42	1886	False	False
49	1886	False	False
56	1886	False	False
63	1886	False	False
70	1886	False	False
77	1886	False	False
84	1886	False	False
91	1886	False	False
98	1886	False	False
105	1886	False	False
112	1886	False	False
119	1886	False	False
126	3772	False	False
133	5658	False	False
140	5658	False	False
147	5658	False	False
154	8487	False	False
161	8487	False	False
168	8487	False	False
175	8487	False	False
182	8487	False	False
189	8487	False	False
196	8487	False	False
203	8487	False	False
210	8487	False	False
217	8487	False	False
224	8487	False	False
231	8487	False	False
238	8487	False	False
245	7544	False	False
252	6601	False	False

259	5658	False	False
266	5658	False	False
274	5658	False	False
281	5658	False	False
288	4715	False	False
295	3772	False	False
302	2829	False	False
309	2829	False	False
316	2829	False	False
323	2829	False	False
330	2829	False	False
336	1886	False	False
344	1886	False	False
351	1886	False	False
358	1886	False	False
365	1886	False	False

Target_Elev Data - Davil Canyon Target Elevations
    Description -
    Notes - Data based on 1985 ammendment to the FERC application for Susitna Figure B.3.2.2. -DEE 12-11-2008

IDay	Elevation
1	1455
365	1455

Flood_Elev Data - Devil Canyon Flood Elevations
    Description -
    Notes - Data from 1985 ammendment to the FERC application for Susitna Table B.3.2.1.

IDay	Elevation
1	1456
365	1456

Min_Elev Data - Devil Canyon Minimum Elevations
    Description -
    Notes - Data from 1985 ammendment to the FERC application Table B.3.2.1. DEE 12-11-2008

IDay	Elevation
1	1435
120	1435
121	1405
304	1405
305	1435
365	1435

Level_Fluct Data - None

IDay	Elevation	Hard	PercentAbove

Level_Rate Data - None

IDay	Rate

Flashboard Data - None

Elevation	Flow	Trip	Reset

Bypass Data - None

IDay	Data	OrInflow	Destination

Ramp_Rate Data - Devil Canyon Ramp Rates
Description -
Notes - Data based on environmental flow case E-VI report. -DEE 12-11-2008

IDay	UpRampDay	UpRampHour	DownRampDay	DownRampHour	Type
1	12000	500	12000	500	Flow
365	12000	500	12000	500	Flow

Withdrawal Data - None

IDay	Withdrawal	Return	UseProjected	FileName

Rec_Flows Data - None

IDay	Data	StartHr	EndHr

Generating Setting Conditions, Name - Devil Canyon
Description -
Notes -

Plant_Generation Data - Devil Canyon Generating Unit
Description -
Notes -

Unit_No	Head_Loss_ID	Generator_Per	Turbine_Perf_	Gate_Leakage
1	9	8	2	0
2	9	8	2	0
3	9	8	2	0
4	9	8	2	0

Head Loss Data, ID = - 9, Name = Devil Canyon Headloss
Description -
Notes -

Unit_No	Unit_HL	Common_HL	Use_Com2	Max_Unit
1	3.6792E-08	0	0	4
2	3.67692E-08	0	0	4
3	3.67692E-08	0	0	4
4	3.67692E-08	0	0	4

Turbine Performance, ID = - 2, Name = Devil Canyon Turbines
Description -
Notes - Assumes a 2% loss in efficiency for every 100 feet below the rated head -DEE

Head	Flow	Eff
545	953.07	0.699
545	2001.44	0.879
545	2477.97	0.919
545	2859.2	0.929
545	3049.81	0.919
545	3621.65	0.899
558.75	965.01	0.7017
558.75	2026.53	0.8817
558.75	2509.03	0.9218
558.75	2895.04	0.9317
558.75	3088.04	0.9218
558.75	3667.05	0.9018
572.5	976.81	0.7045
572.5	2051.31	0.8845
572.5	2539.72	0.9245
572.5	2930.44	0.9345
572.5	3125.81	0.9245
572.5	3711.9	0.9045
586.25	988.48	0.7072
586.25	2075.8	0.8873
586.25	2570.04	0.9273
586.25	2965.43	0.9373
586.25	3163.12	0.9273
586.25	3756.21	0.9072
600	1000	0.71
600	2100	0.89
600	2600	0.93
600	3000	0.94
600	3200	0.93
600	3800	0.91

Generator Performance Data, ID = - 8, Name = Devil Canyon Generators
Description -
Notes - Based on data from as-built large hydro generators -DEE 12_4_2008

gOutput	Eff	Cap
37.4	0.9283	195.5
55.25	0.95	195.5
73.1	0.9608	195.5
91.8	0.968	195.5
110.5	0.9715	195.5
121.55	0.9732	195.5
132.6	0.9748	195.5
140.25	0.9756	195.5
147.9	0.9764	195.5
170	0.9781	195.5
186.5854	0.9781	195.5
195.5	0.9781	195.5

Maintenance Data - None

IDay	Unit

Min_Unit Data - None

Head	Flow	Eff	CenterLine	Headloss	GeneratorEff	OpStyle

HDR/AEA Susitna Hydroelectric Project
CHEOPS Watana and Devil Canyon Firm Capacity Estimate
Watana and Devil Canyon: Monthly Capacity
By: HDR
By: David Elwood Date: 11/13/2009
Checked By: Nolan Adams
Reviewed By:

Probability of Exceeding Winter Capacity Target

Probability	Capacity Target
100%	470
99%	560
98%	710
97%	750
91%	930
80%	1120
58%	1470

	52-Year Average Monthly Power Output (MW)												
Capacity Target (MW)	January	February	March	April	May	June	July	August	September	October	November	December	**Annual Energy (GWhrs)**
470	470	450	470	460	1,520	1,510	1,390	1,090	690	430	460	460	6,800
560	560	530	550	550	1,480	1,440	1,210	980	640	420	540	550	6,900
710	710	670	710	680	1,290	1,160	940	820	600	420	690	710	6,800
750	740	710	750	700	1,230	1,100	890	800	600	410	730	750	6,800
930	930	890	860	690	740	870	770	790	590	410	910	930	6,800
1120	1,120	990	820	410	480	810	760	790	590	410	1,090	1,110	6,800
1470	1,380	860	190	90	470	810	760	790	590	410	1,460	1,470	6,700

HDR/AEA Susitna Hydroelectric Project
CHEOPS Watana and Devil Canyon Firm Capacity Estimate
Devil Canyon: Monthly Capacity
By: HDR
By: David Elwood Date: 11/13/2009
Checked By: Nolan Adams
Reviewed By:

Assumptions
1. Devil Canyon Reservoir is run as a re-regulating reservoir. The pool is kept full all winter long.
2. Winter inflow to Devil Canyon Reservoir is the outflow from the Watana powerhouse. Summer inflow is 12% greater than Watana outflow due to additional drainage area.
2. Net head at full pool of 598'.
3. Turbine efficiency of 94%.
4. Generator Efficiency of 98%.
5. Transformer Losses of 2%.
6. Forced Outage Rate of 1.5%.

Probability of Exceeding Winter Capacity Target

Probability	Capacity Target (MW)
100%	220
99%	260
98%	340
97%	350
91%	440
80%	530
58%	680

	52-Year Average Monthly Flow (cfs)											
Capacity Target (MW)	January	February	March	April	May	June	July	August	September	October	November	December
220	4,871	4,432	4,937	4,733	16,667	15,986	14,411	11,251	6,993	4,446	4,637	4,834
260	5,765	5,182	5,799	5,715	16,120	14,977	12,614	10,145	6,521	4,345	5,426	5,689
340	7,409	6,753	7,595	7,219	13,892	12,272	9,889	8,592	6,067	4,283	7,056	7,429
350	7,732	7,108	8,000	7,394	13,275	11,618	9,447	8,432	6,063	4,283	7,373	7,770
440	9,880	9,048	9,284	7,465	8,123	9,324	8,125	8,260	6,010	4,282	9,185	9,699
530	11,945	10,109	9,031	4,588	5,410	8,678	8,000	8,241	5,990	4,281	10,995	11,603
680	14,970	9,167	2,666	1,420	5,201	8,678	8,000	8,241	5,990	4,281	14,733	15,806

	52-Year Average Monthly Power Output (MW)											
Capacity Target (MW)	January	February	March	April	May	June	July	August	September	October	November	December
220	219	199	222	213	684	684	648	506	315	200	209	217
260	259	233	261	257	684	674	568	456	293	195	244	256
340	333	304	342	325	625	552	445	387	273	193	317	334
350	348	320	360	333	597	523	425	379	273	193	332	350
440	444	407	418	336	365	419	366	372	270	193	413	436
530	537	455	406	206	243	390	360	371	269	193	495	522
680	673	412	120	64	234	390	360	371	269	193	663	684

HDR/AEA Susitna Hydroelectric Project
CHEOPS Watana and Devil Canyon Firm Capacity Estimate
Watana: Monthly Capacity
By: HDR
By: David Elwood Date: 11/13/2009
Checked By: Nolan Adams
Reviewed By:

Probability of Exceeding Winter Capacity Target

Probability	Capacity Target (MW)
100%	250
99%	300
98%	380
97%	400
91%	500
80%	600
58%	800

	52-Year Average Monthly Power Output (MW)											
Capacity Target (MW)	January	February	March	April	May	June	July	August	September	October	November	December
250	252	252	251	247	846	833	743	593	377	236	252	252
300	301	297	296	296	803	770	645	530	349	232	301	301
380	377	375	375	362	670	615	497	438	330	227	382	382
400	395	395	394	369	635	580	472	431	329	227	403	402
500	494	489	444	360	376	454	408	422	325	227	502	497
600	590	535	420	210	245	426	402	421	324	226	603	593
800	713	452	73	36	241	426	402	421	324	226	801	789

Complete Scenario Data for Scenario - Devil Canyon 80MW Winter
Written out on 11/19/2009 2:31:15 PM

System Misc. - 80MW Winter Demand
Description -
Notes -

CarryOver	MaxPeak	ForecastDays	ForecastAcr	WaterYearType
True	False	3	0	38

Loadshape Data - Sample
Description - Sample
Notes - Sample Data

IMonth	Period	Duration	Price
1	1	7	1
1	2	0	2
1	3	8	3
1	4	0	2
1	5	8	3
1	6	0	2
1	7	1	1
1	8	10	1
1	9	8	2
1	10	0	1
1	11	0	2
1	12	6	1
2	1	7	1
2	2	0	2
2	3	8	3
2	4	0	2
2	5	8	3
2	6	0	2
2	7	1	1
2	8	10	1
2	9	8	2
2	10	0	1
2	11	0	2
2	12	6	1
3	1	7	1
3	2	0	2
3	3	8	3
3	4	0	2
3	5	8	3
3	6	0	2
3	7	1	1
3	8	10	1
3	9	8	2
3	10	0	1
3	11	0	2
3	12	6	1
4	1	7	1
4	2	0	2
4	3	8	3
4	4	0	2
4	5	8	3
4	6	0	2
4	7	1	1
4	8	10	1
4	9	8	2

4	10	0	1
4	11	0	2
4	12	6	1
5	1	7	1
5	2	0	2
5	3	8	3
5	4	0	2
5	5	8	3
5	6	0	2
5	7	1	1
5	8	10	1
5	9	8	2
5	10	0	1
5	11	0	2
5	12	6	1
6	1	7	1
6	2	0	2
6	3	8	3
6	4	0	2
6	5	8	3
6	6	0	2
6	7	1	1
6	8	10	1
6	9	8	2
6	10	0	1
6	11	0	2
6	12	6	1
7	1	7	1
7	2	0	2
7	3	8	3
7	4	0	2
7	5	8	3
7	6	0	2
7	7	1	1
7	8	10	1
7	9	8	2
7	10	0	1
7	11	0	2
7	12	6	1
8	1	7	1
8	2	0	2
8	3	8	3
8	4	0	2
8	5	8	3
8	6	0	2
8	7	1	1
8	8	10	1
8	9	8	2
8	10	0	1
8	11	0	2
8	12	6	1
9	1	7	1
9	2	0	2
9	3	8	3
9	4	0	2
9	5	8	3
9	6	0	2
9	7	1	1
9	8	10	1
9	9	8	2
9	10	0	1
9	11	0	2
9	12	6	1

10	1	7	1
10	2	0	2
10	3	8	3
10	4	0	2
10	5	8	3
10	6	0	2
10	7	1	1
10	8	10	1
10	9	8	2
10	10	0	1
10	11	0	2
10	12	6	1
11	1	7	1
11	2	0	2
11	3	8	3
11	4	0	2
11	5	8	3
11	6	0	2
11	7	1	1
11	8	10	1
11	9	8	2
11	10	0	1
11	11	0	2
11	12	6	1
12	1	7	1
12	2	0	2
12	3	8	3
12	4	0	2
12	5	8	3
12	6	0	2
12	7	1	1
12	8	10	1
12	9	8	2
12	10	0	1
12	11	0	2
12	12	6	1

Scenario Information for Watana

Physical Setting Conditions, Name - No Watana
Description -
Notes -

Res_Storage Data - Watana Reservoir Curve
Description -
Notes - Data from 1985 ammendment to the FERC application for Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Storage	Sedimentation	Sed_File
1400	0	False	
1500	0	False	
1600	85600	False	
1700	450400	False	
1800	1298500	False	
1900	2630700	False	

2000	4336800	False
2100	6713100	False
2200	1E+07	False

Tailwater Data - Watana Tailwater Rating
Description -
Notes - Data from 1985 ammendment to the FERC application Figure B.4.2.3. -DEE 12-11-2008

Flow	Elevation
0	1450
8000	1455
27000	1460
53000	1465
92000	1470
140000	1475
160000	1477

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - Unlimited Capacity
Description -
Notes -

Elevation	Flow
1	100000

Outlet2 Data - No Watana Spillway
Description -
Notes -

Elevation	Flow
1500	220000
1510	259600

Outlet3 Data - None

Elevation	Flow

Plant_Options Data - No Watana
Description -
Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type
0	0	False	0

Res_Area Data - Watana Reservoir Area
Description -
Notes - Data from the 1985 ammendment to the FERC application Figure B.3.2.1. -DEE 12-11-2008

Elevation	Area	Sedimentation	Sed_File
1500	0	False	
1600	3333	False	

1700	6000	False
1800	10000	False
1900	15000	False
2000	21000	False
2100	33333	False
2200	40000	False

Evaporation Data - Watana Evaporation
    Description - BPK 2008-12-16
    Notes - Based on information from table B.3.1.11 from the 1985 ammendment to the FERC application. A reservoir area of 40000 acres has been assumed. -DEE. Modified for units of ft per acre per day.

iMonth	Coeff
5	0.00672
6	0.006667
7	0.006183
8	0.004839
9	0.002778

Operating Setting Conditions, Name - No Watana
    Description -
    Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - None

IDay	Data	OrInflow	Dependent

Target_Elev Data - No Watana
    Description -
    Notes -

IDay	Elevation
1	1500
365	1500

Flood_Elev Data - No Watana Flood Elevation
    Description -
    Notes -

IDay	Elevation
1	1501
365	1501

Min_Elev Data - 1390
    Description -
    Notes - Minimum elevation for filling set 10 feet below minimum reservoir level. -DEE 12-11-2008

IDay	Elevation
1	1390

365 1390

Level_Fluct Data - None

IDay	Elevation	Hard	PercentAbove

Level_Rate Data - None

IDay	Rate

Flashboard Data - None

Elevation	Flow	Trip	Reset

Bypass Data - None

IDay	Data	OrInflow	Destination

Ramp_Rate Data - None

IDay	UpRampDay	UpRampHour	DownRampDay	DownRampHour	Type

Withdrawal Data - None

IDay	Withdrawal	Return	UseProjected	FileName

Rec_Flows Data - None

IDay	Data	StartHr	EndHr

Generating Setting Conditions, Name - No Watana
Description -
Notes -

Plant_Generation Data - None

Unit_No	Head_Loss_ID	Generator_Per	Turbine_Perf_	Gate_Leakage

Maintenance Data - None

IDay	Unit

Min_Unit Data - None

Head	Flow	Eff	CenterLine	Headloss	GeneratorEff	OpStyle

Scenario Information for Devil Canyon

Physical Setting Conditions, Name - Devil Canyon Only
Description -
Notes -

Res_Storage Data - Devil Canyon Reservoir Volume
Description -
Notes - Data from 1985 ammendment to the FERC applicationf ro Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Storage	Sedimentation	Sed_File
800	0	False	
900	0	False	
1000	9800	False	
1100	52490	False	
1200	139670	False	
1300	326770	False	
1400	701970	False	
1450	1046350	False	

Tailwater Data - Devil Canyon Tailwater Rating
Description -
Notes - Data from 1985 ammendment to the FERC application for the Susitna Project -DEE

Flow	Elevation
0	845
9000	850
26000	855
60000	860
119000	865
200000	870

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - Devil Canyon Only
Description -
Notes -

Elevation	Flow
1092	42000

Outlet2 Data - Devil Canyon Spillway Capacity
Description -
Notes - Data based on the minimum and maximum operating limits for the Devil Canyon spillway. -DEE 12-11-2008

Elevation	Flow
1456	240000
1465.6	309000

Outlet3 Data - None

Elevation	Flow

Plant_Options Data - Devil Canyon Only
Description -
Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type
0	0	False	1

Res_Area Data - Devil Canyon Reservoir Area
Description -
Notes - Data from 1985 ammendment to the FERC application for Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Area	Sedimentation	Sed_File
900	0	False	
1000	100	False	
1100	800	False	
1200	1200	False	
1300	2200	False	
1400	6300	False	
1450	7200	False	

Evaporation Data - Devil Canyon Evaporation
Description - BPK 2008-12-16
Notes - As per table B.3.1.11 from 1985 ammendment to the FERC application. Assumes reservoir area of 7200 acres. -DEE
Modified for units of ft per acre per day.

iMonth	Coeff
5	0.007258
6	0.0075
7	0.006989
8	0.005108
9	0.003333

Operating Setting Conditions, Name - Devil Canyon Only
Description -
Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - Devil Canyon Minimum Environmental Flow
Description -
Notes - Data based on 1985 ammendment to the FERC application for Susitna environmental flow case E-VI prorated from Gold Creek gauge to Devil Canyon. -DEE 12-11-2008

IDay	Data	OrInflow	Dependent
1	1886	False	False
7	1886	False	False

14	1886	False	False
21	1886	False	False
28	1886	False	False
35	1886	False	False
42	1886	False	False
49	1886	False	False
56	1886	False	False
63	1886	False	False
70	1886	False	False
77	1886	False	False
84	1886	False	False
91	1886	False	False
98	1886	False	False
105	1886	False	False
112	1886	False	False
119	1886	False	False
126	3772	False	False
133	5658	False	False
140	5658	False	False
147	5658	False	False
154	8487	False	False
161	8487	False	False
168	8487	False	False
175	8487	False	False
182	8487	False	False
189	8487	False	False
196	8487	False	False
203	8487	False	False
210	8487	False	False
217	8487	False	False
224	8487	False	False
231	8487	False	False
238	8487	False	False
245	7544	False	False
252	6601	False	False
259	5658	False	False
266	5658	False	False
274	5658	False	False
281	5658	False	False
288	4715	False	False
295	3772	False	False
302	2829	False	False
309	2829	False	False
316	2829	False	False
323	2829	False	False
330	2829	False	False
336	1886	False	False
344	1886	False	False
351	1886	False	False
358	1886	False	False
365	1886	False	False

Target_Elev Data - Devil Canyon Only
    Description -
    Notes -

IDay	Elevation
1	1435
120	1405
244	1455
365	1435

Flood_Elev Data - Devil Canyon Flood Elevations
    Description -
    Notes - Data from 1985 ammendment to the FERC application for Susitna Table B.3.2.1.

IDay	Elevation
1	1456
365	1456

Min_Elev Data - Devil Canyon Only Minimum Elevations
    Description -
    Notes -

IDay	Elevation
1	1405
365	1405

Level_Fluct Data - None

IDay	Elevation	Hard	PercentAbove

Level_Rate Data - None

IDay	Rate

Flashboard Data - None

Elevation	Flow	Trip	Reset

Bypass Data - None

IDay	Data	OrInflow	Destination

Ramp_Rate Data - Devil Canyon Ramp Rates
    Description -
    Notes - Data based on environmental flow case E-VI report. -DEE 12-11-2008

IDay	UpRampDay	UpRampHour	DownRampDay	DownRampHour	Type
1	12000	500	12000	500	Flow
365	12000	500	12000	500	Flow

Withdrawal Data - None

IDay	Withdrawal	Return	UseProjected	FileName

Rec_Flows Data - None

IDay	Data	StartHr	EndHr

Generating Setting Conditions, Name - Devil Canyon

Devil Canyon 80MW.cof
Description -
Notes -

Plant_Generation Data - Devil Canyon Generating Unit
Description -
Notes -

Unit_No	Head_Loss_ID	Generator_Per	Turbine_Perf_	Gate_Leakage
1	9	8	2	0
2	9	8	2	0
3	9	8	2	0
4	9	8	2	0

Head Loss Data, ID = - 9, Name = Devil Canyon Headloss
Description -
Notes -

Unit_No	Unit_HL	Common_HL	Use_Com2	Max_Unit
1	3.6792E-08	0	0	4
2	3.67692E-08	0	0	4
3	3.67692E-08	0	0	4
4	3.67692E-08	0	0	4

Turbine Performance, ID = - 2, Name = Devil Canyon Turbines
Description -
Notes - Assumes a 2% loss in efficiency for every 100 feet below the rated head -DEE

Head	Flow	Eff
545	953.07	0.699
545	2001.44	0.879
545	2477.97	0.919
545	2859.2	0.929
545	3049.81	0.919
545	3621.65	0.899
558.75	965.01	0.7017
558.75	2026.53	0.8817
558.75	2509.03	0.9218
558.75	2895.04	0.9317
558.75	3088.04	0.9218
558.75	3667.05	0.9018
572.5	976.81	0.7045
572.5	2051.31	0.8845
572.5	2539.72	0.9245
572.5	2930.44	0.9345
572.5	3125.81	0.9245
572.5	3711.9	0.9045
586.25	988.48	0.7072
586.25	2075.8	0.8873
586.25	2570.04	0.9273
586.25	2965.43	0.9373
586.25	3163.12	0.9273
586.25	3756.21	0.9072
600	1000	0.71
600	2100	0.89
600	2600	0.93
600	3000	0.94
600	3200	0.93
600	3800	0.91

Generator Performance Data, ID = - 8, Name = Devil Canyon Generators
Description -
Notes - Based on data from as-built large hydro generators -DEE 12_4_2008

gOutput	Eff	Cap
37.4	0.9283	195.5
55.25	0.95	195.5
73.1	0.9608	195.5
91.8	0.968	195.5
110.5	0.9715	195.5
121.55	0.9732	195.5
132.6	0.9748	195.5
140.25	0.9756	195.5
147.9	0.9764	195.5
170	0.9781	195.5
186.5854	0.9781	195.5
195.5	0.9781	195.5

Maintenance Data - None

IDay	Unit

Min_Unit Data - None

Head	Flow	Eff	CenterLine	Headloss	GeneratorEff	OpStyle

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Energy Production Estimates
Devil Canyon Development : 80MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By:
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
units	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh
52-year Average	61,191	55,836	58,604	53,695	376,530	484,707	512,397	503,516	403,568	238,412	58,121	60,724	2,867,301

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
units	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh
1950	59,542	54,146	58,903	408	285,386	441,503	513,104	500,197	285,071	165,646	58,048	59,526	2,481,478
1951	59,847	53,823	35,617	25,310	364,561	481,897	513,201	514,267	493,976	218,534	57,974	60,142	2,879,151
1952	60,142	56,184	59,523	57,946	209,860	474,557	512,027	504,931	425,387	303,218	58,748	61,559	2,784,083
1953	60,926	54,303	59,543	57,873	449,512	495,243	514,104	514,012	463,433	204,827	58,010	60,067	2,991,853
1954	59,566	53,765	59,947	57,884	383,719	495,743	513,972	512,311	419,228	193,977	57,893	61,828	2,869,831
1955	62,336	55,039	60,005	57,607	320,150	463,197	511,709	512,307	432,977	180,924	57,927	59,866	2,774,043
1956	59,525	55,986	59,564	36,596	356,543	493,825	510,739	512,757	484,045	222,900	57,912	63,302	2,913,693
1957	63,298	55,432	61,011	57,806	379,493	494,707	512,860	513,910	497,474	309,289	58,689	60,859	3,064,826
1958	62,889	57,183	60,887	57,729	391,902	495,604	513,144	488,242	259,052	175,776	57,908	59,823	2,680,139
1959	59,545	53,768	59,766	57,648	342,158	496,255	512,314	511,034	430,965	231,611	57,748	62,218	2,875,029
1960	63,696	57,673	60,883	57,808	412,669	494,199	513,172	512,892	497,145	286,751	57,998	60,693	3,075,579
1961	59,966	57,912	63,848	60,947	497,091	494,780	512,501	509,720	433,109	224,720	57,729	60,973	3,033,295
1962	61,945	56,260	60,179	57,604	384,548	491,887	511,963	512,954	447,236	245,825	57,617	61,622	2,949,640
1963	61,835	54,287	59,965	57,643	370,607	495,480	510,009	512,927	408,758	229,080	57,909	60,145	2,878,645
1964	59,766	55,725	59,926	48,240	169,696	487,033	513,086	499,406	327,526	224,583	57,669	60,137	2,562,793
1965	59,945	53,783	59,867	57,628	271,135	495,658	511,542	490,375	477,600	274,122	58,030	60,149	2,869,834
1966	59,626	53,769	59,527	57,608	279,958	483,109	514,207	513,503	397,004	176,857	57,968	59,527	2,712,662
1967	59,532	53,769	59,665	57,607	323,668	494,489	511,974	510,596	436,749	180,318	57,828	60,148	2,806,343
1968	60,148	56,268	60,316	59,830	421,445	494,152	511,890	494,237	303,094	171,542	58,088	59,745	2,750,754
1969	59,926	53,963	27,407	26,172	271,494	412,032	496,589	360,404	213,582	164,024	58,149	59,523	2,203,265
1970	59,947	54,017	13,199	10,725	281,709	436,582	513,045	503,327	319,224	188,170	58,437	61,208	2,499,591
1971	63,513	55,035	59,865	57,606	201,309	441,473	512,847	510,771	421,883	210,082	58,102	61,170	2,653,657
1972	60,002	59,234	64,272	61,824	492,192	493,683	513,166	503,928	391,495	193,158	57,991	60,146	2,951,091
1973	59,686	53,767	59,806	57,625	238,369	455,281	514,224	507,210	307,436	166,180	58,150	59,564	2,537,298
1974	59,826	53,883	37,436	10,384	296,152	497,910	514,570	493,337	388,557	173,379	58,029	59,525	2,642,987
1975	59,531	53,771	59,527	57,608	358,706	493,963	511,462	506,050	468,033	287,756	58,030	60,006	2,974,443
1976	59,525	55,986	59,682	42,993	342,969	472,880	514,598	484,262	241,452	173,245	57,769	61,424	2,566,787
1977	61,895	55,496	62,273	58,702	393,571	492,944	513,092	498,805	416,724	274,753	58,451	60,256	2,946,961
1978	62,154	57,944	63,600	60,595	415,528	471,685	513,843	478,515	292,623	179,843	57,971	60,143	2,714,444
1979	60,147	53,805	59,528	57,605	338,484	495,982	511,164	509,706	365,909	264,379	58,769	60,958	2,836,437
1980	64,282	58,813	61,276	57,948	393,661	490,309	510,310	506,766	413,536	280,773	58,837	62,286	2,958,797
1981	63,024	58,074	63,813	61,316	500,215	497,817	510,209	509,324	432,923	265,809	58,929	63,643	3,085,095
1982	61,300	56,211	60,817	57,768	405,788	495,381	512,576	473,630	470,603	260,177	57,850	60,954	2,973,056
1983	63,839	58,063	64,118	61,509	465,698	496,086	513,701	512,427	420,057	297,971	58,415	61,235	3,073,119
1984	62,121	60,230	64,252	61,964	434,705	494,091	512,893	511,341	324,154	202,713	58,254	61,052	2,847,770
1985	63,515	57,878	63,548	61,241	352,983	495,299	512,062	512,816	473,689	261,469	57,891	60,143	2,972,534
1986	60,142	54,326	59,726	57,612	370,944	478,016	513,394	514,949	428,511	410,120	58,538	62,950	3,069,228
1987	62,575	55,639	61,393	58,177	419,516	496,423	510,818	504,260	408,473	213,135	57,992	60,144	2,908,544
1988	60,088	55,685	59,532	57,613	444,528	494,528	512,171	514,286	413,114	276,980	58,283	61,946	3,008,754
1989	63,286	57,710	63,611	61,299	444,181	495,183	512,808	513,309	479,466	298,592	58,478	62,964	3,110,887
1990	63,225	56,321	62,318	60,143	511,122	493,802	512,851	512,631	495,651	261,222	57,748	60,147	3,147,181
1991	60,373	55,782	61,009	58,065	289,237	460,254	513,719	495,406	408,746	210,812	57,707	60,147	2,731,256
1992	60,594	58,644	62,455	60,160	307,434	465,296	512,189	512,877	337,755	175,953	57,851	60,125	2,671,333
1993	62,110	56,748	61,442	59,590	481,719	496,454	514,437	506,658	484,231	362,021	58,508	60,376	3,204,294
1994	62,966	58,083	63,760	61,319	493,007	494,154	513,802	511,021	316,188	170,801	57,852	61,418	2,864,372
1995	62,534	55,936	62,359	60,490	512,069	494,932	512,164	507,046	497,618	248,559	57,993	60,140	3,131,840
2002	60,143	54,206	59,526	57,609	314,630	492,302	514,761	512,435	472,561	390,005	59,391	60,943	3,048,513
2003	64,243	57,599	64,014	60,192	372,705	465,175	511,062	513,644	397,765	282,527	57,911	60,144	2,906,979
2004	60,146	55,866	59,526	57,624	489,477	495,635	514,162	509,225	238,098	169,907	57,825	59,524	2,767,015
2005	59,529	53,768	59,766	57,627	476,118	493,630	511,920	513,372	496,484	306,791	57,990	60,148	3,147,142
2006	59,566	53,770	59,528	57,605	344,763	494,659	512,997	511,041	397,820	349,435	58,607	60,816	2,960,607
2007	62,125	58,126	64,080	61,724	510,459	497,584	513,544	507,474	431,335	206,177	57,912	60,143	3,030,683

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Average Outflow
Devil Canyon Development : 80MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By:
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs
52-year Average	1,918	1,721	1,869	1,787	12,374	23,936	23,091	21,029	13,468	7,073	1,978	1,988

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
units	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft
1950	118,643	109,022	121,081	48,846	544,544	956,257	1,351,473	1,160,045	505,179	296,127	114,159	118,025	5,443,402
1951	119,863	109,038	90,261	78,873	686,821	1,047,838	1,329,562	1,170,189	1,214,521	389,918	113,082	117,148	6,467,115
1952	117,460	106,679	118,255	116,432	403,009	1,651,137	1,572,322	1,245,664	837,372	540,963	119,218	112,832	6,941,343
1953	115,076	106,782	118,412	116,301	947,213	1,572,693	1,191,442	1,206,146	897,403	366,060	113,556	117,902	6,868,986
1954	117,628	107,043	120,700	117,953	720,304	1,429,209	1,216,514	1,513,136	761,895	347,003	112,904	115,270	6,679,559
1955	114,958	104,723	118,002	114,243	607,789	1,525,098	1,620,787	1,579,405	840,534	323,470	113,471	117,814	7,180,293
1956	118,161	108,459	120,797	94,577	734,563	1,923,455	1,814,734	1,422,774	1,056,513	398,357	111,650	115,175	8,019,215
1957	115,466	101,311	116,696	114,029	712,885	1,714,430	1,394,476	1,221,158	1,157,304	553,767	144,289	192,204	7,538,015
1958	124,559	104,561	116,503	113,864	730,002	1,393,652	1,358,077	1,324,599	459,080	314,184	113,234	117,445	6,269,761
1959	117,382	106,620	119,563	116,497	718,245	1,349,336	1,482,405	1,893,884	993,745	414,128	112,476	113,928	7,538,211
1960	116,168	101,775	116,657	114,097	831,839	908,942	1,367,063	1,386,559	1,202,848	511,902	112,018	136,466	6,906,333
1961	142,302	106,541	116,826	122,189	1,047,012	1,729,776	1,438,954	1,297,464	773,752	400,772	112,674	115,582	7,403,845
1962	114,033	104,066	116,832	113,338	719,774	2,493,677	1,530,497	1,371,471	926,782	439,308	112,356	113,979	8,156,114
1963	114,240	103,256	117,344	114,254	196,408	1,028,255	1,547,096	2,066,857	1,244,568	712,339	348,863	117,093	7,710,571
1964	117,970	107,265	120,883	106,004	331,166	2,706,592	1,356,285	970,013	581,045	401,684	112,529	117,372	7,028,809
1965	118,109	107,080	120,540	117,209	514,793	1,491,024	1,643,269	1,257,715	1,128,080	497,660	113,588	117,983	7,227,050
1966	117,565	106,682	118,934	115,769	533,257	1,758,927	1,182,223	1,295,829	708,137	316,147	113,862	117,451	6,484,785
1967	118,067	107,227	119,852	116,781	662,727	1,698,881	1,620,929	1,980,517	1,000,690	322,276	113,070	117,446	7,978,462
1968	117,460	106,189	116,157	111,452	924,001	1,810,729	1,551,499	1,004,477	536,935	306,994	113,923	118,170	6,817,986
1969	120,007	109,512	82,638	80,380	515,824	757,164	919,177	646,043	381,564	293,424	114,336	118,235	4,138,306
1970	120,523	109,995	62,221	60,632	537,905	897,341	1,357,229	1,176,075	565,444	336,643	113,527	135,565	5,473,099
1971	115,660	105,461	118,094	114,791	385,908	1,667,803	1,429,832	1,967,552	863,583	375,716	111,830	131,187	7,387,417
1972	130,289	107,696	116,826	113,055	1,342,944	2,012,001	1,334,978	1,141,670	756,152	345,674	113,384	117,890	7,632,560
1973	117,806	106,947	120,047	116,924	456,686	1,377,220	1,075,154	1,222,115	550,641	297,072	114,198	117,850	5,672,659
1974	119,669	109,085	91,778	55,680	638,543	1,014,261	1,117,193	970,417	728,771	309,838	113,916	117,264	5,386,415
1975	117,799	106,935	119,080	115,958	697,769	1,858,244	1,633,040	1,062,056	954,818	514,484	113,498	118,104	7,411,786
1976	118,324	108,637	121,291	99,953	658,013	1,167,379	1,115,888	1,172,481	428,132	309,946	112,860	114,629	5,527,531
1977	112,667	101,142	115,159	109,963	735,430	2,162,430	1,356,070	1,133,447	743,807	491,158	121,264	151,282	7,333,819
1978	121,230	105,521	116,749	112,146	757,120	1,005,590	1,231,324	970,407	518,508	321,659	113,126	117,395	5,490,775
1979	118,007	106,236	118,411	115,485	640,828	1,403,205	1,735,322	1,194,105	647,977	472,754	156,870	143,519	6,852,720
1980	116,826	103,621	115,125	113,892	726,454	1,636,223	1,951,693	1,228,917	793,655	501,925	123,360	125,464	7,537,158
1981	114,352	105,521	116,808	112,876	995,994	1,106,512	2,082,429	2,272,748	813,123	475,680	110,578	117,475	8,424,095
1982	112,002	102,883	116,795	113,665	751,673	1,474,065	1,437,598	902,830	1,038,491	463,999	112,953	115,875	6,742,829
1983	115,877	105,521	116,826	112,973	890,299	1,399,492	1,253,469	1,464,003	811,169	532,429	111,316	120,956	7,034,329
1984	119,501	105,521	116,826	113,058	800,021	1,535,985	1,391,521	1,217,621	575,143	362,693	111,926	124,020	6,573,835
1985	117,901	105,521	116,734	112,836	668,790	1,535,139	1,573,239	1,181,632	910,834	466,470	112,947	117,119	7,019,162
1986	117,399	106,454	117,649	114,182	699,717	1,035,588	1,300,122	1,022,016	777,287	815,815	120,914	120,337	6,347,481
1987	113,927	102,009	115,457	113,506	768,577	1,291,038	1,800,988	1,275,106	806,684	381,296	113,135	117,544	6,999,268
1988	117,938	106,035	117,981	114,763	881,254	1,701,974	1,507,897	1,163,573	822,418	495,038	111,744	113,681	7,254,297
1989	115,088	105,521	116,769	112,867	810,025	1,558,647	1,390,434	1,313,657	897,617	533,846	111,221	115,284	7,180,975
1990	115,936	104,414	115,784	160,252	1,571,410	1,909,911	1,387,024	1,430,153	1,549,303	466,208	112,881	117,257	9,040,533
1991	114,745	103,531	114,244	113,966	546,820	1,220,838	1,254,343	1,085,102	738,565	376,737	112,817	117,274	5,898,981
1992	115,138	104,855	115,736	111,007	578,456	1,100,727	1,507,798	1,267,137	609,398	314,794	112,902	115,743	6,053,691
1993	114,853	104,715	114,454	111,122	1,213,785	1,329,332	1,140,487	1,144,650	1,230,052	646,408	111,475	147,601	7,408,934
1994	120,808	105,521	116,789	125,103	920,709	1,766,557	1,237,597	1,094,235	567,011	305,412	112,857	114,642	6,587,242
1995	115,316	103,714	115,474	111,795	1,077,468	1,433,242	1,495,641	1,098,935	1,095,261	444,258	113,072	117,444	7,321,620
2002	117,565	106,499	117,678	114,726	591,956	903,345	1,069,254	1,434,237	950,507	714,555	224,550	154,141	6,499,015
2003	116,826	105,018	116,817	111,096	699,433	1,176,452	1,782,089	1,271,442	814,240	503,744	113,086	117,370	6,927,614
2004	117,840	106,323	118,295	115,219	1,285,858	1,451,366	1,182,440	1,040,903	421,940	304,000	113,512	117,213	6,374,909
2005	117,778	107,075	120,063	116,694	1,382,329	1,949,949	1,559,418	1,303,698	1,323,504	552,315	113,389	118,006	8,764,217
2006	117,521	106,706	118,907	115,751	729,062	1,359,647	1,371,120	1,856,672	738,597	667,280	111,666	123,877	7,416,806
2007	119,472	105,521	116,826	113,057	1,041,202	1,143,152	1,277,207	1,142,497	811,889	368,730	112,965	117,094	6,469,612

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Average Reservoir Elevation
Devil Canyon Development :80MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By:
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
52-year Average	1,446	1,442	1,437	1,432	1,430	1,453	1,456	1,456	1,454	1,448	1,449	1,449

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
1950	1,430	1,422	1,410	1,405	1,413	1,447	1,456	1,456	1,453	1,447	1,442	1,435
1951	1,426	1,417	1,407	1,405	1,421	1,453	1,456	1,456	1,456	1,448	1,449	1,450
1952	1,448	1,442	1,433	1,423	1,410	1,452	1,456	1,456	1,454	1,449	1,453	1,455
1953	1,450	1,442	1,432	1,423	1,445	1,456	1,456	1,456	1,455	1,448	1,446	1,443
1954	1,438	1,431	1,422	1,412	1,426	1,456	1,456	1,456	1,454	1,448	1,449	1,452
1955	1,452	1,448	1,442	1,434	1,416	1,450	1,456	1,456	1,454	1,448	1,445	1,441
1956	1,434	1,425	1,416	1,407	1,425	1,456	1,456	1,456	1,455	1,448	1,450	1,455
1957	1,454	1,451	1,446	1,439	1,424	1,456	1,456	1,456	1,456	1,448	1,454	1,456
1958	1,456	1,452	1,446	1,439	1,428	1,456	1,456	1,456	1,453	1,448	1,447	1,443
1959	1,440	1,435	1,427	1,419	1,427	1,456	1,456	1,456	1,454	1,448	1,449	1,453
1960	1,454	1,451	1,446	1,439	1,433	1,452	1,456	1,456	1,456	1,449	1,450	1,456
1961	1,456	1,455	1,453	1,455	1,452	1,456	1,456	1,456	1,455	1,448	1,448	1,452
1962	1,452	1,450	1,445	1,441	1,425	1,456	1,456	1,456	1,455	1,448	1,449	1,452
1963	1,452	1,450	1,447	1,440	1,430	1,434	1,456	1,456	1,456	1,453	1,447	1,447
1964	1,438	1,430	1,420	1,409	1,406	1,455	1,456	1,455	1,453	1,448	1,449	1,448
1965	1,440	1,431	1,422	1,413	1,416	1,456	1,456	1,456	1,456	1,449	1,446	1,444
1966	1,439	1,434	1,428	1,423	1,415	1,454	1,456	1,456	1,454	1,447	1,443	1,439
1967	1,434	1,430	1,424	1,416	1,422	1,456	1,456	1,456	1,454	1,448	1,447	1,448
1968	1,448	1,447	1,446	1,445	1,433	1,456	1,456	1,455	1,453	1,447	1,444	1,437
1969	1,426	1,415	1,406	1,405	1,415	1,439	1,453	1,450	1,448	1,447	1,442	1,433
1970	1,423	1,412	1,405	1,405	1,413	1,445	1,456	1,456	1,453	1,448	1,452	1,456
1971	1,454	1,447	1,439	1,430	1,411	1,446	1,456	1,456	1,454	1,448	1,450	1,456
1972	1,456	1,456	1,455	1,453	1,451	1,456	1,456	1,456	1,454	1,447	1,447	1,445
1973	1,439	1,432	1,424	1,415	1,411	1,447	1,456	1,456	1,453	1,447	1,443	1,436
1974	1,427	1,417	1,407	1,405	1,421	1,456	1,456	1,455	1,453	1,448	1,443	1,440
1975	1,436	1,432	1,427	1,422	1,421	1,456	1,456	1,456	1,455	1,448	1,447	1,441
1976	1,432	1,423	1,414	1,406	1,412	1,451	1,456	1,456	1,452	1,447	1,448	1,453
1977	1,453	1,451	1,448	1,445	1,427	1,456	1,456	1,456	1,454	1,448	1,452	1,456
1978	1,456	1,454	1,451	1,448	1,441	1,452	1,456	1,456	1,453	1,448	1,449	1,448
1979	1,444	1,438	1,432	1,425	1,419	1,456	1,456	1,456	1,454	1,448	1,453	1,456
1980	1,455	1,452	1,447	1,442	1,432	1,455	1,456	1,456	1,455	1,448	1,453	1,455
1981	1,454	1,455	1,452	1,450	1,452	1,456	1,456	1,456	1,454	1,448	1,452	1,456
1982	1,454	1,451	1,446	1,441	1,432	1,456	1,456	1,455	1,455	1,448	1,448	1,451
1983	1,455	1,455	1,454	1,451	1,446	1,456	1,456	1,456	1,454	1,448	1,451	1,456
1984	1,456	1,456	1,455	1,454	1,439	1,455	1,456	1,456	1,453	1,447	1,450	1,456
1985	1,456	1,454	1,451	1,449	1,427	1,456	1,456	1,456	1,455	1,448	1,449	1,450
1986	1,448	1,445	1,440	1,435	1,421	1,452	1,456	1,456	1,454	1,451	1,453	1,456
1987	1,454	1,451	1,447	1,443	1,439	1,456	1,456	1,456	1,454	1,448	1,449	1,447
1988	1,444	1,439	1,435	1,431	1,438	1,456	1,456	1,456	1,454	1,448	1,451	1,453
1989	1,454	1,453	1,451	1,450	1,445	1,456	1,456	1,456	1,455	1,449	1,451	1,453
1990	1,451	1,449	1,447	1,450	1,455	1,456	1,456	1,456	1,456	1,449	1,447	1,449
1991	1,450	1,449	1,447	1,443	1,417	1,449	1,456	1,456	1,454	1,448	1,447	1,449
1992	1,450	1,449	1,448	1,448	1,420	1,450	1,456	1,456	1,453	1,447	1,449	1,451
1993	1,451	1,449	1,447	1,446	1,450	1,456	1,456	1,456	1,456	1,450	1,452	1,456
1994	1,456	1,455	1,452	1,451	1,448	1,456	1,456	1,456	1,453	1,447	1,449	1,452
1995	1,452	1,450	1,448	1,448	1,454	1,455	1,456	1,456	1,456	1,448	1,449	1,448
2002	1,447	1,443	1,437	1,431	1,421	1,451	1,456	1,456	1,455	1,449	1,456	1,456
2003	1,455	1,454	1,453	1,448	1,424	1,450	1,456	1,456	1,454	1,449	1,448	1,449
2004	1,445	1,439	1,433	1,428	1,452	1,456	1,456	1,456	1,453	1,447	1,443	1,441
2005	1,436	1,431	1,423	1,417	1,449	1,456	1,456	1,456	1,456	1,449	1,447	1,444
2006	1,439	1,434	1,428	1,423	1,425	1,455	1,456	1,456	1,453	1,450	1,451	1,456
2007	1,456	1,456	1,454	1,452	1,453	1,456	1,456	1,456	1,455	1,448	1,449	1,451

Complete Scenario Data for Scenario - High Devil Canyon 350MW Load
Written out on 10/15/2009 1:13:03 PM

System Misc. - 350MW Winter Demand
    Description -
    Notes -

CarryOver	MaxPeak	ForecastDays	ForecastAcr	WaterYearType
True	False	3	0.035	6

Loadshape Data - Sample
    Description - Sample
    Notes - Sample Data

IMonth	Period	Duration	Price
1	1	7	1
1	2	0	2
1	3	8	3
1	4	0	2
1	5	8	3
1	6	0	2
1	7	1	1
1	8	10	1
1	9	8	2
1	10	0	1
1	11	0	2
1	12	6	1
2	1	7	1
2	2	0	2
2	3	8	3
2	4	0	2
2	5	8	3
2	6	0	2
2	7	1	1
2	8	10	1
2	9	8	2
2	10	0	1
2	11	0	2
2	12	6	1
3	1	7	1
3	2	0	2
3	3	8	3
3	4	0	2
3	5	8	3
3	6	0	2
3	7	1	1
3	8	10	1
3	9	8	2
3	10	0	1
3	11	0	2
3	12	6	1
4	1	7	1
4	2	0	2
4	3	8	3
4	4	0	2
4	5	8	3
4	6	0	2
4	7	1	1
4	8	10	1
4	9	8	2

4	10	0	1
4	11	0	2
4	12	6	1
5	1	7	1
5	2	0	2
5	3	8	3
5	4	0	2
5	5	8	3
5	6	0	2
5	7	1	1
5	8	10	1
5	9	8	2
5	10	0	1
5	11	0	2
5	12	6	1
6	1	7	1
6	2	0	2
6	3	8	3
6	4	0	2
6	5	8	3
6	6	0	2
6	7	1	1
6	8	10	1
6	9	8	2
6	10	0	1
6	11	0	2
6	12	6	1
7	1	7	1
7	2	0	2
7	3	8	3
7	4	0	2
7	5	8	3
7	6	0	2
7	7	1	1
7	8	10	1
7	9	8	2
7	10	0	1
7	11	0	2
7	12	6	1
8	1	7	1
8	2	0	2
8	3	8	3
8	4	0	2
8	5	8	3
8	6	0	2
8	7	1	1
8	8	10	1
8	9	8	2
8	10	0	1
8	11	0	2
8	12	6	1
9	1	7	1
9	2	0	2
9	3	8	3
9	4	0	2
9	5	8	3
9	6	0	2
9	7	1	1
9	8	10	1
9	9	8	2
9	10	0	1
9	11	0	2
9	12	6	1

10	1	7	1
10	2	0	2
10	3	8	3
10	4	0	2
10	5	8	3
10	6	0	2
10	7	1	1
10	8	10	1
10	9	8	2
10	10	0	1
10	11	0	2
10	12	6	1
11	1	7	1
11	2	0	2
11	3	8	3
11	4	0	2
11	5	8	3
11	6	0	2
11	7	1	1
11	8	10	1
11	9	8	2
11	10	0	1
11	11	0	2
11	12	6	1
12	1	7	1
12	2	0	2
12	3	8	3
12	4	0	2
12	5	8	3
12	6	0	2
12	7	1	1
12	8	10	1
12	9	8	2
12	10	0	1
12	11	0	2
12	12	6	1

Scenario Information for Watana

Physical Setting Conditions, Name - No Watana
Description -
Notes -

Res_Storage Data - Watana Reservoir Curve
Description -
Notes - Data from 1985 ammendment to the FERC application for Susitna Figure B.3.2.1. -DEE 12-11-2008

Elevation	Storage	Sedimentation	Sed_File
1400	0	False	
1500	0	False	
1600	85600	False	
1700	450400	False	
1800	1298500	False	
1900	2630700	False	

2000	4336800	False
2100	6713100	False
2200	1E+07	False

Tailwater Data - Watana Tailwater Rating
Description -
Notes - Data from 1985 ammendment to the FERC application Figure B.4.2.3. -DEE 12-11-2008

Flow	Elevation
0	1450
8000	1455
27000	1460
53000	1465
92000	1470
140000	1475
160000	1477

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - Unlimited Capacity
Description -
Notes -

Elevation	Flow
1	100000

Outlet2 Data - No Watana Spillway
Description -
Notes -

Elevation	Flow
1500	220000
1510	259600

Outlet3 Data - None

Elevation	Flow

Plant_Options Data - No Watana
Description -
Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type
0	0	False	0

Res_Area Data - Watana Reservoir Area
Description -
Notes - Data from the 1985 ammendment to the FERC application Figure B.3.2.1. -DEE 12-11-2008

Elevation	Area	Sedimentation	Sed_File
1500	0	False	
1600	3333	False	

1700	6000	False
1800	10000	False
1900	15000	False
2000	21000	False
2100	33333	False
2200	40000	False

Evaporation Data - Watana Evaporation
    Description - BPK 2008-12-16
    Notes - Based on information from table B.3.1.11 from the 1985 ammendment to the FERC application. A reservoir area of 40000 acres has been assumed. -DEE. Modified for units of ft per acre per day.

iMonth	Coeff
5	0.00672
6	0.006667
7	0.006183
8	0.004839
9	0.002778

Operating Setting Conditions, Name - No Watana
    Description -
    Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - None

IDay	Data	OrInflow	Dependent

Target_Elev Data - No Watana
    Description -
    Notes -

IDay	Elevation
1	1500
365	1500

Flood_Elev Data - No Watana Flood Elevation
    Description -
    Notes -

IDay	Elevation
1	1501
365	1501

Min_Elev Data - 1390
    Description -
    Notes - Minimum elevation for filling set 10 feet below minimum reservoir level. -DEE 12-11-2008

IDay	Elevation
1	1390

365 1390

Level_Fluct Data - None

IDay	Elevation	Hard	PercentAbove

Level_Rate Data - None

IDay	Rate

Flashboard Data - None

Elevation	Flow	Trip	Reset

Bypass Data - None

IDay	Data	OrInflow	Destination

Ramp_Rate Data - None

IDay	UpRampDay	UpRampHour	DownRampDay	DownRampHour	Type

Withdrawal Data - None

IDay	Withdrawal	Return	UseProjected	FileName

Rec_Flows Data - None

IDay	Data	StartHr	EndHr

Generating Setting Conditions, Name - No Watana
Description -
Notes -

Plant_Generation Data - None

Unit_No	Head_Loss_ID	Generator_Per	Turbine_Perf_	Gate_Leakage

Maintenance Data - None

IDay	Unit

Min_Unit Data - None

Head	Flow	Eff	CenterLine	Headloss	GeneratorEff	OpStyle

Scenario Information for Devil Canyon

Physical Setting Conditions, Name - High Devil Canyon
Description -
Notes -

Res_Storage Data - High Devil Canyon Reservoir Volume
Description -
Notes -

Elevation	Storage	Sedimentation	Sed_File
1000	0	False	
1100	11240	False	
1200	63000	False	
1300	163600	False	
1400	404600	False	
1500	946900	False	
1600	1893500	False	
1700	3332800	False	
1725	3789600	False	
1750	4284200	False	
1775	4821400	False	
1800	5600000	False	

Tailwater Data - High Devil Canyon Tailwater Rating
Description -
Notes -

Flow	Elevation
0	1000
9000	1020
26000	1025
60000	1030
119000	1035
200000	1040

Ramp_Curve Data - None

Elevation	Flow

Outlet1 Data - None

Elevation	Flow

Outlet2 Data - High Devil Canyon Spillway Capacity
Description -
Notes -

Elevation	Flow
1750	240000
1755	309000

Outlet3 Data - None

Elevation Flow

Plant_Options Data - Devil Canyon Only
Description -
Notes -

Min_Op_Flow	Min_Phys_Elev	Use_Min_Phys_	Op_Type
0	0	False	1

Res_Area Data - High Devil Canyon Reservoir Area
Description -
Notes -

Elevation	Area	Sedimentation	Sed_File
1200	740	False	
1600	11000	False	
1750	19000	False	
1800	22000	False	

Evaporation Data - None

iMonth	Coeff

Operating Setting Conditions, Name - High Devil Canyon
Description -
Notes -

MinInst Data - None

IDay	Data	OrInflow	Dependent

MinDaily Data - Devil Canyon Minimum Environmental Flow
Description -
Notes - Data based on 1985 ammendment to the FERC application for Susitna environmental flow case E-VI prorated from Gold Creek gauge to Devil Canyon. -DEE 12-11-2008

IDay	Data	OrInflow	Dependent
1	1886	False	False
7	1886	False	False
14	1886	False	False
21	1886	False	False
28	1886	False	False
35	1886	False	False
42	1886	False	False
49	1886	False	False
56	1886	False	False
63	1886	False	False
70	1886	False	False
77	1886	False	False
84	1886	False	False
91	1886	False	False
98	1886	False	False
105	1886	False	False
112	1886	False	False

119	1886	False	False
126	3772	False	False
133	5658	False	False
140	5658	False	False
147	5658	False	False
154	8487	False	False
161	8487	False	False
168	8487	False	False
175	8487	False	False
182	8487	False	False
189	8487	False	False
196	8487	False	False
203	8487	False	False
210	8487	False	False
217	8487	False	False
224	8487	False	False
231	8487	False	False
238	8487	False	False
245	7544	False	False
252	6601	False	False
259	5658	False	False
266	5658	False	False
274	5658	False	False
281	5658	False	False
288	4715	False	False
295	3772	False	False
302	2829	False	False
309	2829	False	False
316	2829	False	False
323	2829	False	False
330	2829	False	False
336	1886	False	False
344	1886	False	False
351	1886	False	False
358	1886	False	False
365	1886	False	False

Target_Elev Data - High Devil Canyon Target Elevations
    Description -
    Notes -

IDay	Elevation
1	1702
121	1605
152	1629
182	1672
213	1707
244	1730
274	1743
305	1750
365	1702

Flood_Elev Data - High Devil Canyon
    Description -
    Notes -

IDay	Elevation
1	1751
365	1751

Min_Elev Data - High Devil Canyon Minimum Elevations

Description -
Notes -

IDay	Elevation
1	1585
365	1585

Level_Fluct Data - None

IDay	Elevation	Hard	PercentAbove

Level_Rate Data - None

IDay	Rate

Flashboard Data - None

Elevation	Flow	Trip	Reset

Bypass Data - None

IDay	Data	OrInflow	Destination

Ramp_Rate Data - Devil Canyon Ramp Rates
Description -
Notes - Data based on environmental flow case E-VI report. -DEE 12-11-2008

IDay	UpRampDay	UpRampHour	DownRampDay	DownRampHour	Type
1	12000	500	12000	500	Flow
365	12000	500	12000	500	Flow

Withdrawal Data - None

IDay	Withdrawal	Return	UseProjected	FileName

Rec_Flows Data - None

IDay	Data	StartHr	EndHr

Generating Setting Conditions, Name - High Devil Canyon
Description -
Notes -

Plant_Generation Data - High Devil Canyon Generating
Description -
Notes -

Unit_No	Head_Loss_ID	Generator_Per	Turbine_Perf_	Gate_Leakage
1	14	9	8	0

2	14	9	8	0
3	14	9	8	0
4	14	9	8	0

Head Loss Data, ID = - 14, Name = High Devil Canyon Headloss
Description -
Notes - Based on Full Watana Headloss

Unit_No	Unit_HL	Common_HL	Use_Com2	Max_Unit
1	0.0000016	0	0	4
2	0.0000016	0	0	4
3	0.0000016	0	0	4
4	0.0000016	0	0	4

Turbine Performance, ID = - 8, Name = High Devil Canyon
Description -
Notes - Based on Full Watana Turbines

Head	Flow	Eff
555	1174.45	0.686
555	1626.16	0.836
555	2348.9	0.906
555	2619.93	0.911
555	2800.62	0.906
555	3252.33	0.876
600	1221.14	0.704
600	1690.81	0.854
600	2442.27	0.924
600	2724.08	0.929
600	2911.94	0.924
600	3381.61	0.894
680	1300	0.72
680	1800	0.87
680	2600	0.94
680	2900	0.945
680	3100	0.94
680	3600	0.91
710	1328.37	0.72
710	1839.28	0.87
710	2656.73	0.94
710	2963.28	0.945
710	3167.64	0.94
710	3678.55	0.91
750	1356.14	0.72
750	1877.73	0.87
750	2712.28	0.94
750	3025.24	0.945
750	3233.87	0.94
750	3755.47	0.91

Generator Performance Data, ID = - 9, Name = High Devil Canyon Generators
Description -
Notes -

gOutput	Eff	Cap
44	0.9283	230
65	0.95	230
86	0.9608	230
108	0.968	230
130	0.9715	230

143	0.9732	230
156	0.9748	230
165	0.9756	230
174	0.9764	230
200	0.9781	230
219.51	0.9781	230
230	0.9781	230

Maintenance Data - None

IDay	Unit

Min_Unit Data - None

Head	Flow	Eff	CenterLine	Headloss	GeneratorEff	OpStyle

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Energy Production Estimates
High Devil Canyon Development : 345MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By:
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
units	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh
52-year Average	261,793	235,028	256,947	246,585	286,705	382,319	468,485	522,161	466,859	251,263	252,237	260,736	3,891,118

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
units	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh	MWh
1950	262,252	236,693	261,785	222,815	142,382	267,909	376,852	456,268	269,574	186,506	251,876	261,707	3,196,618
1951	262,605	236,572	261,719	210,397	168,183	336,206	411,904	450,543	521,234	272,545	251,928	260,818	3,644,654
1952	261,727	245,657	261,898	253,301	170,916	354,089	471,034	559,661	506,559	297,953	253,283	259,837	3,895,915
1953	261,736	236,987	262,124	253,409	365,309	405,767	455,277	554,203	531,676	240,618	251,615	261,371	4,080,091
1954	261,576	236,960	262,038	253,398	313,684	379,340	437,741	517,366	520,311	199,420	251,638	260,901	3,894,374
1955	261,717	237,136	261,932	253,330	230,705	360,568	484,690	558,126	520,428	215,236	251,399	261,499	3,896,767
1956	261,774	245,052	262,224	253,334	229,698	405,290	541,189	558,692	541,945	252,902	252,212	260,297	4,064,609
1957	261,749	236,963	262,011	253,482	320,803	398,467	472,176	558,567	541,774	327,674	253,800	259,240	4,146,707
1958	261,636	236,190	262,292	253,666	365,491	393,933	447,018	556,152	381,096	187,499	251,049	261,666	3,857,687
1959	262,028	236,529	262,207	253,370	231,411	378,749	441,847	517,766	514,177	248,581	252,033	260,513	3,859,210
1960	261,738	245,466	261,999	253,435	350,617	318,140	364,574	479,800	541,344	317,029	252,678	259,886	3,906,705
1961	261,808	236,589	261,922	253,821	378,079	412,795	550,642	559,215	508,782	252,058	251,809	260,735	4,188,255
1962	261,667	237,050	262,011	253,449	332,518	431,237	558,171	558,865	522,924	249,294	252,343	260,325	4,179,854
1963	261,707	236,992	262,077	253,428	318,922	403,382	524,271	558,839	511,984	216,074	251,916	261,038	4,060,629
1964	261,685	245,411	262,039	253,361	149,370	453,945	558,984	560,871	435,272	188,884	251,910	260,840	3,882,571
1965	261,717	236,996	262,043	253,387	209,775	380,702	479,684	558,093	541,235	324,099	251,902	261,069	4,020,701
1966	261,629	237,203	261,902	253,264	225,002	395,575	452,055	551,676	505,083	197,404	251,335	261,607	3,853,735
1967	261,800	236,799	262,148	253,418	234,787	394,209	487,611	556,814	522,439	214,310	251,415	261,315	3,937,064
1968	261,619	245,688	261,737	253,426	312,636	404,647	540,740	560,417	419,435	187,848	251,146	261,653	3,960,992
1969	262,266	236,717	261,910	253,299	142,570	263,627	294,520	305,814	224,055	171,790	253,524	262,142	2,932,235
1970	261,708	42,250	178	4,144	141,851	266,143	365,870	454,487	273,059	187,049	250,846	261,745	2,509,329
1971	261,547	236,887	262,130	253,364	148,410	343,115	455,405	556,007	514,614	213,566	251,882	260,452	3,757,380
1972	261,733	245,316	261,760	253,734	372,866	475,096	559,121	559,968	516,479	189,650	251,564	261,399	4,208,686
1973	261,617	236,893	262,075	253,379	151,693	348,244	436,595	456,260	352,268	187,192	251,348	261,731	3,459,294
1974	262,410	236,596	261,794	226,425	176,378	319,541	311,513	336,409	261,657	188,216	251,172	261,667	3,093,777
1975	261,904	236,661	262,183	253,432	242,875	399,323	522,499	560,469	541,759	317,617	252,360	260,932	4,112,012
1976	261,702	245,426	262,131	253,424	250,214	373,830	421,458	449,220	241,601	185,208	252,347	261,729	3,458,291
1977	262,347	236,422	262,094	253,351	178,028	400,793	547,428	559,930	486,911	261,903	253,377	259,497	3,962,079
1978	261,743	236,512	262,060	253,763	367,432	370,193	420,167	390,968	240,568	184,842	252,500	261,727	3,502,475
1979	262,613	236,485	261,781	243,779	156,881	371,263	439,078	558,119	478,015	216,575	253,637	259,439	3,737,664
1980	261,715	244,976	261,922	253,841	361,917	390,958	514,490	559,567	514,067	276,608	253,422	259,650	4,153,132
1981	261,725	236,648	261,937	253,839	376,210	392,266	486,389	555,708	520,455	237,317	253,452	259,733	4,095,680
1982	261,747	236,793	262,008	253,635	357,644	384,819	446,709	494,134	505,618	289,635	252,194	260,441	4,005,376
1983	261,794	236,848	261,923	253,730	364,614	392,833	447,071	529,763	503,848	283,619	253,198	259,740	4,048,981
1984	261,771	245,133	261,955	253,868	362,832	386,501	457,356	557,124	440,328	188,567	251,550	260,743	3,927,727
1985	261,694	237,017	261,871	253,563	293,097	386,816	478,399	558,049	542,491	280,828	252,262	260,509	4,066,596
1986	261,680	237,043	261,925	253,445	329,077	335,834	418,335	399,966	306,637	397,173	253,601	259,640	3,714,357
1987	261,705	236,754	261,909	253,730	362,352	384,072	461,499	559,572	517,435	201,163	252,035	260,943	4,013,169
1988	261,699	245,709	261,816	253,339	355,266	396,491	507,809	560,042	509,196	256,141	252,767	260,117	4,120,392
1989	261,729	236,844	261,758	253,764	365,574	391,236	458,452	558,254	542,346	307,413	253,048	260,008	4,150,425
1990	261,730	236,876	261,775	253,948	393,072	507,319	558,773	558,583	540,240	308,423	251,922	260,728	4,393,389
1991	261,716	237,025	261,953	253,546	231,423	345,392	433,205	456,941	356,092	188,768	251,529	261,097	3,538,685
1992	261,615	245,611	261,765	253,475	227,959	342,967	431,231	509,813	420,244	187,937	250,993	261,641	3,655,250
1993	261,490	237,236	261,790	253,381	362,312	403,411	446,942	496,986	541,406	374,513	253,421	259,539	4,152,428
1994	261,727	236,525	262,060	253,874	376,471	406,024	536,277	560,051	450,093	187,881	250,982	261,607	4,043,571
1995	261,551	237,226	261,806	253,389	367,427	388,014	474,045	559,681	542,104	290,081	252,231	260,757	4,148,312
2002	262,205	236,511	262,040	253,333	179,531	296,936	358,837	465,101	542,050	451,691	253,762	260,327	3,822,323
2003	260,893	236,155	262,353	253,062	374,766	393,575	500,788	558,853	514,404	304,517	252,461	260,305	4,172,132
2004	261,782	245,471	261,997	253,542	388,783	461,874	557,733	560,048	392,846	187,378	251,186	261,747	4,084,387
2005	262,041	236,438	262,247	253,519	370,430	480,816	557,316	558,487	540,252	356,097	252,564	260,487	4,390,692
2006	261,739	237,079	261,922	253,457	342,127	391,116	498,743	556,597	509,266	387,532	253,421	259,515	4,212,513
2007	261,720	236,428	262,320	253,538	386,283	415,207	500,730	559,479	536,996	242,871	252,488	260,212	4,168,273

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Average Outflow
High Devil Canyon Development : 345MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By:
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs
52-year Average	7,104	7,129	7,432	7,767	8,750	11,227	13,873	17,878	14,206	6,540	6,723	6,921

Monthly Outflow Volume

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
units	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft	ac-ft
1950	445,885	417,915	486,989	457,905	284,237	493,789	635,891	726,333	423,562	291,785	408,958	433,597	5,506,846
1951	449,000	420,846	491,645	430,532	326,181	608,492	693,208	723,423	886,726	423,348	400,486	424,739	6,278,625
1952	434,294	405,675	465,987	476,419	334,665	623,402	759,848	1,201,015	890,327	459,523	397,849	421,118	6,870,122
1953	432,194	402,445	462,723	471,109	678,718	684,313	725,829	958,749	933,400	371,582	401,535	426,874	6,949,472
1954	436,469	408,278	470,816	484,003	602,261	670,562	716,753	923,090	851,760	308,471	401,147	425,031	6,698,640
1955	434,187	404,422	463,536	471,876	445,439	638,450	784,198	1,504,585	906,590	332,917	402,522	428,026	7,216,747
1956	438,789	410,962	475,938	492,481	436,014	683,851	1,310,124	1,422,651	1,076,565	389,967	399,661	422,835	7,959,838
1957	432,721	401,806	460,220	467,026	613,928	680,391	760,513	1,071,448	1,157,228	511,467	396,845	417,376	7,370,970
1958	427,854	393,996	451,719	455,079	678,940	678,255	721,516	1,065,368	598,463	291,683	405,180	430,040	6,598,093
1959	440,933	411,456	476,276	492,639	444,094	670,312	718,849	1,508,115	1,051,730	384,002	400,084	423,602	7,422,093
1960	432,943	402,646	461,241	468,582	667,953	574,086	613,594	764,081	1,135,245	496,305	398,689	421,339	6,836,705
1961	430,746	397,138	453,596	455,257	685,689	692,342	1,036,459	1,301,907	814,591	388,971	400,638	424,413	7,481,747
1962	433,515	403,094	461,454	467,315	637,868	736,158	1,431,082	1,371,119	972,963	384,615	399,319	422,946	8,121,449
1963	424,460	391,510	446,729	448,357	509,881	585,031	709,082	1,455,564	1,243,030	809,042	296,219	415,321	7,734,226
1964	435,906	408,121	470,759	485,171	294,425	772,005	1,356,234	989,706	688,796	291,729	400,302	424,894	7,018,050
1965	435,700	407,557	469,670	481,250	404,287	671,263	781,729	1,146,289	1,088,114	519,531	400,621	425,704	7,231,715
1966	435,379	406,765	466,434	474,496	435,125	678,741	724,192	1,005,215	807,980	305,454	403,182	428,649	6,571,611
1967	438,730	409,667	472,159	484,854	448,850	678,216	854,227	1,980,278	1,065,497	331,373	402,105	426,588	7,992,543
1968	435,090	405,662	462,703	468,418	592,584	683,623	1,025,359	1,034,692	662,725	291,691	404,963	430,568	6,898,078
1969	444,101	416,590	484,821	509,127	284,219	493,789	521,845	521,845	381,388	291,785	441,867	478,599	5,269,975
1970	515,908	121,509	44,897	60,651	284,199	493,789	617,737	725,451	428,939	291,672	404,841	428,240	4,417,833
1971	436,709	408,426	471,075	483,797	292,228	615,046	730,075	1,741,165	939,292	330,150	400,416	423,360	7,271,740
1972	432,280	400,292	456,418	460,846	682,708	784,942	1,320,321	1,158,621	836,714	293,328	401,688	426,990	7,655,147
1973	436,826	408,410	470,571	483,148	295,742	618,410	716,185	726,257	549,286	291,674	406,840	431,911	5,835,260
1974	446,047	418,041	487,307	459,427	347,401	578,979	528,544	542,878	411,049	291,701	404,234	429,327	5,344,936
1975	439,674	410,228	472,979	484,564	465,378	680,819	1,000,750	1,075,292	938,730	495,793	399,357	425,253	7,288,817
1976	436,054	408,404	471,030	483,819	483,112	667,633	706,041	717,715	381,556	291,785	410,863	432,808	5,890,819
1977	444,659	414,076	478,807	494,354	345,969	681,369	924,397	1,159,676	768,509	404,119	397,525	419,674	6,933,135
1978	429,812	396,458	453,228	456,423	680,008	665,844	707,799	631,001	381,416	291,785	411,533	434,277	5,939,581
1979	448,866	419,300	487,638	493,087	312,665	666,266	717,297	953,447	752,890	334,350	397,159	418,689	6,401,653
1980	429,507	396,972	454,125	458,704	677,047	676,504	1,172,835	1,238,289	826,028	426,463	397,713	420,247	7,574,434
1981	430,954	397,602	454,279	457,922	684,691	677,614	996,519	2,272,759	880,213	366,391	397,416	420,678	8,437,038
1982	431,355	399,479	457,406	462,264	674,738	673,426	721,305	784,266	914,264	449,702	399,705	423,331	6,791,240
1983	432,289	399,953	456,377	460,793	678,428	677,737	721,597	1,040,519	868,135	437,674	397,781	420,813	6,992,096
1984	430,898	398,201	454,314	457,556	677,532	674,231	735,521	1,016,826	696,190	291,714	401,250	424,415	6,658,649
1985	433,324	402,539	459,979	464,624	560,539	674,472	776,770	1,009,099	943,508	432,705	399,572	423,610	6,980,741
1986	433,312	402,952	461,087	467,698	631,199	609,251	704,743	644,878	481,063	637,203	397,182	420,165	6,290,731
1987	430,923	399,002	456,260	460,795	677,251	673,158	750,531	1,209,195	883,869	310,857	400,272	425,234	7,077,347
1988	434,920	406,189	464,723	472,380	673,308	679,401	826,528	1,130,910	902,583	395,855	398,518	422,207	7,207,523
1989	432,020	399,986	456,351	460,518	678,944	676,775	736,076	1,105,892	922,536	476,679	397,916	421,829	7,165,522
1990	432,054	400,467	457,027	459,786	693,440	973,948	1,387,135	1,430,171	1,547,194	483,189	400,406	424,377	9,089,194
1991	433,452	402,589	459,976	465,305	446,023	622,044	714,413	726,671	558,474	291,721	401,621	425,742	5,948,029
1992	434,276	404,561	461,646	466,518	439,143	618,678	713,364	823,004	661,054	291,695	403,602	427,862	6,145,401
1993	436,088	407,072	465,391	472,264	677,089	683,251	721,539	794,652	1,157,049	583,386	397,525	419,899	7,215,206
1994	429,974	396,514	453,318	455,984	684,905	684,376	885,011	981,366	718,251	291,686	403,581	427,719	6,812,685
1995	436,036	406,922	465,192	471,154	679,899	675,148	765,791	941,734	1,091,278	453,539	399,725	424,562	7,210,980
2002	444,857	414,809	479,815	497,315	350,861	541,312	607,394	749,478	1,028,457	741,458	411,538	415,878	6,683,172
2003	425,026	391,100	444,839	444,616	684,109	677,986	1,131,186	1,410,082	971,128	469,748	399,110	422,873	7,871,805
2004	432,905	402,731	461,400	467,090	691,158	761,351	1,081,859	1,157,064	621,992	291,681	405,943	430,345	7,205,518
2005	440,982	411,129	475,566	489,217	681,171	992,432	1,729,233	1,445,442	1,467,722	575,460	398,807	423,553	9,530,713
2006	433,654	403,505	461,644	467,567	649,575	676,752	813,264	1,969,315	867,560	645,299	397,431	419,759	8,205,325
2007	429,679	395,526	451,637	452,221	690,098	689,317	814,363	1,173,707	923,227	374,689	399,088	422,535	7,216,087

HDR/AEA Susitna Hydroelectric Project
CHEOPS Monthly Average Reservoir Elevation
High Devil Canyon Development : 345MW November-April Demand
By: HDR
By: David Elwood, EIT Date: 9/30/09
Checked By:
Reviewed By:

Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
52-year Average	1,704	1,683	1,659	1,632	1,626	1,675	1,721	1,742	1,745	1,744	1,738	1,723

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
units	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
1950	1,689	1,662	1,634	1,601	1,599	1,641	1,689	1,727	1,735	1,737	1,728	1,709
1951	1,685	1,658	1,629	1,596	1,611	1,653	1,692	1,721	1,748	1,747	1,740	1,725
1952	1,707	1,684	1,658	1,628	1,611	1,664	1,727	1,751	1,749	1,747	1,744	1,730
1953	1,712	1,689	1,663	1,634	1,638	1,691	1,726	1,747	1,750	1,746	1,738	1,722
1954	1,703	1,679	1,652	1,622	1,620	1,665	1,708	1,742	1,749	1,744	1,739	1,725
1955	1,707	1,686	1,661	1,633	1,617	1,662	1,730	1,751	1,749	1,745	1,737	1,720
1956	1,699	1,673	1,646	1,616	1,620	1,691	1,744	1,751	1,751	1,747	1,741	1,728
1957	1,711	1,691	1,666	1,638	1,622	1,684	1,728	1,749	1,751	1,748	1,745	1,735
1958	1,721	1,703	1,679	1,653	1,637	1,680	1,718	1,750	1,742	1,740	1,733	1,716
1959	1,696	1,672	1,646	1,616	1,615	1,664	1,713	1,745	1,749	1,746	1,741	1,727
1960	1,710	1,689	1,664	1,637	1,625	1,653	1,691	1,735	1,750	1,748	1,743	1,730
1961	1,715	1,698	1,675	1,653	1,650	1,696	1,743	1,751	1,748	1,746	1,740	1,726
1962	1,709	1,688	1,664	1,638	1,621	1,695	1,751	1,751	1,750	1,746	1,742	1,728
1963	1,726	1,709	1,688	1,661	1,632	1,631	1,695	1,745	1,751	1,748	1,746	1,738
1964	1,704	1,679	1,652	1,622	1,607	1,708	1,751	1,751	1,745	1,745	1,740	1,725
1965	1,705	1,680	1,653	1,625	1,616	1,666	1,725	1,749	1,750	1,748	1,740	1,724
1966	1,705	1,682	1,657	1,630	1,616	1,682	1,723	1,748	1,748	1,744	1,736	1,719
1967	1,699	1,676	1,650	1,622	1,618	1,680	1,731	1,751	1,750	1,745	1,738	1,723
1968	1,705	1,684	1,662	1,637	1,626	1,691	1,743	1,751	1,745	1,741	1,733	1,715
1969	1,692	1,664	1,636	1,605	1,600	1,632	1,662	1,683	1,684	1,684	1,671	1,643
1970	1,612	1,586	1,585	1,585	1,598	1,637	1,688	1,725	1,736	1,739	1,734	1,720
1971	1,702	1,678	1,652	1,622	1,608	1,654	1,724	1,749	1,749	1,745	1,740	1,727
1972	1,711	1,693	1,671	1,646	1,646	1,723	1,751	1,751	1,749	1,744	1,738	1,722
1973	1,702	1,679	1,652	1,623	1,612	1,660	1,707	1,727	1,740	1,739	1,731	1,712
1974	1,689	1,662	1,633	1,600	1,602	1,651	1,687	1,717	1,736	1,743	1,735	1,718
1975	1,698	1,675	1,649	1,622	1,618	1,685	1,740	1,751	1,750	1,748	1,741	1,724
1976	1,704	1,679	1,652	1,623	1,617	1,659	1,695	1,725	1,731	1,732	1,725	1,710
1977	1,691	1,668	1,643	1,615	1,610	1,687	1,742	1,751	1,747	1,747	1,744	1,732
1978	1,717	1,699	1,676	1,651	1,639	1,655	1,692	1,718	1,729	1,731	1,724	1,707
1979	1,685	1,660	1,633	1,602	1,598	1,657	1,711	1,749	1,746	1,746	1,745	1,734
1980	1,717	1,698	1,675	1,649	1,634	1,677	1,738	1,751	1,748	1,747	1,744	1,731
1981	1,714	1,697	1,674	1,649	1,648	1,678	1,725	1,751	1,749	1,747	1,745	1,731
1982	1,713	1,694	1,670	1,644	1,630	1,670	1,718	1,742	1,748	1,747	1,741	1,727
1983	1,712	1,694	1,671	1,646	1,637	1,678	1,718	1,745	1,749	1,747	1,744	1,731
1984	1,714	1,696	1,674	1,650	1,635	1,672	1,723	1,748	1,745	1,744	1,739	1,726
1985	1,709	1,689	1,666	1,641	1,622	1,673	1,727	1,749	1,751	1,747	1,741	1,727
1986	1,709	1,689	1,664	1,638	1,621	1,651	1,692	1,719	1,736	1,748	1,745	1,731
1987	1,714	1,695	1,671	1,646	1,634	1,670	1,720	1,751	1,749	1,745	1,740	1,724
1988	1,706	1,684	1,659	1,633	1,628	1,682	1,735	1,751	1,749	1,746	1,743	1,729
1989	1,712	1,693	1,671	1,646	1,637	1,677	1,724	1,749	1,750	1,748	1,744	1,729
1990	1,712	1,693	1,670	1,647	1,666	1,736	1,751	1,751	1,751	1,748	1,740	1,726
1991	1,709	1,689	1,666	1,640	1,618	1,653	1,704	1,728	1,737	1,745	1,738	1,724
1992	1,707	1,686	1,663	1,639	1,618	1,652	1,703	1,740	1,744	1,742	1,736	1,721
1993	1,703	1,682	1,658	1,633	1,635	1,689	1,717	1,740	1,751	1,749	1,744	1,732
1994	1,716	1,699	1,676	1,652	1,649	1,692	1,738	1,750	1,746	1,742	1,736	1,721
1995	1,703	1,682	1,658	1,634	1,640	1,674	1,727	1,750	1,751	1,747	1,741	1,725
2002	1,690	1,667	1,641	1,613	1,607	1,648	1,688	1,729	1,751	1,749	1,749	1,740
2003	1,725	1,709	1,691	1,666	1,646	1,679	1,734	1,751	1,749	1,747	1,742	1,728
2004	1,710	1,689	1,664	1,638	1,662	1,720	1,749	1,751	1,744	1,740	1,732	1,716
2005	1,696	1,672	1,647	1,619	1,644	1,727	1,751	1,751	1,751	1,749	1,742	1,727
2006	1,709	1,688	1,664	1,638	1,626	1,677	1,731	1,751	1,749	1,749	1,744	1,732
2007	1,717	1,701	1,680	1,656	1,659	1,700	1,733	1,751	1,750	1,746	1,742	1,728

Appendix B:
Detailed Cost Estimates

For the purposes of this submittal, the appendices have been attached as PDFs.

Susitna Hydroelectric Project
Cost Estimates for Alternate Project Configurations

By: HDR

By: Leanne Andruszkiewicz, E.I.T.
Checked By: Kellen Roberts, E.I.T.
Reviewed By: Ken Fonnesbeck, P.E.

Date: 10/16/2009

Summary of Key Assumptions Used for Estimating Purposes		
FERC Line #	**Line Item Name**	**Notes**
330	Land and Land Rights	These costs were assumed to be the same all Watana Project alternatives.
331	Power Plant Structure Improvements	PH sizes & costs are based on the # of T-G units used in each alt. configuration w/Lwr Low Watana PH being 1/2 the size of the Full Watana PH, Low Watana (Non-Exp) being 2/3 of the Full Watana PH size & Low Watana (Exp) having the same size PH as Full Watana PH.
332	Reservoir, Dams and Waterways	Estimates for each alternate configuration are based on the 1985 conveyance scheme. Lwr. Low Watana and Low Watana Non-Exp. are based on the Stage 1 scheme from 1985 (2 headrace features, 4 penstocks and 1 tailrace tunnel).The Low Watana Exp. and Full Watana estimates are based on the 1985 Stage 3 configuration (3 headraces, 6 penstocks and 2 tailrace tunnels). Quantities and costs for the Full Watana, and Low Watana Exp alternatives are based on the 1985 volumes. Lower Low Watana and Low Watana Non-exp quantities are based on calculated volume estimates.
333	Waterwheels, Turbines and Generators	Vendor prices were obtained for the largest size turbine-generator units, and the smaller T-G units were accordingly estimated on a dollars per kW basis with Lower Low Watana having 3 units est. at $71 M each, Low Watana (Exp and Non-Exp) having 4 units est. at $74 M each, and Full Watana having 6 units est. at $79 M each.
334	Accessory Electrical Equipment	Quantities and pricing were adjusted based on plant capacities and experience with similar projects.
335	Misc Power Plant Equipment	Quantities and pricing were adjusted based on plant capacities and experience with similar projects.
336	Roads, Rails and Air Facilities	The road cost estimate reflects access coming from the north via the Denali Highway. Unit prices for roads were based on recent Alaska D.O.T prices for upgraded, new and construction roads. Quantities and pricing for items other than actual roads mirror the 1982 Acres estimate. Additional maintenance costs were added to the largest project configuration.
350-390	Transmission Features	Transmission features were estimated by others for the smallest capacity project, and in turn were scaled up accordingly for the larger alternatives.
399	Other Tangible Property	This cost category applies to general construction equipment.
63	Main Construction Camp	This cost is based upon an assumed 750 man work force for the Lower Low Watana project. Adjustments for increased camp maintenance costs & additional personnel have been added to each larger alternative.

Water Conveyance Summary Table

	Lower Low Watana	Non- Expandable Low Watana	Expandable Low Watana	Full Watana
Flow (cfs)	10700	14500	14500	22300
Number of Units	3	4	4	6
Unit Size (MW)	125	150	150	200
Plant Nameplate Capacity (MW)	375	600	600	1200
# of Headraces	1	2	3	3
Headrace Diameter (ft)	24	24	24	24
Headrace Velocity (ft/s)	23	16	16	15
# of Penstocks	3	4	6	6
Concrete Lined Penstock Diameter (ft)	18	18	18	18
Steel Penstock Diameter (ft)	15	15	15	15
Concrete Lined Penstock Velocity (ft/s)	14	14	14	14
Steel Penstock Velocity (ft/s)	20	20	20	20
# of Tailrace Tunnels	1	1	2	2
Tailrace Diameter (ft)	34	34	34	34
Tailrace Velocity (ft/s)	12	16	16	12

Susitna Hydroelectric Project
Cost Estimates for Alternate Project Configurations

Cost Estimates based on 1982 Quantities escalated to 2008 Dollars

Revision E

By: HDR|DTA

By: Leanne Andruszkiewicz, E.I.T.

Checked By: Kellen Roberts, E.I.T.

Reviewed By: Ken Fonnesbeck, P.E.

Date: 10/16/2009

Line Item Name	Lower Low Watana	Low Watana Non-Expandable	Low Watana Expandable	Full Watana	Watana-Devil Canyon	Staged Development	Devil Canyon
Total Estimated Const. Costs (Billions $)	$ 4.1	$ 4.5	$ 4.9	$ 6.4	$ 9.6	$ 10.0	$ 3.6

FERC Line #	Line Item Name	Lower Low Watana	Low Watana Non-Expandable	Low Watana Expandable	Full Watana	Watana-Devil Canyon	Staged Development	Devil Canyon
71A	Engineering, Env, and Regulatory (7%)	$ 213,000,000	$ 236,000,000	$ 259,000,000	$ 338,000,000	$ 501,000,000	$ 528,000,000	$ 191,000,000
Subtotal		$ 213,000,000	$ 236,000,000	$ 259,000,000	$ 338,000,000	$ 501,000,000	$ 528,000,000	$ 191,000,000
Contingency (20%)		$ 43,000,000	$ 47,000,000	$ 52,000,000	$ 68,000,000	$ 100,000,000	$ 106,000,000	$ 38,000,000
Total		$ 256,000,000	$ 283,000,000	$ 311,000,000	$ 406,000,000	$ 601,000,000	$ 634,000,000	$ 229,000,000
330	Land and Land Rights	$ 121,000,000	$ 121,000,000	$ 121,000,000	$ 121,000,000	$ 173,000,000	$ 173,000,000	$ 52,000,000
331	Power Plant Structure Improvements	$ 93,000,000	$ 115,000,000	$ 159,000,000	$ 159,000,000	$ 324,000,000	$ 325,000,000	$ 165,000,000
332.1-.4	Reservoir, Dams and tunnels	$ 1,415,000,000	$ 1,537,690,000	$ 1,718,000,000	$ 2,424,000,000	$ 3,324,000,000	$ 3,485,000,000	$ 900,000,000
332.5-.9	Waterways	$ 590,000,000	$ 590,000,000	$ 677,000,000	$ 677,000,000	$ 1,093,000,000	$ 1,191,000,000	$ 415,000,000
333	Waterwheels, Turbines and Generators	$ 213,000,000	$ 297,000,000	$ 297,000,000	$ 475,000,000	$ 770,000,000	$ 834,000,000	$ 295,000,000
334	Accessory Electrical Equipment	$ 29,000,000	$ 41,000,000	$ 41,000,000	$ 72,000,000	$ 110,000,000	$ 119,000,000	$ 38,000,000
335	Misc Power Plant Equipment	$ 17,000,000	$ 21,000,000	$ 32,000,000	$ 32,000,000	$ 61,000,000	$ 61,000,000	$ 29,000,000
336	Roads, Rails and Air Facilities	$ 232,000,000	$ 232,000,000	$ 232,000,000	$ 280,000,000	$ 388,000,000	$ 394,000,000	$ 535,000,000
		$ -	$ -	$ -	$ -			
Subtotal		$ 2,710,000,000	$ 2,954,690,000	$ 3,277,000,000	$ 4,240,000,000	$ 6,243,000,000	$ 6,582,000,000	$ 2,429,000,000
Contingency (20%)		$ 542,000,000	$ 591,000,000	$ 655,000,000	$ 848,000,000	$ 1,249,000,000	$ 1,316,000,000	$ 486,000,000
Total		$ 3,252,000,000	$ 3,545,690,000	$ 3,932,000,000	$ 5,088,000,000	$ 7,492,000,000	$ 7,898,000,000	$ 2,915,000,000
350-390	Transmission Features	$ 177,000,000	$ 224,000,000	$ 224,000,000	$ 353,000,000	$ 481,000,000.00	$ 481,000,000	$ 99,000,000
Subtotal		$ 177,000,000	$ 224,000,000	$ 224,000,000	$ 353,000,000	$ 481,000,000	$ 481,000,000	$ 99,000,000
Contingency (20%)		$ 35,000,000	$ 45,000,000	$ 45,000,000	$ 71,000,000	$ 96,000,000	$ 96,000,000	$ 20,000,000
Total		$ 212,000,000	$ 269,000,000	$ 269,000,000	$ 424,000,000	$ 577,000,000	$ 577,000,000	$ 119,000,000

	General Plant							
389	Land and Land Rights	$ -	$ -	$ -	$ -	$ -	$ -	$ -
390	Structures and Improvements	$ -	$ -	$ -	$ -	$ -	$ -	$ -
391	Office Furniture and Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -
392	Transportation Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -
393	Stores Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -
394	Tools Shop and Garage Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -
395	Laboratory Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -
396	Power-Operated Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -
397	Communications Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -
398	Miscellaneous Equipment	$ -	$ -	$ -	$ -	$ -	$ -	$ -
399	Other Tangible Property	$ 12,000,000	$ 16,000,000	$ 16,000,000	$ 20,000,000	36000000	$ 42,000,000	$ 16,000,000
Subtotal		$ 12,000,000	$ 16,000,000	$ 16,000,000	$ 20,000,000	$ 36,000,000	$ 42,000,000	$ 16,000,000
Contingency (20%)		$ 2,000,000	$ 3,000,000	$ 3,000,000	$ 4,000,000	$ 7,000,000	$ 8,000,000	$ 3,000,000
Total		$ 14,000,000	$ 19,000,000	$ 19,000,000	$ 24,000,000	$ 43,000,000	$ 50,000,000	$ 19,000,000
	Indirect Costs							
61	Temporary Construction Facilities	$ -	$ -	$ -	$ -	0	$ -	$ -
62	Construction Equipment	$ -	$ -	$ -	$ -	0	$ -	$ -
63	Main Construction Camp	$ 150,000,000	$ 180,000,000	$ 180,000,000	$ 210,000,000	$ 390,000,000	$ 440,000,000	$ 180,000,000
64	Labor Expense	$ -	$ -	$ -	$ -	0	$ -	$ -
65	Superintendence	$ -	$ -	$ -	$ -	0	$ -	$ -
66	Insurance	$ -	$ -	$ -	$ -	0	$ -	$ -
68	Mitigation	$ -	$ -	$ -	$ -	0	$ -	$ -
69	Fees	$ -	$ -	$ -	$ -	0	$ -	$ -
Subtotal		$ 150,000,000	$ 180,000,000	$ 180,000,000	$ 210,000,000	$ 390,000,000	$ 440,000,000	$ 180,000,000
Contingency (20%)		$ 30,000,000	$ 36,000,000	$ 36,000,000	$ 42,000,000	$ 78,000,000	$ 88,000,000	$ 36,000,000
Total		$ 180,000,000	$ 216,000,000	$ 216,000,000	$ 252,000,000	$ 468,000,000	$ 528,000,000	$ 216,000,000
71B	Construction Management (4%)	$ 122,000,000	$ 135,000,000	$ 148,000,000	$ 193,000,000	$ 286,000,000	$ 302,000,000	$ 109,000,000
72	Legal Expenses							
75	Taxes							
76	Administrative & Gen. Expenses							
77	Interest							
80	Earnings/Expenses During Construction							
Subtotal		$ 122,000,000	$ 135,000,000	$ 148,000,000	$ 193,000,000	$ 286,000,000	$ 302,000,000	$ 109,000,000
Contingency (20%)		$ 24,000,000	$ 27,000,000	$ 30,000,000	$ 39,000,000	$ 57,000,000	$ 60,000,000	$ 22,000,000
Total		$ 146,000,000	$ 162,000,000	$ 178,000,000	$ 232,000,000	$ 343,000,000	$ 362,000,000	$ 131,000,000
Total Subtotal		$ 3,384,000,000	$ 3,745,690,000	$ 4,104,000,000	$ 5,354,000,000	$ 7,937,000,000	$ 8,375,000,000	$ 3,024,000,000
Total Contingency		$ 676,000,000	$ 749,000,000	$ 821,000,000	$ 1,072,000,000	$ 1,587,000,000	$ 1,674,000,000	$ 605,000,000
Total (Millions of Dollars)		**$ 4,100**	**$ 4,500**	**$ 4,900**	**$ 6,400**	**$ 9,600**	**$ 10,000**	**$ 3,600**

HDR/AEA Susitna Hydroelectric Project
Cost Estimates based on 1982 quantities
By: HDR
By: Leanne Andruszkiewicz, E.I.T.
Checked By: Kellen Roberts, E.I.T.
Date: 10/15/2009
2008 Dollars
Lower Low Watana (3 Turbines)

FERC Line #	Sub Categories			Description	Quantity	Units	2008 Unit Price	Line Price	Total
330			**Land and Land Rights**						
	0.1			Land	1	LS	$ 120,870,000	$ 120,870,000	
	0.2			Land Rights				$ -	
	0.3			Misc Charges in Credit Above				$ -	
								$ -	**$ 121,000,000**
								$ -	
331			**Powerplant Structure Improvements**					$ -	
	0.1			Powerhouse				$ -	
		0.11		Powerhouse and Draft Tube				$ -	
			0.111	Excavation				$ -	
				Powerhouse Vault Rock	61,250	CY	$ 90	$ 5,520,000	
				Draft Tube Rock	12,600	CY	$ 90	$ 1,140,000	
			0.113	Surface Preparation/ Grouting				$ -	
				Powerhouse	49,500	SF	$ 3	$ 160,000	
				Draft Tube	38,250	SF	$ 3	$ 130,000	
				Grout Curtain- Drill holes	21,900	LF	$ 28	$ 610,000	
				Grout Curtain- Cement	8,750	CF	$ 81	$ 710,000	
			0.114	Concrete and Shot Crete				$ -	
				Powerhouse Concrete	16,300	CY	$ 693	$ 11,290,000	
				Powerhouse Concrete Overbreak	1,200	CY	$ 447	$ 540,000	
				Powerhouse Reinforcing Steel	815	TON	$ 2,858	$ 2,330,000	
				Powerhouse 4" Shotcrete	20,500	SF	$ 10	$ 210,000	
				Draft Tube Concrete	6,000	CY	$ 693	$ 4,160,000	
				Draft Tube Concrete Overbreak	1,250	CY	$ 447	$ 560,000	
				Draft Tube Reinforcing Steel	495	TON	$ 2,858	$ 1,410,000	
				Draft Tube 2" Shotcrete	3,050	SF	$ 5	$ 20,000	
			0.115	Support and Anchors				$ -	
				Powerhouse Rockbolts 1" @ 25' Hy	485	EA	$ 1,235	$ 600,000	
				Powerhouse Rockbolts 1" @ 15'	985	EA	$ 736	$ 720,000	
				Powerhouse Steel Mesh	22,300	SF	$ 6	$ 130,000	
				Powerhouse Steel Support	69	TON	$ 12,672	$ 870,000	
				Draft Tube Rockbolts 1" @ 25' Hy	75	EA	$ 1,235	$ 90,000	
				Draft Tube Rockbolts 1" @ 12'	195	EA	$ 528	$ 100,000	
				Draft Tube Rockbolts 1" @ 9'	95	EA	$ 432	$ 40,000	
				Draft Tube Steel Mesh	9,450	SF	$ 7	$ 60,000	
			0.117	Holes (U/S of Powerhouse)	7,500	LF	$ 51	$ 380,000	
				Holes (Powerhouse Crown)	14,250	LF	$ 51	$ 730,000	
			0.118	Structural- Misc Steelwork				$ -	
				Powerhouse and Draft Tube- Steel Crane Rails	1	LS	$ 10,276,309	$ 10,280,000	
			0.119	Architectural- Powerhouse	1	LS	$ 2,927,898	$ 2,930,000	
			0.11c	Mechanical				$ -	
				Draft Tube Gates	3	SETS	$ 427,880	$ 1,280,000	
				Draft Tube Gate Guides	3	SETS	$ 202,680	$ 610,000	
				Draft Tube Crane	1	LS	$ 1,140,000	$ 1,140,000	
		0.12		Access Tunnels and Portals				$ -	
			0.121	Excavation				$ -	
				Main Tunnel	25,125	CY	$ 97	$ 2,450,000	
				Transformer Gallery Tunnel	8,875	CY	$ 97	$ 860,000	
				Grouting Gallery Tunnel	950	CY	$ 396	$ 380,000	
				Surge Chamber Access Tunnel	3,625	CY	$ 145	$ 530,000	
				Penstock Access Tunnel	30,750	CY	$ 145	$ 4,470,000	
				Penstock Elbow Access Tunnel	7,500	CY	$ 145	$ 1,090,000	

	Access Shaft Tunnel	650	CY	$	145	$	90,000
	Connector Tunnel	950	CY	$	379	$	360,000
	Portals Overburden	3,000	CY	$	17	$	50,000
	Portals Rock	1,500	CY	$	49	$	70,000
0.123	Surface Preparation					$	-
	Main Tunnel Slab	26,550	SF	$	2	$	60,000
	Penstock Access Slab	32,600	SF	$	2	$	70,000
	Horizontal Portal	100	SF	$	2	$	-
	Inclined Portal	1,050	SF	$	3	$	-
0.124	Concrete and Shot Crete					$	-
	Main Portal					$	-
	Concrete Slab	15	CY	$	406	$	10,000
	Concrete Walls	285	CY	$	406	$	120,000
	Concrete Overbreak	25	CY	$	368	$	10,000
	Reinforcing Steel	20	TON	$	2,888	$	60,000
	Tunnels					$	-
	Concrete Slab Main Tunnel	975	CY	$	504	$	490,000
	Concrete Plugs Penstock Elbow ACC	7,500	CY	$	756	$	5,670,000
	Concrete Overbreak Main Tunnel 6"	500	CY	$	346	$	170,000
	Reinforcing Steel	35	TON	$	2,888	$	100,000
	2 " Shotcrete Main Tunnel	10,050	SF	$	5	$	50,000
	2 " Shotcrete Transformer Gal	3,550	SF	$	5	$	20,000
	2 " Shotcrete Surge Chamber Acc	1,950	SF	$	5	$	10,000
	2 " Shotcrete Penstock Access	12,350	SF	$	5	$	60,000
	2 " Shotcrete Penstock Elbow Acc	3,550	SF	$	5	$	20,000
	2 " Shotcrete Access Shaft	150	SF	$	5	$	-
	2 " Shotcrete Grout Gallery	400	SF	$	5	$	-
	2 " Shotcrete Connector Tunnel	400	SF	$	5	$	-
0.125	Support and Anchors					$	-
	Main Tunnel					$	-
	Rockbolts 1" @12'	600	EA	$	528	$	320,000
	Rockbolts 1" @ 9'	125	EA	$	432	$	50,000
	Steel Mesh	31,500	SF	$	6	$	200,000
	Steel Support	33	TON	$	12,801	$	420,000
	Main Tunnel Portal					$	-
	Rockbolts 1" @15'	25	EA	$	736	$	20,000
	Transformer Gallery Tunnel					$	-
	Rockbolts 1" @12'	205	EA	$	528	$	110,000
	Rockbolts 1" @ 9'	35	EA	$	432	$	20,000
	Steel Mesh	11,250	SF	$	6	$	70,000
	Steel Support	12	TON	$	12,801	$	150,000
	Grouting Gallery Tunnel					$	-
	Rockbolts 3/4" @ 6'	80	EA	$	327	$	30,000
	Steel Mesh	80	SF	$	6	$	-
	Steel Support	2	TON	$	12,801	$	30,000
	Surge Chamber Access Tunnel					$	-
	Rockbolts 1" @12'	115	EA	$	528	$	60,000
	Rockbolts 1" @ 9'	25	EA	$	432	$	10,000
	Steel Mesh	6,025	SF	$	6	$	40,000
	Steel Support	7	TON	$	12,801	$	90,000
	Penstock Access Tunnel					$	-
	Rockbolts 1" @12'	715	EA	$	528	$	380,000
	Rockbolts 1" @ 9'	120	EA	$	432	$	50,000
	Steel Mesh	38,750	SF	$	6	$	250,000
	Steel Support	29	TON	$	12,801	$	370,000
	Penstock Elbow Access Tunnel					$	-
	Rockbolts 1" @12'	210	EA	$	528	$	110,000
	Rockbolts 1" @ 9'	60	EA	$	432	$	30,000
	Steel Mesh	11,250	SF	$	6	$	70,000
	Steel Support	15	TON	$	12,801	$	190,000
	Access Shaft Tunnel					$	-

			Rockbolts 1" @12'	10	EA	$	528	$	10,000
			Rockbolts 1" @ 9'	10	EA	$	432	$	-
			Steel Mesh	465	SF	$	6	$	-
			Steel Support	4	TON	$	12,801	$	50,000
			Connector Tunnel					$	-
			Rockbolts 3/4" @ 6'	80	EA	$	327	$	30,000
			Steel Mesh	80	SF	$	6	$	-
			Steel Support	2	TON	$	12,801	$	30,000
	0.129		Architectural- Main Portal Doors	2	SETS	$	158,372	$	320,000
	0.12c		Mechanical Ventilation System					$	-
0.13			Access Shaft					$	-
	0.131		Excavation Rock	6,850	CY	$	228	$	1,560,000
	0.133		Surface Preparation Shaft	32,000	SF	$	3	$	110,000
	0.134		Concrete and Shot Crete	0				$	-
			Concrete Lining	1,675	CY	$	945	$	1,580,000
			Concrete Overbreak 6"	610	CY	$	551	$	340,000
	0.135		Support and Anchors - Rockbolts 3/4" @ 6'	525	EA	$	327	$	170,000
	0.138		Structural Misc Steelwork	25	TON	$	7,395	$	180,000
	0.139		Architectural- control Building					$	-
	0.13c		Mechanical Elevators	1	LS	$	2,368,815	$	2,370,000
0.14			Fire Protection Head Tank					$	-
	0.141		Excavation	575	CY	$	589	$	340,000
	0.143		Surface Preparation	1,400	SF	$	2	$	-
	0.144		Concrete & Shotcrete					$	-
			Concrete	125	CY	$	964	$	120,000
			Concrete Overbreak 6"	23	CY	$	406	$	10,000
			Reinforcing Steel	5	TON	$	2,858	$	10,000
	0.145		Support and Anchors					$	-
			Rockbolts 1" @12'	13	EA	$	528	$	10,000
			Rockbolts 1" @ 9'	5	EA	$	432	$	-
			Steel Mesh	600	SF	$	6	$	-
			Steel Support	2	TON	$	12,672	$	30,000
	0.148		Misc Steelwork	1	LS	$	73,298	$	70,000
	0.14c		Mechanical Piping/Valves					$	-
0.15			Bus Tunnels (totals for 3 Bus Tunnels)					$	-
	0.151		Excavation					$	-
			Rock Horizontal	1,350	CY	$	214	$	290,000
			Rock Inclined	650	CY	$	601	$	390,000
	0.153		Surface Preparation- Tunnels	3,550	SF	$	3	$	10,000
	0.154		Concrete and Shotcrete					$	-
			Concrete Slab	175	CY	$	819	$	140,000
			Concrete Overbreak 12"	125	CY	$	472	$	60,000
			Reinforcing Steel	9	TON	$	2,858	$	30,000
			2" Shotcrete	1,100	SF	$	5	$	10,000
	0.155		Supports and Anchors					$	-
			Rockbolts 1" @ 25'	30	EA	$	1,235	$	40,000
			Rockbolts 1" @ 12'	70	EA	$	528	$	40,000
			Rockbolts 1" @ 9'	25	EA	$	432	$	10,000
			Steel Mesh	3,400	SF	$	6	$	20,000
			Steel Support	6	TON	$	12,672	$	70,000
0.16			Transformer Gallery Tunnel					$	-
	0.161		Excavation- Rock	13,400	CY	$	87	$	1,170,000
	0.163		Surface Preparation	12,300	SF	$	2	$	30,000
	0.164		Concrete and Shotcrete					$	-
			Concrete Base Slab	1,200	CY	$	1,228	$	1,470,000
			Concrete Overbreak 12"H/6"V	385	CY	$	378	$	150,000
			Reinforcing Steel	60	TON	$	2,858	$	170,000
	0.165		Support and Anchors					$	-
			Rockbolts 1" @ 25'	300	EA	$	1,235	$	370,000
			Rockbolts 1" @ 15'	135	EA	$	736	$	100,000

				Steel Mesh	10,350	SF	$	6	$	60,000	
				Steel Support	15	TON	$	12,672	$	180,000	
		0.167		Drainage Holes	4,150	LF	$	48	$	200,000	
	0.17			Cable Shafts					$	-	
		0.171		Excavation Rock	1,700	CY	$	601	$	1,020,000	
		0.173		Surface Preparation Shafts	20,700	SF	$	3	$	70,000	
		0.174		Concrete and Shotcrete					$	-	
				Concrete Lining	520	CY	$	1,764	$	920,000	
				Concrete Overbreak 6"	400	CY	$	882	$	350,000	
		0.175		Supports and Anchors- Rockbolts 3/4" @ 6'	325	EA	$	327	$	110,000	
		0.178		Structural Misc Steelwork	9	TON	$	15,602	$	140,000	
		0.179		Architectural- Enclosures	1	LS	$	199,317	$	200,000	
		0.17c		Mechanical Hoist	2	EA	$	476,960	$	950,000	
	0.18			Dewatering (during Construction)					$	-	
		0.181		Dewatering (Power Facilities)	1	LS	$	1,336,799	$	1,340,000	
	0.19			Instrumentation					$	-	
		0.191		Instrumentation	1	LS	$	1,714,814	$	1,710,000	
	0.2			Misc Buildings (Control Buildings)	1	LS	$	4,433,085	$	4,430,000	
	0.3			Permanent Town							
									$	-	**$ 93,000,000**
332				**Reservoir, Dams and Waterways**					$	-	
	0.1			Reservoir					$	-	
		0.11		Reservoir Clearing	18,000	ACRE	$	3,006	$	54,110,000	
	0.2			Diversion Tunnels /Cofferdams					$	-	
		0.21		Diversion Tunnels /Portals					$	-	
			0.211	Excavation					$	-	
				Upper Tunnel					$	-	
				Rock	221,000	CY	$	92	$	20,400,000	
				Lower Tunnel					$	-	
				Rock	208,000	CY	$	92	$	19,200,000	
				Excavate Concrete for Plug	700	CY	$	97	$	70,000	
				Upstream Upper Portal					$	-	
				Rock Usable (Face Only)	11,200	CY	$	49	$	550,000	
				Upstream Lower Portal (Including Most Exc for Upper Portal)					$	-	
				Rock Usable	108,000	CY	$	49	$	5,310,000	
				Rock Waste	21,750	CY	$	49	$	1,070,000	
				Downstream Portals					$	-	
				Overburden	17,000	CY	$	17	$	290,000	
				Rock Usable	120,000	CY	$	49	$	5,900,000	
				Rock Waste	28,000	CY	$	49	$	1,380,000	
				Emergency Release Chambers					$	-	
				Excavate Concrete for Plugs	1,800	CY	$	102	$	180,000	
				Gate Chamber	4,700	CY	$	111	$	520,000	
				Access Tunnel to Gate Chamber					$	-	
				Rock	19,100	CY	$	97	$	1,860,000	
			0.212	Fill- Temp for Coffer Dam to Construct Upstream Portals	23,000	CY	$	12	$	270,000	
			0.213	Surface Preparation \ grouting					$	-	
				Upstream Upper Portal					$	-	
				Horizontal	3,200	SF	$	2	$	10,000	
				Inclined	8,600	SF	$	3	$	30,000	
				Upstream Lower Portal					$	-	
				Horizontal	1,300	SF	$	2	$	-	
				Inclined	14,900	SF	$	3	$	50,000	
				Downstream Upper Portal					$	-	
				Horizontal	6,100	SF	$	2	$	10,000	
				Inclined	20,500	SF	$	3	$	70,000	
				Downstream Lower Portal					$	-	
				Horizontal	600	SF	$	2	$	-	
				Inclined	5,600	SF	$	3	$	20,000	
				Grout Upper Tunnel Plugs					$	-	
				Drill Holes	4,100	LF	$	27	$	110,000	

		Cement	820	CF	$	81	$	70,000
		Grout Lower Tunnel Permanent Plugs					$	-
		Drill Holes	2,050	LF	$	27	$	50,000
		Cement	410	CF	$	81	$	30,000
0.214		Concrete and Shotcrete					$	-
		Upper Tunnel					$	-
		Concrete Lining	42,400	CY	$	567	$	24,040,000
		Concrete Lining Overbreak 6"	10,200	CY	$	315	$	3,210,000
		Reinforcing Steel	24	TON	$	2,888	$	70,000
		2" Shotcrete	56,000	SF	$	5	$	290,000
		Lower Tunnel					$	-
		Concrete Lining	37,600	CY	$	567	$	21,320,000
		Concrete Lining for Plug	6,200	CY	$	428	$	2,660,000
		Concrete Lining Overbreak 6"	10,000	CY	$	315	$	3,150,000
		Reinforcing Steel	24	TON	$	2,888	$	70,000
		2" Shotcrete	57,900	SF	$	5	$	300,000
		Upstream Upper Portal					$	-
		Concrete Headwall	3,200	CY	$	652	$	2,090,000
		Concrete Lining	1,300	CY	$	652	$	850,000
		Concrete Slab	750	CY	$	652	$	490,000
		Concrete Piers	800	CY	$	652	$	520,000
		Concrete Overbreak 12" H/6"V	300	CY	$	472	$	140,000
		Reinforcing Steel	400	TON	$	2,888	$	1,160,000
		Upstream Lower Portal					$	-
		Concrete Headwall	4,500	CY	$	652	$	2,930,000
		Concrete Lining	3,000	CY	$	652	$	1,960,000
		Concrete Slab	300	CY	$	652	$	200,000
		Concrete Piers	700	CY	$	652	$	460,000
		Concrete Overbreak 12" H/6"V	350	CY	$	472	$	170,000
		Reinforcing Steel	600	TON	$	2,888	$	1,730,000
		Downstream Upper Portal					$	-
		Concrete Headwall	500	CY	$	652	$	330,000
		Concrete Slab	100	CY	$	652	$	70,000
		Concrete Overbreak 12" H/6"V	100	CY	$	472	$	50,000
		Reinforcing Steel	40	TON	$	2,888	$	120,000
		Downstream Lower Portal					$	-
		Concrete Headwall	2,500	CY	$	652	$	1,630,000
		Concrete Slab	100	CY	$	652	$	70,000
		Concrete Overbreak 12" H/6"V	150	CY	$	472	$	70,000
		Reinforcing Steel	170	TON	$	2,888	$	490,000
		Downstream Flip Bucket					$	-
		Concrete Slab	800	CY	$	652	$	520,000
		Concrete Walls	2,300	CY	$	652	$	1,500,000
		Concrete Invert	1,200	CY	$	652	$	780,000
		Concrete Overbreak 12" H/6"V	410	CY	$	42	$	20,000
		Reinforcing Steel	280	TON	$	2,888	$	810,000
		Downstream Retaining Wall					$	-
		Concrete Slab	200	CY	$	652	$	130,000
		Concrete Walls	2,000	CY	$	652	$	1,300,000
		Concrete Overbreak 12" H/6"V	110	CY	$	472	$	50,000
		Reinforcing Steel	90	TON	$	2,888	$	260,000
		Emergency Release Chambers					$	-
		Concrete Plug	15,300	CY	$	756	$	11,560,000
		4" Shotcrete	2,790	SF	$	10	$	30,000
		Access Tunnel to Gate Chamber					$	-
		2" Shotcrete	12,800	SF	$	5	$	70,000
0.215		Supports and Anchors					$	-
		Lower Tunnel					$	-
		Rockbolts 1" @ 12'	3,650	EA	$	528	$	1,930,000
		Rockbolts 1" @ 9'	620	EA	$	432	$	270,000
		Steel Mesh	217,100	SF	$	6	$	1,380,000

			Steel Support	220	TON	$	12,801	$ 2,820,000
			Upper Tunnel					$ -
			Rockbolts 1" @ 12'	3,530	EA	$	528	$ 1,870,000
			Rockbolts 1" @ 9'	600	EA	$	432	$ 260,000
			Steel Mesh	210,200	SF	$	6	$ 1,340,000
			Steel Support	213	TON	$	12,801	$ 2,730,000
			Upstream Lower Portal					$ -
			Rockbolts 1" @ 15'	240	EA	$	736	$ 180,000
			Anchors 1" @ 25'	290	EA	$	1,235	$ 360,000
			Upstream Upper Portal					$ -
			Rockbolts 1" @ 15'					$ -
			Anchors 1" @ 25'	130	EA	$	736	$ 100,000
			Downstream Lower Portal					$ -
			Rockbolts 1" @ 15'	200	EA	$	736	$ 150,000
			Downstream Upper Portal					$ -
			Rockbolts 1" @ 15'	100	EA	$	736	$ 70,000
			Retaining Wall Anchors 1" @25'	100	EA	$	1,235	$ 120,000
			Emergency Release Chambers					$ -
			Rockbolts 1" @ 25'	100	EA	$	1,235	$ 120,000
			Rockbolts 1" @ 15'	125	EA	$	736	$ 90,000
			Steel Mesh	3,600	SF	$	6	$ 20,000
			Steel Support	14	TON	$	12,801	$ 180,000
			Metal to Roof Anchors 3/4" @ 6'	20	EA	$	342	$ 10,000
			Access Tunnel to Gate Chamber					$ -
			Rockbolts 1" @ 12'	775	EA	$	528	$ 410,000
			Rockbolts 1" @ 9'	240	EA	$	432	$ 100,000
			Steel Mesh	39,900	SF	$	6	$ 250,000
			Steel Support	55	TON	$	12,801	$ 700,000
	0.218		Structural- Misc Steelwork	2,775	SF	$	94	$ 260,000
	0.21c		Mechanical					$ -
			Upstream Lower Gates					$ -
			Gate Equipment	2	EA	$	5,073,120	$ 10,150,000
			Upstream Upper Gates					$ -
			Gate Equipment	2	EA	$	2,840,080	$ 5,680,000
			Trashracks	1	LS	$	1,777,500	$ 1,780,000
			Downstream Lower Outlet					$ -
			Stoplog Guides	1	LS	$	142,200	$ 140,000
			Stoplogs includes follower	1	LS	$	1,967,100	$ 1,970,000
			Downstream Upper Outlet					$ -
			Stoplog Guides	1	LS	$	82,950	$ 80,000
			Low Level Release					$ -
			Slide Gates Include Steel Liner	9	EA	$	3,517,470	$ 31,660,000
								$ -
0.22			Upstream Cofferdam					$ -
	0.221		Excavation					$ -
			Overburden Removal	1,000	CY	$	12	$ 10,000
	0.222		Fill					$ -
			Rock Fill	38,400	CY	$	11	$ 420,000
			Fine Filter	16,600	CY	$	37	$ 610,000
			Coarse Filter	15,900	CY	$	30	$ 480,000
			Rock Shell	196,500	CY	$	11	$ 2,060,000
			Closure Dike	58,500	CY	$	11	$ 640,000
			Rip Rap	21,200	CY	$	24	$ 510,000
	0.223		Cutoff Slurry Wall					$ -
			excavation	4,850	CY	$	5	$ 20,000
			slurry wall	43,600	SF	$	72	$ 3,160,000
	0.22d		Dewatering					$ -
			Initial Dewatering	1	LS	$	5,807,685	$ 5,810,000
			Dewatering Maintenance	1	LS	$	22,377,990	$ 22,380,000
0.23			Down Stream Cofferdam					$ -
	0.231		Excavation					$ -

				overburden	5,000	CY	$	12	$	60,000
				Rock	500	CY	$	10	$	-
				Removal of Cofferdam	14,500	CY	$	13	$	200,000
		0.232		Fill					$	-
				Rip Rap	1,800	CY	$	24	$	40,000
				Closure Dike	15,200	CY	$	11	$	170,000
		0.233		Cutoff Slurry Wall					$	-
				Excavation	1,830	CY	$	5	$	10,000
				Slurry Wall	16,500	SF	$	72	$	1,200,000
0.3			Main Dam						$	-
	0.31		Main Dam						$	-
		0.311		Excavation					$	-
				Overburden above el. 1470	2,026,000	CY	$	12	$	23,360,000
				Overburden below el. 1470	5,320,000	CY	$	11	$	58,840,000
				Rock Usable above el. 1470	1,289,000	CY	$	43	$	55,470,000
				Rock Usable below el. 1470	478,000	CY	$	44	$	20,900,000
				Rock Waste above el. 1470	1,950,000	CY	$	43	$	83,910,000
				Rock Waste below el. 1470	869,500	CY	$	50	$	43,630,000
		0.312		Fill- Estimated from Attatched Calculations					$	-
				Rip Rap (upstream)	216,000	CY	$	23	$	5,030,000
				Gravel (upstream)	3,517,000	CY	$	21	$	72,310,000
				Coarse Filter (upstream)	925,759	CY	$	29	$	26,720,000
				Fine Filter (upstream)	1,045,588	CY	$	38	$	39,640,000
				Core (impervious)	6,300,000	CY	$	25	$	159,830,000
				Fine Filter (downstream)	1,171,412	CY	$	38	$	44,410,000
				Coarse Filter (downstream)	1,074,241	CY	$	29	$	31,000,000
				Shell- Rock and Gravel	1,583,000	CY	$	19	$	30,360,000
				Shell- Rock From Other Sources	763,000	CY	$	10	$	7,700,000
				Cobbles (downstream Face)	280,000	CY	$	16	$	4,580,000
				Road Base	12,000	CY	$	34	$	410,000
				Frost Protection					$	-
				Process Protection	960,000	CY	$	10	$	9,900,000
				Place Protection	960,000	CY	$	3	$	3,160,000
				Remove 1' Protect and Waste	93,000	CY	$	7	$	670,000
				Scarify Core Surface	193	ACRE	$	859	$	170,000
				Filter Fabric					$	-
				Filter Fabric	592,000	SF	$	1	$	520,000
		0.313		Surface Prep/ Grouting					$	-
				Surface Preparation					$	-
				Under Core/Filters above el. 1500	1,340,000	SF	$	3	$	4,170,000
				Under Core/Filters below el. 1500	490,000	SF	$	3	$	1,520,000
				Under Shell above el. 1500	4,149,000	SF	$	2	$	8,920,000
				Under Shell below el. 1500	2,067,000	SF	$	2	$	4,440,000
				Consolidation Grout					$	-
				Drill Holes	550,000	LF	$	12	$	6,550,000
				Cement	550,000	CF	$	68	$	37,300,000
				Grout Curtain					$	-
				Drill Holes	372,000	LF	$	27	$	9,950,000
				Cement	149,000	CF	$	81	$	12,080,000
				Dental Concrete					$	-
				Dental Concrete	68,000	CY	$	365	$	24,840,000
		0.317		Drainage					$	-
				Holes	109,000	LF	$	51	$	5,590,000
	0.32			Grout Galleries/Portals					$	-
		0.321		Excavation					$	-
				Tunnels/ Shafts- Core Area					$	-
				Rock Horizontal	8,100	CY	$	395	$	3,200,000
				Rock Inclined	9,000	CY	$	553	$	4,980,000
				Rock Vertical	1,600	CY	$	536	$	860,000
				Tunnels/ Shafts- Access					$	-
				Rock Horizontal	10,400	CY	$	395	$	4,110,000

				Rock Inclined	1,600	CY	$	553	$ 880,000
				Portals					$ -
				Overburden Rock	2,900	CY	$	17	$ 50,000
				Rock	800	CY	$	49	$ 40,000
		0.323		Surface Preparation					$ -
				Portals					$ -
				Horizontal	24	SF	$	2	$ -
				Inclined	160	SF	$	3	$ -
									$ -
		0.324		Concrete and Shotcrete					$ -
				Tunnels- Core Area					$ -
				Concrete Plugs	800	CY	$	428	$ 340,000
				Concrete Slab	1,800	CY	$	945	$ 1,700,000
				Concrete Overbreak 6"	920	CY	$	756	$ 700,000
				Reinforcing Steel	64	TON	$	2,888	$ 180,000
				2" Shotcrete	12,000	SF	$	5	$ 60,000
				Tunnels-Access					$ -
				Concrete Slab	1,280	CY	$	945	$ 1,210,000
				Concrete Overbreak 6"	640	CY	$	756	$ 480,000
				Reinforcing Steel	48	TON	$	2,888	$ 140,000
				2" Shotcrete	4,300	SF	$	5	$ 20,000
				Shafts					$ -
				2" Shotcrete	4,000	SF	$	5	$ 20,000
				Portals					$ -
				Concrete	16	CY	$	406	$ 10,000
				Reinforcing Steel	2	TON	$	2,888	$ -
		0.325		Support and Anchors					$ -
				Tunnels- Core Area					$ -
				Rockbolts 3/4" @6'	1,400	EA	$	327	$ 460,000
				Steel Mesh	2,400	SF	$	5	$ 10,000
				Steel Support	16	TON	$	12,801	$ 200,000
				Tunnels- Access					$ -
				Rockbolts 3/4" @6'	960	EA	$	327	$ 310,000
				Steel Mesh	880	SF	$	5	$ -
				Steel Support	16	TON	$	12,801	$ 200,000
				Shafts					$ -
				Rockbolts 3/4" @6'	280	EA	$	327	$ 90,000
				Steel Mesh	800	SF	$	5	$ -
				Portals					$ -
				Rockbolts 1" @15'	24	EA	$	736	$ 20,000
		0.329		Architectural Portal Doors					$ -
				Portal Doors	1	LS	$	33,900	$ 30,000
	0.33			Instrumentation					$ -
		0.331		Instrumentation	1	LS	$	17,315,220	$ 17,320,000
0.4				Relict Channel					$ -
	0.41			Shore Protection					$ -
		0.411		Excavation					$ -
				Overburden Stripping 2' thick	2,200	CY	$	12	$ 30,000
		0.412		Fill					$ -
				Dump and Spread					$ -
				Filter Material - 2' layer	2,200	CY	$	32	$ 70,000
				Rock Spalls/ Rip Rap- 3' Ave	3,300	CY	$	10	$ 30,000
				Shore Protection					$ -
				Rip Rap	24,000	CY	$	24	$ 580,000
				Waste Rock	24,000	CY	$	23	$ 550,000
	0.44			Channel Filter Blanket					$ -
		0.442		Fill					$ -
				Coarse Filter	2,900,000	CY	$	34	$ 98,170,000
				Fine Filter	2,180,000	CY	$	44	$ 95,160,000
				Rip Rap	182,000	CY	$	24	$ 4,420,000
		0.443		Surface preparation					$ -

			Foundation Prep						$	-	
			Clearing and Grubbing	460	ACRE	$	3,963	$	1,820,000		
			Excavation	2,236,000	CY	$	16	$	34,930,000		
										$	**1,415,450,000**
	0.5		Outlet Facilities								
		0.51	Outlet Facilities- (Intake Civil Work Include in Power Intake)	1	LS	$	73,000,000	$	73,000,000		
		0.52	Main (Chute) Spillway (Includes Civil Works for Outlet Facilities)	1	LS	$	182,000,000	$	182,000,000		
		0.53	Emergency Spillway	1	LS	$	164,000,000	$	164,000,000		
	0.6		Power Intake (Inc Inlet exec and Inlet Structure Civil Works for Outlet)	1	LS	$	97,000,000	$	97,000,000		
	0.7		Surge Chamber	1	LS	$	17,000,000	$	17,000,000		
		0.81	Head Race (Based on Penstock costs	1	LS	$	28,000,000	$	28,000,000		
		0.82	Penstocks	1	LS	$	17,000,000	$	17,000,000		
	0.9		Tailrace Works (1 Portal with Combined Tailrace/Diversion Tunnel)	1	LS	$	12,000,000	$	12,000,000		
										$	**590,000,000**
333			**Waterwheels, Turbines and Generators**								
		0.11	Turbines and Governors								
			0.111 Supply								
			0.112 Install								
	0.2		Generators and Exciters								
		0.21	Generators and Exciters (Supply and Install)								
			0.211 Generators and Exciters								
	0.3		Total Bid From Vendor (includes all equipment in this category)	3	EA	$	71,100,000	$	213,000,000	**$**	**213,000,000**
			Average from acquired quotes								
334			**Accessory Electrical Equipment**								
	0.1		Connections, Supports and Structures								
		0.11	Structures								
			0.111 Structures (included Below)								
		0.12	Conductors and Insulators								
			0.121 Generator Isolated Phase Bus	1	LS	$	2,401,600	$	2,400,000		
			0.122 HV Power Cables and Accessories	1	LS	$	975,650	$	980,000		
			0.123 LV Power Cables and Accessories	1	LS	$	450,300	$	450,000		
			0.124 Control Cables and Accessories	1	LS	$	825,550	$	830,000		
			0.125 Grounding System	1	LS	$	112,575	$	110,000		
		0.13	Conduits and Fittings			$	-	$	-		
			0.131 Conduits and Fittings	1	LS	$	300,200	$	300,000		
	0.2		Switchgear and Control Equipment			$	-	$	-		
		0.21	Auxiliary Transformers			$	-	$	-		
			0.211 Auxiliary Transformers	4	EA	$	83,811	$	340,000		
		0.22	Circuit Breakers Generators					$	-		
			0.221 Circuit Breakers Generators	3	EA	$	1,504,300	$	4,510,000		
		0.23	Surge Protectors and Generator Cubicles			$	-	$	-		
			0.231 Surge Protectors and Generator Cubicles	3	EA	$	50,000	$	150,000		
		0.24	Switch boards			$	-	$	-		
			0.241 Switch boards	1	LS	$	585,390	$	590,000		
		0.25	Auxiliary Power Equipment			$	-	$	-		
			0.251 Auxiliary Power Equipment	3	EA	$	100,000	$	300,000		
	0.3		Cubicles and Appurtenances					$	-		
		0.31	Control, relay and meter boards			$	-	$	-		
			0.311 Control, relay and meter boards	3	EA	$	200,000	$	600,000		
		0.32	Computer Control System					$	-		
			0.321 Computer Control System					$	-		
		0.33	Supervisor and Telemeter System					$	-		
			0.331 Supervisor and Telemeter System					$	-		
								$	-		
	0.4		Power Transformers					$	-		
		0.41	Power Transformers					$	-		
			0.411 Power Transformers	7	EA	$	1,628,571	$	11,400,000		
								$	-		
	0.5		Lighting System					$	-		

		0.51		Powerhouse and Transformer Gallery				$ -			
			0.511	Powerhouse and Transformer Gallery	1	LS	$ 1,824,900	$ 1,820,000			
		0.52		Access Tunnels and Roads				$ -			
			0.521	Access Tunnels and Roads	1	LS	$ 402,900	$ 400,000			
								$ -			
	0.6			Misc. Electrical Equipment				$ -			
		0.61		Misc. Electrical Equipment				$ -			
			0.611	Misc. Electrical Equipment	1	LS	$ 625,680	$ 630,000			
								$ -			
	0.7			Surface Accessory Equipment				$ -			
		0.71		34.5 kV and LV Equipment				$ -			
			0.711	Switchboard	1	LS	$ 213,300	$ 210,000			
			0.712	Cables	1	LS	$ 450,300	$ 450,000			
			0.713	Aux Transformers	1	LS	$ 284,400	$ 280,000			
		0.73		Diesel Generator- Standby				$ -			
			0.731	Diesel Generator- Standby	2	EA	$ 347,550	$ 700,000			
		0.74		Exterior Lighting				$ -			
			0.741	Exterior Lighting	1	LS	$ 355,500	$ 360,000			
		0.75		Mimic Board- Control Building				$ -			
			0.751	Mimic Board- Control Building	1	LS	$ 1,185,000	$ 1,190,000			
								$ -		$	**29,000,000**
335				**Misc Powerplant Equipment**				$ -			
	0.1			Auxiliary Systems- Underground				$ -			
		0.11		Station Water Systems				$ -			
			0.111	Station Water Systems	1	LS	$ 1,576,050	$ 1,580,000			
		0.12		Fire Protection Systems			$ -	$ -			
			0.121	Fire Protection Systems	1	LS	$ 900,600	$ 900,000			
		0.13		Compressed Air Systems			$ -	$ -			
			0.131	Compressed Air Systems	1	LS	$ 1,125,750	$ 1,130,000			
		0.14		Oil Handling Systems			$ -	$ -			
			0.141	Oil Handling Systems	1	LS	$ 750,500	$ 750,000			
		0.15		Drainage & Dewatering			$ -	$ -			
			0.151	Drainage & Dewatering	2	EA	$ 1,738,000	$ 3,480,000			
		0.16		Heating, Ventilation and Cooling System			$ -	$ -			
			0.161	Heating, Ventilation and Cooling System	1	LS	$ 1,125,750	$ 1,130,000			
		0.17		Miscellaneous			$ -	$ -			
			0.171	Miscellaneous	1	LS	$ 750,500	$ 750,000			
	0.2			Auxiliary Systems- Surface Facilities			$ -	$ -			
		0.21		Auxiliary Systems- Surface Facilities			$ -	$ -			
			0.211	Auxiliary Systems- Surface Facilities	1	LS	$ 711,000	$ 710,000			
	0.3			Auxiliary Equipment			$ -	$ -			
		0.31		Powerhouse Cranes			$ -	$ -			
			0.311	Powerhouse Cranes	2	EA	$ 1,800,000	$ 3,600,000			
		0.32		Elevators			$ -	$ -			
			0.321	Elevators	2	EA	$ 181,700	$ 360,000			
		0.33		Miscellaneous Cranes and Hoists			$ -	$ -			
			0.331	Miscellaneous Cranes and Hoists	1	LS	$ 505,500	$ 510,000			
		0.34		Machine Shop Equipment			$ -	$ -			
			0.341	Machine Shop Equipment	1	LS	$ 2,022,000	$ 2,020,000			
	0.4			General Station Equipment			$ -	$ -			
	0.5			Communications Equipment	1	LS	$ 67,545	$ 70,000			
										$	**17,000,000**
336				**Roads, Rails and Air Facilities**							
	0.1			Roads							
		0.11		Permanent Roads							
				Cost of road upgrades for 23 mi of Denali Highway	23	Mi	$ 1,000,000.00	$ 23,000,000.00			
				Cost of New road to 42 Mi of road to Watana	42	Mi	$ 3,000,000.00	$ 126,000,000.00			
		0.131		Site Roads							
				Construction Roads							
				Site Roads	20	Mile	$ 750,000.00	$ 15,000,000			
				Maintenance	141	MI/YRS	$ 223,092.85	$ 31,500,000			

	0.132		Permanent Roads								
			Permanent Roads	6	Mile	$	1,287,997.42	$	7,700,000		
	0.2		Rail								
		0.1	Railhead at Cantwell	1	LS	$	14,000,000.00	$	14,000,000		
	0.3		Airstrip								
		0.31	Airstrip								
			Permanent Airstrip	1	LS	$	13,000,000.00	$	13,000,000		
			Temporary Airstrip	1	LS	$	2,000,000.00	$	2,000,000		
										$	**232,000,000**
350-359		**Transmission Plant**		33	MILE	$	4,500,000.00	$	148,500,000.00		
				2	EA	$	14,000,000.00	$	28,000,000.00		
										$	**177,000,000.00**
		General Plant									
389		**Land and Land Rights**									
		Land and Land Rights				(incl in 330)					
390		**Structures and Improvements**									
		Structures and Improvements				(incl in 331.2)					
391		**Office Furniture and Equipment**									
		Office Furniture and Equipment				(incl in 399)					
392		**Transportation Equipment**									
		Transportation Equipment				(incl in 399)					
393		**Stores Equipment**									
		Stores Equipment				(incl in 399)					
394		**Tools Shop and Garage Equipment**									
		Tools Shop and Garage Equipment				(incl in 399)					
395		**Laboratory Equipment**									
		Laboratory Equipment				(incl in 399)					
396		**Power-Operated Equipment**									
		Power-Operated Equipment				(incl in 399)					
397		**Communications Equipment**									
		Communications Equipment				(incl in 399)					
398		**Miscellaneous Equipment**									
		Miscellaneous Equipment				(incl in 399)					
399		**Other Tangible Property**									
		Other Tangible Property		1	LS	$	11,850,000	$	11,850,000		
		Saved Maintence		1	LS	$	(231,220)	$	(230,000)		
								$	-	**$**	**12,000,000**
		Indirect Costs									
61		**Temporary Construction Facilities**									
		Temporary Construction Facilities				(incl in direct costs)					
62		**Construction Equipment**									
		Construction Equipment				(incl in direct costs)					
63		**Main Construction Camp**									

	0.1	Main Construction Camp	1 LS	$	150,000,000	**$**	**150,000,000**	
							$	**150,000,000**
	64	**Labor Expense**						
		Labor Expense						
	65	**Superintendence**						
		Superintendence						
	66	**Insurance**						
		Insurance						
	68	**Mitigation Fishery, Terrestrial and Recrational)- Not Included**						
			1 LS	$	-	$	-	**$** **-**
	69	**Fees**						
		Fees						
Subtotal								
	Contingency (20%)		1 LS	$	676,800,000			**$** **677,000,000**
Subtotal								
	71	**Engineering (4%), Enviornmental (2%), Regulatory(1%)**	1 LS	$	213,000,000			**$** **213,000,000**
	71a	**Construction Management (4%)**	1 LS	$	122,000,000			**$** **122,000,000**
	72	**Legal Expenses**						
	75	**Taxes**						
	76	**Administrative & Gen. Expenses**						
	77	**Interest**						
	80	**Earnings/Expenses During Construction**						
Total Project Cost							**$**	**4,061,000,000**
Max Plant Capacity	380							

HDR/AEA Susitna Hydroelectric Project
Cost Estimates based on 1982 quantities
By: HDR
By: Leanne Andruszkiewicz, E.I.T.
Checked By: Kellen Roberts, E.I.T.
Date: 10/15/2009
2008 Dollars
Low Watana (Non-Expandable) (4 Turbines)

FERC Line #	Sub Categories	Description	Quantity	Units	2008 Unit Price	Line Price	Total
330		**Land and Land Rights**					
	0.1	Land	1	LS	$ 120,870,000.00	$ 120,870,000	
	0.2	Land Rights				$ -	
	0.3	Misc Charges in Credit Above				$ -	
						$ -	**$ 121,000,000**
						$ -	
331		**Powerplant Structure Improvements**				$ -	
	0.1	Powerhouse				$ -	
	0.11	Powerhouse and Draft Tube				$ -	
	0.111	Excavation				$ -	
		Powerhouse Vault Rock	81,667	CY	$ 90.12	$ 7,360,000	
		Draft Tube Rock	16,800	CY	$ 90.12	$ 1,510,000	
	0.113	Surface Preparation/ Grouting	0			$ -	
		Powerhouse	66,000	SF	$ 3.33	$ 220,000	
		Draft Tube	51,000	SF	$ 3.33	$ 170,000	
		Grout Curtain- Drill holes	29,200	LF	$ 27.63	$ 810,000	
		Grout Curtain- Cement	11,667	CF	$ 81.10	$ 950,000	
	0.114	Concrete and Shot Crete	0			$ -	
		Powerhouse Concrete	21,733	CY	$ 692.87	$ 15,060,000	
		Powerhouse Concrete Overbreak	1,600	CY	$ 447.21	$ 720,000	
		Powerhouse Reinforcing Steel	1,087	TON	$ 2,858.29	$ 3,110,000	
		Powerhouse 4" Shotcrete	27,333	SF	$ 10.14	$ 280,000	
		Draft Tube Concrete	8,000	CY	$ 692.87	$ 5,540,000	
		Draft Tube Concrete Overbreak	1,667	CY	$ 447.21	$ 750,000	
		Draft Tube Reinforcing Steel	660	TON	$ 2,858.29	$ 1,890,000	
		Draft Tube 2" Shotcrete	4,067	SF	$ 5.45	$ 20,000	
	0.115	Support and Anchors	0			$ -	
		Powerhouse Rockbolts 1" @ 25' Hy	647	EA	$ 1,234.86	$ 800,000	
		Powerhouse Rockbolts 1" @ 15'	1,313	EA	$ 735.81	$ 970,000	
		Powerhouse Steel Mesh	29,733	SF	$ 5.81	$ 170,000	
		Powerhouse Steel Support	91	TON	$ 12,671.94	$ 1,160,000	
		Draft Tube Rockbolts 1" @ 25' Hy	100	EA	$ 1,234.86	$ 120,000	
		Draft Tube Rockbolts 1" @ 12'	260	EA	$ 528.34	$ 140,000	
		Draft Tube Rockbolts 1" @ 9'	127	EA	$ 432.12	$ 50,000	
		Draft Tube Steel Mesh	12,600	SF	$ 6.55	$ 80,000	
	0.117	Holes (U/S of Powerhouse)	10,000	LF	$ 51.32	$ 510,000	
		Holes (Powerhouse Crown)	19,000	LF	$ 51.32	$ 980,000	
	0.118	Structural- Misc Steelwork				$ -	
		Powerhouse and Draft Tube- Steel Crane Rails	1	LS	$ 10,276,309.00	$ 10,280,000	
	0.119	Architectural- Powerhouse	1	LS	$ 2,927,898.00	$ 2,930,000	
	0.11c	Mechanical				$ -	
		Draft Tube Gates	4	SETS	$ 427,880.00	$ 1,710,000	
		Draft Tube Gate Guides	4	SETS	$ 202,680.00	$ 810,000	
		Draft Tube Crane	1	LS	$ 1,140,000.00	$ 1,140,000	
	0.12	Access Tunnels and Portals				$ -	
	0.121	Excavation				$ -	
		Main Tunnel	33,500	CY	$ 97.45	$ 3,260,000	
		Transformer Gallery Tunnel	11,833	CY	$ 97.45	$ 1,150,000	
		Grouting Gallery Tunnel	1,267	CY	$ 396.04	$ 500,000	

	Surge Chamber Access Tunnel	4,833	CY	$	145.22	$	700,000
	Penstock Access Tunnel	41,000	CY	$	145.22	$	5,950,000
	Penstock Elbow Access Tunnel	10,000	CY	$	145.22	$	1,450,000
	Access Shaft Tunnel	867	CY	$	145.22	$	130,000
	Connector Tunnel	1,267	CY	$	379.26	$	480,000
	Portals Overburden	4,000	CY	$	17.14	$	70,000
	Portals Rock	2,000	CY	$	49.31	$	100,000
0.123	Surface Preparation					$	-
	Main Tunnel Slab	35,400	SF	$	2.21	$	80,000
	Penstock Access Slab	43,467	SF	$	2.21	$	100,000
	Horizontal Portal	133	SF	$	2.30	$	-
	Inclined Portal	1,400	SF	$	3.33	$	-
0.124	Concrete and Shot Crete					$	-
	Main Portal					$	-
	Concrete Slab	20	CY	$	406.27	$	10,000
	Concrete Walls	380	CY	$	406.27	$	150,000
	Concrete Overbreak	33	CY	$	368.48	$	10,000
	Reinforcing Steel	27	TON	$	2,887.51	$	80,000
	Tunnels					$	-
	Concrete Slab Main Tunnel	1,300	CY	$	503.90	$	660,000
	Concrete Plugs Penstock Elbow ACC	10,000	CY	$	755.86	$	7,560,000
	Concrete Overbreak Main Tunnel 6"	667	CY	$	346.43	$	230,000
	Reinforcing Steel	47	TON	$	2,887.51	$	130,000
	2 " Shotcrete Main Tunnel	13,400	SF	$	5.26	$	70,000
	2 " Shotcrete Transformer Gal	4,733	SF	$	5.26	$	20,000
	2 " Shotcrete Surge Chamber Acc	2,600	SF	$	5.26	$	10,000
	2 " Shotcrete Penstock Access	16,467	SF	$	5.26	$	90,000
	2 " Shotcrete Penstock Elbow Acc	4,733	SF	$	5.26	$	20,000
	2 " Shotcrete Access Shaft	200	SF	$	5.26	$	-
	2 " Shotcrete Grout Gallery	533	SF	$	5.26	$	-
	2 " Shotcrete Connector Tunnel	533	SF	$	5.26	$	-
0.125	Support and Anchors					$	-
	Main Tunnel					$	-
	Rockbolts 1" @12'	800	EA	$	528.34	$	420,000
	Rockbolts 1" @ 9'	167	EA	$	432.12	$	70,000
	Steel Mesh	42,000	SF	$	6.37	$	270,000
	Steel Support	44	TON	$	12,801.49	$	560,000
	Main Tunnel Portal					$	-
	Rockbolts 1" @15'	33	EA	$	735.79	$	20,000
	Transformer Gallery Tunnel					$	-
	Rockbolts 1" @12'	273	EA	$	528.34	$	140,000
	Rockbolts 1" @ 9'	47	EA	$	432.12	$	20,000
	Steel Mesh	15,000	SF	$	5.89	$	90,000
	Steel Support	16	TON	$	12,801.49	$	200,000
	Grouting Gallery Tunnel					$	-
	Rockbolts 3/4" @ 6'	107	EA	$	327.15	$	30,000
	Steel Mesh	107	SF	$	6.37	$	-
	Steel Support	2	TON	$	12,801.49	$	30,000
	Surge Chamber Access Tunnel					$	-
	Rockbolts 1" @12'	153	EA	$	528.34	$	80,000
	Rockbolts 1" @ 9'	33	EA	$	432.12	$	10,000
	Steel Mesh	8,033	SF	$	6.37	$	50,000
	Steel Support	9	TON	$	12,801.49	$	120,000
	Penstock Access Tunnel					$	-
	Rockbolts 1" @12'	953	EA	$	528.34	$	500,000
	Rockbolts 1" @ 9'	160	EA	$	432.12	$	70,000
	Steel Mesh	51,667	SF	$	6.37	$	330,000
	Steel Support	39	TON	$	12,801.49	$	490,000

		Penstock Elbow Access Tunnel					$	-
		Rockbolts 1" @12'	280	EA	$	528.34	$	150,000
		Rockbolts 1" @ 9'	80	EA	$	432.12	$	30,000
		Steel Mesh	15,000	SF	$	6.37	$	100,000
		Steel Support	20	TON	$	12,801.49	$	260,000
		Access Shaft Tunnel					$	-
		Rockbolts 1" @12'	13	EA	$	528.34	$	10,000
		Rockbolts 1" @ 9'	13	EA	$	432.12	$	10,000
		Steel Mesh	620	SF	$	6.37	$	-
		Steel Support	5	TON	$	12,801.49	$	70,000
		Connector Tunnel					$	-
		Rockbolts 3/4" @ 6'	107	EA	$	327.15	$	30,000
		Steel Mesh	107	SF	$	6.37	$	-
		Steel Support	2	TON	$	12,801.49	$	30,000
	0.129	Architectural- Main Portal Doors	2	SETS	$	158,371.90	$	320,000
	0.12c	Mechanical Ventilation System					$	-
0.13		Access Shaft					$	-
	0.131	Excavation Rock	9,133	CY	$	227.67	$	2,080,000
	0.133	Surface Preparation Shaft	42,667	SF	$	3.33	$	140,000
	0.134	Concrete and Shot Crete					$	-
		Concrete Lining	2,233	CY	$	944.82	$	2,110,000
		Concrete Overbreak 6"	813	CY	$	551.14	$	450,000
	0.135	Support and Anchors - Rockbolts 3/4" @ 6'	700	EA	$	327.15	$	230,000
	0.138	Structural Misc Steelwork	33	TON	$	7,395.00	$	250,000
	0.139	Architectural- control Building					$	-
	0.13c	Mechanical Elevators	1	LS	$	2,368,815.00	$	2,370,000
0.14		Fire Protection Head Tank					$	-
	0.141	Excavation	767	CY	$	588.80	$	450,000
	0.143	Surface Preparation	1,867	SF	$	2.30	$	-
	0.144	Concrete & Shotcrete					$	-
		Concrete	167	CY	$	963.72	$	160,000
		Concrete Overbreak 6"	30	CY	$	406.27	$	10,000
		Reinforcing Steel	7	TON	$	2,858.29	$	20,000
	0.145	Support and Anchors					$	-
		Rockbolts 1" @12'	17	EA	$	528.34	$	10,000
		Rockbolts 1" @ 9'	7	EA	$	432.12	$	-
		Steel Mesh	800	SF	$	6.30	$	10,000
		Steel Support	2	TON	$	12,671.95	$	30,000
	0.148	Misc Steelwork	1	LS	$	73,297.50	$	70,000
	0.14c	Mechanical Piping/Valves					$	-
0.15		Bus Tunnels (totals for 3 Bus Tunnels)					$	-
	0.151	Excavation					$	-
		Rock Horizontal	1,800	CY	$	213.70	$	380,000
		Rock Inclined	867	CY	$	601.04	$	520,000
	0.153	Surface Preparation- Tunnels	4,733	SF	$	3.33	$	20,000
	0.154	Concrete and Shotcrete					$	-
		Concrete Slab	233	CY	$	818.84	$	190,000
		Concrete Overbreak 12"	167	CY	$	472.41	$	80,000
		Reinforcing Steel	12	TON	$	2,858.29	$	30,000
		2" Shotcrete	1,467	SF	$	5.26	$	10,000
	0.155	Supports and Anchors					$	-
		Rockbolts 1" @ 25'	40	EA	$	1,234.86	$	50,000
		Rockbolts 1" @ 12'	93	EA	$	528.34	$	50,000
		Rockbolts 1" @ 9'	33	EA	$	432.12	$	10,000
		Steel Mesh	4,533	SF	$	6.30	$	30,000
		Steel Support	7	TON	$	12,671.94	$	90,000
0.16		Transformer Gallery Tunnel					$	-

		0.161	Excavation- Rock	17,867	CY	$	87.44	$	1,560,000		
		0.163	Surface Preparation	16,400	SF	$	2.30	$	40,000		
		0.164	Concrete and Shotcrete					$	-		
			Concrete Base Slab	1,600	CY	$	1,228.27	$	1,970,000		
			Concrete Overbreak 12"H/6"V	513	CY	$	377.93	$	190,000		
			Reinforcing Steel	80	TON	$	2,858.29	$	230,000		
		0.165	Support and Anchors					$	-		
			Rockbolts 1" @ 25'	400	EA	$	1,234.86	$	490,000		
			Rockbolts 1" @ 15'	180	EA	$	735.81	$	130,000		
			Steel Mesh	13,800	SF	$	5.81	$	80,000		
			Steel Support	19	TON	$	12,671.94	$	240,000		
		0.167	Drainage Holes	5,533	LF	$	47.95	$	270,000		
	0.17		Cable Shafts					$	-		
		0.171	Excavation Rock	2,267	CY	$	601.04	$	1,360,000		
		0.173	Surface Preparation Shafts	27,600	SF	$	3.33	$	90,000		
		0.174	Concrete and Shotcrete					$	-		
			Concrete Lining	693	CY	$	1,763.66	$	1,220,000		
			Concrete Overbreak 6"	533	CY	$	881.83	$	470,000		
		0.175	Supports and Anchors- Rockbolts 3/4" @ 6'	433	EA	$	327.15	$	140,000		
		0.178	Structural Misc Steelwork	12	TON	$	15,602.00	$	190,000		
		0.179	Architectural- Enclosures	1	LS	$	199,317.00	$	200,000		
		0.17c	Mechanical Hoist	2	EA	$	476,960.00	$	950,000		
	0.18		Dewatering (during Construction)					$	-		
		0.181	Dewatering (Power Facilities)	1	LS	$	1,336,798.50	$	1,340,000		
	0.19		Instrumentation					$	-		
		0.191	Instrumentation	1	LS	$	1,714,813.50	$	1,710,000		
0.2			Misc Buildings (Control Buildings)	1	LS	$	4,433,085.00	$	4,430,000		
0.3			Permanent Town	(included in 63.5)							
								$	-	**$**	**115,000,000**
332			**Reservoir, Dams and Waterways**					$	-		
0.1			Reservoir					$	-		
	0.11		Reservoir Clearing	23,000	ACRE	$	3,005.85	$	69,130,000		
0.2			Diversion Tunnels /Cofferdams					$	-		
	0.21		Diversion Tunnels /Portals					$	-		
		0.211	Excavation					$	-		
			Upper Tunnel					$	-		
			Rock	221,000	CY	$	92.33	$	20,400,000		
			Lower Tunnel					$	-		
			Rock	208,000	CY	$	92.33	$	19,200,000		
			Excavate Concrete for Plug	700	CY	$	96.92	$	70,000		
			Upstream Upper Portal					$	-		
			Rock Usable (Face Only)	11,200	CY	$	49.16	$	550,000		
			Upstream Lower Portal (Including Most Exc for Upper Portal)					$	-		
			Rock Usable	108,000	CY	$	49.16	$	5,310,000		
			Rock Waste	21,750	CY	$	49.16	$	1,070,000		
			Downstream Portals					$	-		
			Overburden	17,000	CY	$	17.14	$	290,000		
			Rock Usable	120,000	CY	$	49.16	$	5,900,000		
			Rock Waste	28,000	CY	$	49.16	$	1,380,000		
			Emergency Release Chambers					$	-		
			Excavate Concrete for Plugs	1,800	CY	$	101.98	$	180,000		
			Gate Chamber	4,700	CY	$	110.73	$	520,000		
			Access Tunnel to Gate Chamber					$	-		
			Rock	19,100	CY	$	97.15	$	1,860,000		
		0.212	Fill- Temp for Coffer Dam to Construct Upstream Portals	23,000	CY	$	11.66	$	270,000		
		0.213	Surface Preparation \ grouting					$	-		
			Upstream Upper Portal					$	-		
			Horizontal	3,200	SF	$	2.30	$	10,000		

	Inclined	8,600	SF	$	3.33	$	30,000
	Upstream Lower Portal					$	-
	Horizontal	1,300	SF	$	2.30	$	-
	Inclined	14,900	SF	$	3.33	$	50,000
	Downstream Upper Portal					$	-
	Horizontal	6,100	SF	$	2.30	$	10,000
	Inclined	20,500	SF	$	3.33	$	70,000
	Downstream Lower Portal					$	-
	Horizontal	600	SF	$	2.30	$	-
	Inclined	5,600	SF	$	3.33	$	20,000
	Grout Upper Tunnel Plugs					$	-
	Drill Holes	4,100	LF	$	26.76	$	110,000
	Cement	820	CF	$	81.10	$	70,000
	Grout Lower Tunnel Permanent Plugs					$	-
	Drill Holes	2,050	LF	$	26.76	$	50,000
	Cement	410	CF	$	81.10	$	30,000
0.214	Concrete and Shotcrete					$	-
	Upper Tunnel					$	-
	Concrete Lining	42,400	CY	$	566.89	$	24,040,000
	Concrete Lining Overbreak 6"	10,200	CY	$	314.94	$	3,210,000
	Reinforcing Steel	24	TON	$	2,887.51	$	70,000
	2" Shotcrete	56,000	SF	$	5.26	$	290,000
	Lower Tunnel					$	-
	Concrete Lining	37,600	CY	$	566.89	$	21,320,000
	Concrete Lining for Plug	6,200	CY	$	428.32	$	2,660,000
	Concrete Lining Overbreak 6"	10,000	CY	$	314.94	$	3,150,000
	Reinforcing Steel	24	TON	$	2,887.51	$	70,000
	2" Shotcrete	57,900	SF	$	5.26	$	300,000
	Upstream Upper Portal					$	-
	Concrete Headwall	3,200	CY	$	651.93	$	2,090,000
	Concrete Lining	1,300	CY	$	651.93	$	850,000
	Concrete Slab	750	CY	$	651.93	$	490,000
	Concrete Piers	800	CY	$	651.93	$	520,000
	Concrete Overbreak 12" H/6"V	300	CY	$	472.41	$	140,000
	Reinforcing Steel	400	TON	$	2,887.51	$	1,160,000
	Upstream Lower Portal					$	-
	Concrete Headwall	4,500	CY	$	651.93	$	2,930,000
	Concrete Lining	3,000	CY	$	651.93	$	1,960,000
	Concrete Slab	300	CY	$	651.93	$	200,000
	Concrete Piers	700	CY	$	651.93	$	460,000
	Concrete Overbreak 12" H/6"V	350	CY	$	472.41	$	170,000
	Reinforcing Steel	600	TON	$	2,887.51	$	1,730,000
	Downstream Upper Portal					$	-
	Concrete Headwall	500	CY	$	651.93	$	330,000
	Concrete Slab	100	CY	$	651.93	$	70,000
	Concrete Overbreak 12" H/6"V	100	CY	$	472.41	$	50,000
	Reinforcing Steel	40	TON	$	2,887.51	$	120,000
	Downstream Lower Portal					$	-
	Concrete Headwall	2,500	CY	$	651.93	$	1,630,000
	Concrete Slab	100	CY	$	651.93	$	70,000
	Concrete Overbreak 12" H/6"V	150	CY	$	472.41	$	70,000
	Reinforcing Steel	170	TON	$	2,887.51	$	490,000
	Downstream Flip Bucket					$	-
	Concrete Slab	800	CY	$	651.93	$	520,000
	Concrete Walls	2,300	CY	$	651.93	$	1,500,000
	Concrete Invert	1,200	CY	$	651.93	$	780,000
	Concrete Overbreak 12" H/6"V	410	CY	$	42.41	$	20,000
	Reinforcing Steel	280	TON	$	2,887.51	$	810,000

	Downstream Retaining Wall					$	-
	Concrete Slab	200	CY	$	651.93	$	130,000
	Concrete Walls	2,000	CY	$	651.93	$	1,300,000
	Concrete Overbreak 12" H/6"V	110	CY	$	472.41	$	50,000
	Reinforcing Steel	90	TON	$	2,887.51	$	260,000
	Emergency Release Chambers					$	-
	Concrete Plug	15,300	CY	$	755.86	$	11,560,000
	4" Shotcrete	2,790	SF	$	10.13	$	30,000
	Access Tunnel to Gate Chamber					$	-
	2" Shotcrete	12,800	SF	$	5.26	$	70,000
0.215	Supports and Anchors					$	-
	Lower Tunnel					$	-
	Rockbolts 1" @ 12'	3,650	EA	$	528.34	$	1,930,000
	Rockbolts 1" @ 9'	620	EA	$	432.12	$	270,000
	Steel Mesh	217,100	SF	$	6.37	$	1,380,000
	Steel Support	220	TON	$	12,801.49	$	2,820,000
	Upper Tunnel					$	-
	Rockbolts 1" @ 12'	3,530	EA	$	528.34	$	1,870,000
	Rockbolts 1" @ 9'	600	EA	$	432.12	$	260,000
	Steel Mesh	210,200	SF	$	6.37	$	1,340,000
	Steel Support	213	TON	$	12,801.49	$	2,730,000
	Upstream Lower Portal					$	-
	Rockbolts 1" @ 15'	240	EA	$	735.81	$	180,000
	Anchors 1" @ 25'	290	EA	$	1,234.86	$	360,000
	Upstream Upper Portal					$	-
	Rockbolts 1" @ 15'					$	-
	Anchors 1" @ 25'	130	EA	$	735.81	$	100,000
	Downstream Lower Portal					$	-
	Rockbolts 1" @ 15'	200	EA	$	735.81	$	150,000
	Downstream Upper Portal					$	-
	Rockbolts 1" @ 15'	100	EA	$	735.81	$	70,000
	Retaining Wall Anchors 1" @25'	100	EA	$	1,234.86	$	120,000
	Emergency Release Chambers					$	-
	Rockbolts 1" @ 25'	100	EA	$	1,234.86	$	120,000
	Rockbolts 1" @ 15'	125	EA	$	735.77	$	90,000
	Steel Mesh	3,600	SF	$	6.37	$	20,000
	Steel Support	14	TON	$	12,801.49	$	180,000
	Metal to Roof Anchors 3/4" @ 6'	20	EA	$	342.42	$	10,000
	Access Tunnel to Gate Chamber					$	-
	Rockbolts 1" @ 12'	775	EA	$	528.34	$	410,000
	Rockbolts 1" @ 9'	240	EA	$	432.12	$	100,000
	Steel Mesh	39,900	SF	$	6.37	$	250,000
	Steel Support	55	TON	$	12,801.49	$	700,000
0.218	Structural- Misc Steelwork	2,775	SF	$	93.61	$	260,000
0.21c	Mechanical					$	-
	Upstream Lower Gates					$	-
	Gate Equipment	2	EA	$	5,073,120.00	$	10,150,000
	Upstream Upper Gates					$	-
	Gate Equipment	2	EA	$	2,840,080.00	$	5,680,000
	Trashracks	1	LS	$	1,777,500.00	$	1,780,000
	Downstream Lower Outlet					$	-
	Stoplog Guides	1	LS	$	142,200.00	$	140,000
	Stoplogs includes follower	1	LS	$	1,967,100.00	$	1,970,000
	Downstream Upper Outlet					$	-
	Stoplog Guides	1	LS	$	82,950.00	$	80,000
	Low Level Release					$	-
	Slide Gates Include Steel Liner	9	EA	$	3,517,470.00	$	31,660,000
						$	-

	0.22		Upstream Cofferdam					$	-
		0.221	Excavation					$	-
			Overburden Removal	1,000	CY	$	11.56	$	10,000
		0.222	Fill					$	-
			Rock Fill	38,400	CY	$	10.90	$	420,000
			Fine Filter	16,600	CY	$	36.84	$	610,000
			Coarse Filter	15,900	CY	$	30.05	$	480,000
			Rock Shell	196,500	CY	$	10.50	$	2,060,000
			Closure Dike	58,500	CY	$	10.90	$	640,000
			Rip Rap	21,200	CY	$	24.26	$	510,000
		0.223	Cutoff Slurry Wall					$	-
			excavation	4,850	CY	$	4.88	$	20,000
			slurry wall	43,600	SF	$	72.44	$	3,160,000
		0.22d	Dewatering					$	-
			Initial Dewatering	1	LS	$	5,807,685.00	$	5,810,000
			Dewatering Maintenance	1	LS	$	22,377,990.00	$	22,380,000
	0.23		Down Stream Cofferdam					$	-
		0.231	Excavation					$	-
			overburden	5,000	CY	$	11.56	$	60,000
			Rock	500	CY	$	9.91	$	-
			Removal of Cofferdam	14,500	CY	$	13.48	$	200,000
		0.232	Fill					$	-
			Rip Rap	1,800	CY	$	24.26	$	40,000
			Closure Dike	15,200	CY	$	10.90	$	170,000
		0.233	Cutoff Slurry Wall					$	-
			Excavation	1,830	CY	$	4.60	$	10,000
			Slurry Wall	16,500	SF	$	72.44	$	1,200,000
0.3			Main Dam					$	-
	0.31		Main Dam					$	-
		0.311	Excavation					$	-
			Overburden above el. 1470	2,026,000	CY	$	11.53	$	23,360,000
			Overburden below el. 1470	5,320,000	CY	$	11.06	$	58,840,000
			Rock Usable above el. 1470	1,289,000	CY	$	43.03	$	55,470,000
			Rock Usable below el. 1470	478,000	CY	$	43.72	$	20,900,000
			Rock Waste above el. 1470	1,950,000	CY	$	43.03	$	83,910,000
			Rock Waste below el. 1470	869,500	CY	$	50.18	$	43,630,000
		0.312	Fill- Estimated from Attatched Calculations					$	-
			Rip Rap (upstream)	409,000	CY	$	23.30	$	9,530,000
			Gravel (upstream)	6,659,000	CY	$	20.56	$	136,910,000
			Coarse Filter (upstream)	925,759	CY	$	28.86	$	26,720,000
			Fine Filter (upstream)	1,045,588	CY	$	37.91	$	39,640,000
			Core (impervious)	6,300,000	CY	$	25.37	$	159,830,000
			Fine Filter (downstream)	1,171,412	CY	$	37.91	$	44,410,000
			Coarse Filter (downstream)	1,074,241	CY	$	28.86	$	31,000,000
			Shell- Rock and Gravel	2,998,209	CY	$	19.18	$	57,510,000
			Shell- Rock From Other Sources	1,445,000	CY	$	10.09	$	14,580,000
			Cobbles (downstream Face)	530,000	CY	$	16.35	$	8,670,000
			Road Base	12,000	CY	$	34.42	$	410,000
			Frost Protection					$	-
			Process Protection	960,000	CY	$	10.31	$	9,900,000
			Place Protection	960,000	CY	$	3.29	$	3,160,000
			Remove 1' Protect and Waste	93,000	CY	$	7.21	$	670,000
			Scarify Core Surface	193	ACRE	$	858.77	$	170,000
			Filter Fabric					$	-
			Filter Fabric	592,000	SF	$	0.88	$	520,000
		0.313	Surface Prep/ Grouting					$	-
			Surface Preparation					$	-
			Under Core/Filters above el. 1500	1,340,000	SF	$	3.11	$	4,170,000

			Under Core/Filters below el. 1500	490,000	SF	$	3.11	$ 1,520,000
			Under Shell above el. 1500	4,149,000	SF	$	2.15	$ 8,920,000
			Under Shell below el. 1500	2,067,000	SF	$	2.15	$ 4,440,000
			Consolidation Grout					$ -
			Drill Holes	550,000	LF	$	11.91	$ 6,550,000
			Cement	550,000	CF	$	67.81	$ 37,300,000
			Grout Curtain					$ -
			Drill Holes	372,000	LF	$	26.76	$ 9,950,000
			Cement	149,000	CF	$	81.10	$ 12,080,000
			Dental Concrete					$ -
			Dental Concrete	68,000	CY	$	365.33	$ 24,840,000
	0.317		Drainage					$ -
			Holes	109,000	LF	$	51.32	$ 5,590,000
0.32			Grout Galleries/Portals					$ -
	0.321		Excavation					$ -
			Tunnels/ Shafts- Core Area					$ -
			Rock Horizontal	8,100	CY	$	394.80	$ 3,200,000
			Rock Inclined	9,000	CY	$	552.93	$ 4,980,000
			Rock Vertical	1,600	CY	$	536.19	$ 860,000
			Tunnels/ Shafts- Access					$ -
			Rock Horizontal	10,400	CY	$	394.80	$ 4,110,000
			Rock Inclined	1,600	CY	$	552.93	$ 880,000
			Portals					$ -
			Overburden Rock	2,900	CY	$	17.16	$ 50,000
			Rock	800	CY	$	49.16	$ 40,000
	0.323		Surface Preparation					$ -
			Portals					$ -
			Horizontal	24	SF	$	2.30	$ -
			Inclined	160	SF	$	3.33	$ -
								$ -
	0.324		Concrete and Shotcrete					$ -
			Tunnels- Core Area					$ -
			Concrete Plugs	800	CY	$	428.32	$ 340,000
			Concrete Slab	1,800	CY	$	944.82	$ 1,700,000
			Concrete Overbreak 6"	920	CY	$	755.86	$ 700,000
			Reinforcing Steel	64	TON	$	2,887.51	$ 180,000
			2" Shotcrete	12,000	SF	$	5.26	$ 60,000
			Tunnels-Access					$ -
			Concrete Slab	1,280	CY	$	944.82	$ 1,210,000
			Concrete Overbreak 6"	640	CY	$	755.86	$ 480,000
			Reinforcing Steel	48	TON	$	2,887.51	$ 140,000
			2" Shotcrete	4,300	SF	$	5.26	$ 20,000
			Shafts					$ -
			2" Shotcrete	4,000	SF	$	5.26	$ 20,000
			Portals					$ -
			Concrete	16	CY	$	406.36	$ 10,000
			Reinforcing Steel	2	TON	$	2,887.51	$ -
	0.325		Support and Anchors					$ -
			Tunnels- Core Area					$ -
			Rockbolts 3/4" @6'	1,400	EA	$	327.15	$ 460,000
			Steel Mesh	2,400	SF	$	5.37	$ 10,000
			Steel Support	16	TON	$	12,801.49	$ 200,000
			Tunnels- Access					$ -
			Rockbolts 3/4" @6'	960	EA	$	327.15	$ 310,000
			Steel Mesh	880	SF	$	5.37	$ -
			Steel Support	16	TON	$	12,801.49	$ 200,000
			Shafts					$ -
			Rockbolts 3/4" @6'	280	EA	$	327.15	$ 90,000

			Steel Mesh	800	SF	$	5.37	$	-		
			Portals					$	-		
			Rockbolts 1" @15'	24	EA	$	735.81	$	20,000		
		0.329	Architectural Portal Doors					$	-		
			Portal Doors	1	LS	$	33,900.00	$	30,000		
	0.33		Instrumentation					$	-		
		0.331	Instrumentation	1	LS	$	17,315,220.00	$	17,320,000		
0.4			Relict Channel					$	-		
	0.41		Shore Protection					$	-		
		0.411	Excavation					$	-		
			Overburden Stripping 2' thick	2,200	CY	$	11.56	$	30,000		
		0.412	Fill					$	-		
			Dump and Spread					$	-		
			Filter Material - 2' layer	2,200	CY	$	31.93	$	70,000		
			Rock Spalls/ Rip Rap- 3' Ave	3,300	CY	$	9.86	$	30,000		
			Shore Protection					$	-		
			Rip Rap	24,000	CY	$	24.26	$	580,000		
			Waste Rock	24,000	CY	$	22.78	$	550,000		
	0.44		Channel Filter Blanket					$	-		
		0.442	Fill					$	-		
			Coarse Filter	2,900,000	CY	$	33.85	$	98,170,000		
			Fine Filter	2,180,000	CY	$	43.65	$	95,160,000		
			Rip Rap	182,000	CY	$	24.26	$	4,420,000		
		0.443	Surface preparation					$	-		
			Foundation Prep					$	-		
			Clearing and Grubbing	460	ACRE	$	3,963.11	$	1,820,000		
			Excavation	2,236,000	CY	$	15.62	$	34,930,000		
0.5			Outlet Facilities							**$**	**1,537,690,000**
	0.51		Outlet Facilities- (Intake Civil Work Include in Power Intake)	1	LS	$	73,000,000	$	73,000,000		
	0.52		Main (Chute) Spillway (Includes Civil Works for Outlet Facilities)	1	LS	$	182,000,000	$	182,000,000		
	0.53		Emergency Spillway	1	LS	$	164,000,000	$	164,000,000		
0.6			Power Intake (Inc Inlet exec and Inlet Structure Civil Works for Outlet)	1	LS	$	97,000,000	$	97,000,000		
0.7			Surge Chamber	1	LS	$	17,000,000	$	17,000,000		
	0.81		Head Race (Based on Penstock costs	1	LS	$	28,000,000	$	28,000,000		
	0.82		Penstocks	1	LS	$	17,000,000	$	17,000,000		
0.9			Tailrace Works (1 Portal with Combined Tailrace/Diversion Tunnel)	1	LS	$	12,000,000	$	12,000,000		
										$	**590,000,000**
333			**Waterwheels, Turbines and Generators**								
	0.11		Turbines and Governors								
		0.111	Supply								
		0.112	Install								
0.2			Generators and Exciters								
	0.21		Generators and Exciters (Supply and Install)								
		0.211	Generators and Exciters								
0.3			Total Bid From Vendor (includes all equipment in this category) Average from acquired quotes	4	EA	$	74,200,000.00	$	297,000,000	**$**	**297,000,000**
334			**Accessory Electrical Equipment**								
0.1			Connections, Supports and Structures								
	0.11		Structures								
		0.111	Structures (included Below)								
	0.12		Conductors and Insulators								
		0.121	Generator Isolated Phase Bus	1	LS	$	3,792,000.00	$	3,790,000		
		0.122	HV Power Cables and Accessories	1	LS	$	1,540,500.00	$	1,540,000		
		0.123	LV Power Cables and Accessories	1	LS	$	711,000.00	$	710,000		
		0.124	Control Cables and Accessories	1	LS	$	1,303,500.00	$	1,300,000		
		0.125	Grounding System	1	LS	$	177,750.00	$	180,000		

	0.13		Conduits and Fittings							
		0.131	Conduits and Fittings	1	LS	$	474,000.00	$	470,000	
0.2			Switchgear and Control Equipment							
	0.21		Auxiliary Transformers							
		0.211	Auxiliary Transformers	4	EA	$	83,811	$	340,000	
	0.22		Circuit Breakers Generators					$	-	
		0.221	Circuit Breakers Generators	4	EA	$	1,504,300	$	6,020,000	
	0.23		Surge Protectors and Generator Cubicles			$	-	$	-	
		0.231	Surge Protectors and Generator Cubicles	4	EA	$	50,000.00	$	200,000	
	0.24		Switch boards			$	-	$	-	
		0.241	Switch boards	1	LS	$	924,300.00	$	920,000	
	0.25		Auxiliary Power Equipment			$	-	$	-	
		0.251	Auxiliary Power Equipment	4	EA	$	100,000	$	400,000	
0.3			Cubicles and Appurtenances					$	-	
	0.31		Control, relay and meter boards					$	-	
		0.311	Control, relay and meter boards	4	EA	$	200,000	$	800,000	
	0.32		Computer Control System			$	-	$	-	
		0.321	Computer Control System			$	-	$	-	
	0.33		Supervisor and Telemeter System			$	-	$	-	
		0.331	Supervisor and Telemeter System			$	-	$	-	
						$	-	$	-	
0.4			Power Transformers			$	-	$	-	
	0.41		Power Transformers			$	-	$	-	
		0.411	Power Transformers	7	EA	$	2,571,429	$	18,000,000	
						$	-	$	-	
0.5			Lighting System					$	-	
	0.51		Powerhouse and Transformer Gallery					$	-	
		0.511	Powerhouse and Transformer Gallery	1	LS	$	1,824,900.00	$	1,820,000	
	0.52		Access Tunnels and Roads					$	-	
		0.521	Access Tunnels and Roads	1	LS	$	402,900.00	$	400,000	
								$	-	
0.6			Misc. Electrical Equipment					$	-	
	0.61		Misc. Electrical Equipment					$	-	
		0.611	Misc. Electrical Equipment	1	LS	$	625,680.00	$	630,000	
								$	-	
0.7			Surface Accessory Equipment					$	-	
	0.71		34.5 kV and LV Equipment					$	-	
		0.711	Switchboard	1	LS	$	213,300	$	210,000	
		0.712	Cables	1	LS	$	450,300	$	450,000	
		0.713	Aux Transformers	1	LS	$	284,400	$	280,000	
	0.73		Diesel Generator- Standby					$	-	
		0.731	Diesel Generator- Standby	2	EA	$	347,550	$	700,000	
	0.74		Exterior Lighting					$	-	
		0.741	Exterior Lighting	1	LS	$	355,500	$	360,000	
	0.75		Mimic Board- Control Building					$	-	
		0.751	Mimic Board- Control Building	1	LS	$	1,185,000	$	1,190,000	
								$	-	**$ 41,000,000**
335			**Misc Powerplant Equipment**					$	-	
0.1			Auxiliary Systems- Underground					$	-	
	0.11		Station Water Systems					$	-	
		0.111	Station Water Systems	1	LS	$	2,488,500.00	$	2,490,000	
	0.12		Fire Protection Systems			$	-	$	-	
		0.121	Fire Protection Systems	1	LS	$	1,422,000.00	$	1,420,000	
	0.13		Compressed Air Systems			$	-	$	-	
		0.131	Compressed Air Systems	1	LS	$	1,777,500.00	$	1,780,000	
	0.14		Oil Handling Systems			$	-	$	-	
		0.141	Oil Handling Systems	1	LS	$	1,185,000.00	$	1,190,000	
	0.15		Drainage & Dewatering			$	-	$	-	

		0.151	Drainage & Dewatering	2	EA	$	1,738,000	$	3,480,000		
	0.16		Heating, Ventilation and Cooling System			$	-	$	-		
		0.161	Heating, Ventilation and Cooling System	1	LS	$	1,777,500.00	$	1,780,000		
	0.17		Miscellaneous			$	-	$	-		
		0.171	Miscellaneous	1	LS	$	1,185,000.00	$	1,190,000		
0.2			Auxiliary Systems- Surface Facilities			$	-	$	-		
	0.21		Auxiliary Systems- Surface Facilities			$	-	$	-		
		0.211	Auxiliary Systems- Surface Facilities	1	LS	$	711,000	$	710,000		
0.3			Auxiliary Equipment			$	-	$	-		
	0.31		Powerhouse Cranes			$	-	$	-		
		0.311	Powerhouse Cranes	2	EA	$	1,800,000	$	3,600,000		
	0.32		Elevators			$	-	$	-		
		0.321	Elevators	2	EA	$	181,700	$	360,000		
	0.33		Miscellaneous Cranes and Hoists			$	-	$	-		
		0.331	Miscellaneous Cranes and Hoists	1	LS	$	505,500	$	510,000		
	0.34		Machine Shop Equipment			$	-	$	-		
		0.341	Machine Shop Equipment	1	LS	$	2,022,000	$	2,020,000		
0.4			General Station Equipment			$	-	$	-		
0.5			Communications Equipment	1	LS	$	106,650.00	$	110,000		
								$	-	**$**	**21,000,000**
336			**Roads, Rails and Air Facilities**					$	-		
0.1			Roads								
	0.11		Permanent Roads								
			Cost of road upgrades for 23 mi of Denali Highway	23	Mi	$	1,000,000.00	$	23,000,000.00		
			Cost of New road to 42 Mi of road to Watana	42	Mi	$	3,000,000.00	$	126,000,000.00		
	0.131		Site Roads								
			Construction Roads								
			Site Roads	20	Mile	$	750,000.00	$	15,000,000		
			Maintenance	141	MI/YRS	$	223,092.85	$	31,500,000		
	0.132		Permanent Roads								
			Permanent Roads	6	Mile	$	1,287,997.42	$	7,700,000		
0.2			Rail								
	0.1		Railhead at Cantwell	1	LS	$	14,000,000.00	$	14,000,000		
0.3			Airstrip								
	0.31		Airstrip								
			Permanent Airstrip	1	LS	$	13,000,000.00	$	13,000,000		
			Temporary Airstrip	1	LS	$	2,000,000.00	$	2,000,000		
										$	**232,000,000**
350-359			**Transmission Plant**	33	MILE	$	5,700,000.00	$	188,100,000.00		
				2	EA	$	18,000,000.00	$	36,000,000.00		
										$	**224,000,000.00**
			General Plant								
389			**Land and Land Rights**								
			Land and Land Rights								
							(incl in 330)				
390			**Structures and Improvements**								
			Structures and Improvements								
							(incl in 331.2)				
391			**Office Furniture and Equipment**								
			Office Furniture and Equipment								
							(incl in 399)				
392			**Transportation Equipment**								
			Transportation Equipment								

						(incl in 399)				
	393		**Stores Equipment**							
			Stores Equipment							
						(incl in 399)				
	394		**Tools Shop and Garage Equipment**							
			Tools Shop and Garage Equipment							
						(incl in 399)				
	395		**Laboratory Equipment**							
			Laboratory Equipment							
						(incl in 399)				
	396		**Power-Operated Equipment**							
			Power-Operated Equipment							
						(incl in 399)				
	397		**Communications Equipment**							
			Communications Equipment							
						(incl in 399)				
	398		**Miscellaneous Equipment**							
			Miscellaneous Equipment							
						(incl in 399)				
	399		**Other Tangible Property**							
			Other Tangible Property	1	LS	$ 16,000,000	$	16,000,000		
			Saved Maintenance	1	LS	$ (231,220)	$	(230,000)		
							$	-	**$**	**16,000,000**
			Indirect Costs							
	61		**Temporary Construction Facilities**							
			Temporary Construction Facilities			(incl in direct costs)				
	62		**Construction Equipment**							
			Construction Equipment			(incl in direct costs)				
	63		**Main Construction Camp**							
		0.1	Main Construction Camp	1	LS	$ 180,000,000	**$**	**180,000,000**		
									$	**180,000,000**
	64		**Labor Expense**							
			Labor Expense							
	65		**Superintendence**							
			Superintendence							
	66		**Insurance**							
			Insurance							
	68		**Mitigation Fishery, Terrestrial and Recreational)- Not Included**							
	69		**Fees**							
			Fees							
Subtotal										
	Contingency (20%)			1	LS	$ 749,200,000.00			**$**	**749,000,000**
Subtotal										
	71		**Engineering (4%), Environmental (2%), Regulatory(1%)**	1	LS	$ 236,000,000.00			**$**	**236,000,000**
	71a		**Construction Management (4%)**	1	LS	$ 135,000,000.00			**$**	**135,000,000**
	72		**Legal Expenses**							
	75		**Taxes**							
	76		**Administrative & Gen. Expenses**							
	77		**Interest**							
	80		**Earnings/Expenses During Construction**							
Total Project Cost									**$**	**4,495,000,000**
Max Plant Capacity	600									

HDR/AEA Susitna Hydroelectric Project
Cost Estimates based on 1982 quantities
By: HDR
By: Leanne Andruszkiewicz, E.I.T.
Checked By: Kellen Roberts, E.I.T.
Date: 10/15/2009
2008 Dollars
Low Watana (Expandable) (4 Turbines)

FERC Line #	Sub Categories			Description	Quantity	Units	2008 Unit Price	Line Price	Total
	330			**Land and Land Rights**					
	0.1			Land	1	LS	$ 120,870,000	$ 120,870,000	
	0.2			Land Rights				$ -	
	0.3			Misc Charges in Credit Above				$ -	
								$ -	**$ 121,000,000**
								$ -	
	331			**Powerplant Structure Improvements**				$ -	
	0.1			Powerhouse				$ -	
		0.11		Powerhouse and Draft Tube				$ -	
			0.111	Excavation				$ -	
				Powerhouse Vault Rock	122,500	CY	$ 90	$ 11,040,000	
				Draft Tube Rock	25,200	CY	$ 90	$ 2,270,000	
			0.113	Surface Preparation/ Grouting				$ -	
				Powerhouse	99,000	SF	$ 3	$ 330,000	
				Draft Tube	76,500	SF	$ 3	$ 250,000	
				Grout Curtain- Drill holes	43,800	LF	$ 28	$ 1,210,000	
				Grout Curtain- Cement	17,500	CF	$ 81	$ 1,420,000	
			0.114	Concrete and Shot Crete				$ -	
				Powerhouse Concrete	32,600	CY	$ 693	$ 22,590,000	
				Powerhouse Concrete Overbreak	2,400	CY	$ 447	$ 1,070,000	
				Powerhouse Reinforcing Steel	1,630	TON	$ 2,858	$ 4,660,000	
				Powerhouse 4" Shotcrete	41,000	SF	$ 10	$ 420,000	
				Draft Tube Concrete	12,000	CY	$ 693	$ 8,310,000	
				Draft Tube Concrete Overbreak	2,500	CY	$ 447	$ 1,120,000	
				Draft Tube Reinforcing Steel	990	TON	$ 2,858	$ 2,830,000	
				Draft Tube 2" Shotcrete	6,100	SF	$ 5	$ 30,000	
			0.115	Support and Anchors				$ -	
				Powerhouse Rockbolts 1" @ 25' Hy	970	EA	$ 1,235	$ 1,200,000	
				Powerhouse Rockbolts 1" @ 15'	1,970	EA	$ 736	$ 1,450,000	
				Powerhouse Steel Mesh	44,600	SF	$ 6	$ 260,000	
				Powerhouse Steel Support	137	TON	$ 12,672	$ 1,740,000	
				Draft Tube Rockbolts 1" @ 25' Hy	150	EA	$ 1,235	$ 190,000	
				Draft Tube Rockbolts 1" @ 12'	390	EA	$ 528	$ 210,000	
				Draft Tube Rockbolts 1" @ 9'	190	EA	$ 432	$ 80,000	
				Draft Tube Steel Mesh	18,900	SF	$ 7	$ 120,000	
			0.117	Holes (U/S of Powerhouse)	15,000	LF	$ 51	$ 770,000	
				Holes (Powerhouse Crown)	28,500	LF	$ 51	$ 1,460,000	
			0.118	Structural- Misc Steelwork				$ -	
				Powerhouse and Draft Tube- Steel Crane Rails	1	LS	$ 10,276,309	$ 10,280,000	
			0.119	Architectural- Powerhouse	1	LS	$ 2,927,898	$ 2,930,000	
			0.11c	Mechanical				$ -	
				Draft Tube Gates	4	SETS	$ 427,880	$ 1,710,000	
				Draft Tube Gate Guides	6	SETS	$ 202,680	$ 1,220,000	
				Draft Tube Crane	1	LS	$ 1,140,000	$ 1,140,000	
		0.12		Access Tunnels and Portals				$ -	
			0.121	Excavation				$ -	
				Main Tunnel	50,250	CY	$ 97	$ 4,900,000	
				Transformer Gallery Tunnel	17,750	CY	$ 97	$ 1,730,000	
				Grouting Gallery Tunnel	1,900	CY	$ 396	$ 750,000	
				Surge Chamber Access Tunnel	7,250	CY	$ 145	$ 1,050,000	
				Penstock Access Tunnel	61,500	CY	$ 145	$ 8,930,000	

	Penstock Elbow Access Tunnel	15,000	CY	$	145	$	2,180,000
	Access Shaft Tunnel	1,300	CY	$	145	$	190,000
	Connector Tunnel	1,900	CY	$	379	$	720,000
	Portals Overburden	6,000	CY	$	17	$	100,000
	Portals Rock	3,000	CY	$	49	$	150,000
0.123	Surface Preparation					$	-
	Main Tunnel Slab	53,100	SF	$	2	$	120,000
	Penstock Access Slab	65,200	SF	$	2	$	140,000
	Horizontal Portal	200	SF	$	2	$	-
	Inclined Portal	2,100	SF	$	3	$	10,000
0.124	Concrete and Shot Crete					$	-
	Main Portal					$	-
	Concrete Slab	30	CY	$	406	$	10,000
	Concrete Walls	570	CY	$	406	$	230,000
	Concrete Overbreak	50	CY	$	368	$	20,000
	Reinforcing Steel	40	TON	$	2,888	$	120,000
	Tunnels					$	-
	Concrete Slab Main Tunnel	1,950	CY	$	504	$	980,000
	Concrete Plugs Penstock Elbow ACC	15,000	CY	$	756	$	11,340,000
	Concrete Overbreak Main Tunnel 6"	1,000	CY	$	346	$	350,000
	Reinforcing Steel	70	TON	$	2,888	$	200,000
	2 " Shotcrete Main Tunnel	20,100	SF	$	5	$	110,000
	2 " Shotcrete Transformer Gal	7,100	SF	$	5	$	40,000
	2 " Shotcrete Surge Chamber Acc	3,900	SF	$	5	$	20,000
	2 " Shotcrete Penstock Access	24,700	SF	$	5	$	130,000
	2 " Shotcrete Penstock Elbow Acc	7,100	SF	$	5	$	40,000
	2 " Shotcrete Access Shaft	300	SF	$	5	$	-
	2 " Shotcrete Grout Gallery	800	SF	$	5	$	-
	2 " Shotcrete Connector Tunnel	800	SF	$	5	$	-
0.125	Support and Anchors					$	-
	Main Tunnel					$	-
	Rockbolts 1" @12'	1,200	EA	$	528	$	630,000
	Rockbolts 1" @ 9'	250	EA	$	432	$	110,000
	Steel Mesh	63,000	SF	$	6	$	400,000
	Steel Support	66	TON	$	12,801	$	840,000
	Main Tunnel Portal					$	-
	Rockbolts 1" @15'	50	EA	$	736	$	40,000
	Transformer Gallery Tunnel					$	-
	Rockbolts 1" @12'	410	EA	$	528	$	220,000
	Rockbolts 1" @ 9'	70	EA	$	432	$	30,000
	Steel Mesh	22,500	SF	$	6	$	130,000
	Steel Support	24	TON	$	12,801	$	310,000
	Grouting Gallery Tunnel					$	-
	Rockbolts 3/4" @ 6'	160	EA	$	327	$	50,000
	Steel Mesh	160	SF	$	6	$	-
	Steel Support	2	TON	$	12,801	$	30,000
	Surge Chamber Access Tunnel					$	-
	Rockbolts 1" @12'	230	EA	$	528	$	120,000
	Rockbolts 1" @ 9'	50	EA	$	432	$	20,000
	Steel Mesh	12,050	SF	$	6	$	80,000
	Steel Support	14	TON	$	12,801	$	180,000
	Penstock Access Tunnel					$	-
	Rockbolts 1" @12'	1,430	EA	$	528	$	760,000
	Rockbolts 1" @ 9'	240	EA	$	432	$	100,000
	Steel Mesh	77,500	SF	$	6	$	490,000
	Steel Support	58	TON	$	12,801	$	740,000
	Penstock Elbow Access Tunnel					$	-
	Rockbolts 1" @12'	420	EA	$	528	$	220,000
	Rockbolts 1" @ 9'	120	EA	$	432	$	50,000

		Steel Mesh	22,500	SF	$	6	$	140,000
		Steel Support	30	TON	$	12,801	$	380,000
		Access Shaft Tunnel					$	-
		Rockbolts 1" @12'	20	EA	$	528	$	10,000
		Rockbolts 1" @ 9'	20	EA	$	432	$	10,000
		Steel Mesh	930	SF	$	6	$	10,000
		Steel Support	8	TON	$	12,801	$	100,000
		Connector Tunnel					$	-
		Rockbolts 3/4" @ 6'	160	EA	$	327	$	50,000
		Steel Mesh	160	SF	$	6	$	-
		Steel Support	2	TON	$	12,801	$	30,000
	0.129	Architectural- Main Portal Doors	2	SETS	$	158,372	$	320,000
	0.12c	Mechanical Ventilation System					$	-
0.13		Access Shaft					$	-
	0.131	Excavation Rock	13,700	CY	$	228	$	3,120,000
	0.133	Surface Preparation Shaft	64,000	SF	$	3	$	210,000
	0.134	Concrete and Shot Crete					$	-
		Concrete Lining	3,350	CY	$	945	$	3,170,000
		Concrete Overbreak 6"	1,220	CY	$	551	$	670,000
	0.135	Support and Anchors - Rockbolts 3/4" @ 6'	1,050	EA	$	327	$	340,000
	0.138	Structural Misc Steelwork	50	TON	$	7,395	$	370,000
	0.139	Architectural- control Building					$	-
	0.13c	Mechanical Elevators	1	LS	$	2,368,815	$	2,370,000
0.14		Fire Protection Head Tank					$	-
	0.141	Excavation	1,150	CY	$	589	$	680,000
	0.143	Surface Preparation	2,800	SF	$	2	$	10,000
	0.144	Concrete & Shotcrete					$	-
		Concrete	250	CY	$	964	$	240,000
		Concrete Overbreak 6"	45	CY	$	406	$	20,000
		Reinforcing Steel	10	TON	$	2,858	$	30,000
	0.145	Support and Anchors					$	-
		Rockbolts 1" @12'	25	EA	$	528	$	10,000
		Rockbolts 1" @ 9'	10	EA	$	432	$	-
		Steel Mesh	1,200	SF	$	6	$	10,000
		Steel Support	2	TON	$	12,672	$	30,000
	0.148	Misc Steelwork	1	LS	$	73,298	$	70,000
	0.14c	Mechanical Piping/Valves					$	-
0.15		Bus Tunnels (totals for 3 Bus Tunnels)					$	-
	0.151	Excavation					$	-
		Rock Horizontal	2,700	CY	$	214	$	580,000
		Rock Inclined	1,300	CY	$	601	$	780,000
	0.153	Surface Preparation- Tunnels	7,100	SF	$	3	$	20,000
	0.154	Concrete and Shotcrete					$	-
		Concrete Slab	350	CY	$	819	$	290,000
		Concrete Overbreak 12"	250	CY	$	472	$	120,000
		Reinforcing Steel	18	TON	$	2,858	$	50,000
		2" Shotcrete	2,200	SF	$	5	$	10,000
	0.155	Supports and Anchors					$	-
		Rockbolts 1" @ 25'	60	EA	$	1,235	$	70,000
		Rockbolts 1" @ 12'	140	EA	$	528	$	70,000
		Rockbolts 1" @ 9'	50	EA	$	432	$	20,000
		Steel Mesh	6,800	SF	$	6	$	40,000
		Steel Support	11	TON	$	12,672	$	140,000
0.16		Transformer Gallery Tunnel					$	-
	0.161	Excavation- Rock	26,800	CY	$	87	$	2,340,000
	0.163	Surface Preparation	24,600	SF	$	2	$	60,000
	0.164	Concrete and Shotcrete					$	-
		Concrete Base Slab	2,400	CY	$	1,228	$	2,950,000

				Concrete Overbreak 12"H/6"V	770	CY	$	378	$	290,000		
				Reinforcing Steel	120	TON	$	2,858	$	340,000		
		0.165		Support and Anchors					$	-		
				Rockbolts 1" @ 25'	600	EA	$	1,235	$	740,000		
				Rockbolts 1" @ 15'	270	EA	$	736	$	200,000		
				Steel Mesh	20,700	SF	$	6	$	120,000		
				Steel Support	29	TON	$	12,672	$	370,000		
		0.167		Drainage Holes	8,300	LF	$	48	$	400,000		
	0.17			Cable Shafts					$	-		
		0.171		Excavation Rock	3,400	CY	$	601	$	2,040,000		
		0.173		Surface Preparation Shafts	41,400	SF	$	3	$	140,000		
		0.174		Concrete and Shotcrete					$	-		
				Concrete Lining	1,040	CY	$	1,764	$	1,830,000		
				Concrete Overbreak 6"	800	CY	$	882	$	710,000		
		0.175		Supports and Anchors- Rockbolts 3/4" @ 6'	650	EA	$	327	$	210,000		
		0.178		Structural Misc Steelwork	18	TON	$	15,602	$	280,000		
		0.179		Architectural- Enclosures	1	LS	$	199,317	$	200,000		
		0.17c		Mechanical Hoist	2	EA	$	476,960	$	950,000		
	0.18			Dewatering (during Construction)					$	-		
		0.181		Dewatering (Power Facilities)	1	LS	$	1,336,799	$	1,340,000		
	0.19			Instrumentation					$	-		
		0.191		Instrumentation	1	LS	$	1,714,814	$	1,710,000		
0.2				Misc Buildings (Control Buildings)	1	LS	$	4,433,085	$	4,430,000		
0.3				Permanent Town	(included in 63.5)							
									$	-	**$**	**159,000,000**
332				**Reservoir, Dams and Waterways**					$	-		
0.1				Reservoir					$	-		
	0.11			Reservoir Clearing	23,000	ACRE	$	3,006	$	69,130,000		
0.2				Diversion Tunnels /Cofferdams					$	-		
	0.21			Diversion Tunnels /Portals					$	-		
		0.211		Excavation					$	-		
				Upper Tunnel					$	-		
				Rock	221,000	CY	$	92	$	20,400,000		
				Lower Tunnel					$	-		
				Rock	208,000	CY	$	92	$	19,200,000		
				Excavate Concrete for Plug	700	CY	$	97	$	70,000		
				Upstream Upper Portal					$	-		
				Rock Usable (Face Only)	11,200	CY	$	49	$	550,000		
				Upstream Lower Portal (Including Most Excav. for Upper Portal)					$	-		
				Rock Usable	108,000	CY	$	49	$	5,310,000		
				Rock Waste	21,750	CY	$	49	$	1,070,000		
				Downstream Portals					$	-		
				Overburden	17,000	CY	$	17	$	290,000		
				Rock Usable	120,000	CY	$	49	$	5,900,000		
				Rock Waste	28,000	CY	$	49	$	1,380,000		
				Emergency Release Chambers					$	-		
				Excavate Concrete for Plugs	1,800	CY	$	102	$	180,000		
				Gate Chamber	4,700	CY	$	111	$	520,000		
				Access Tunnel to Gate Chamber					$	-		
				Rock	19,100	CY	$	97	$	1,860,000		
		0.212		Fill- Temp for Coffer Dam to Construct Upstream Portals	23,000	CY	$	12	$	270,000		
		0.213		Surface Preparation \ grouting					$	-		
				Upstream Upper Portal					$	-		
				Horizontal	3,200	SF	$	2	$	10,000		
				Inclined	8,600	SF	$	3	$	30,000		
				Upstream Lower Portal					$	-		
				Horizontal	1,300	SF	$	2	$	-		
				Inclined	14,900	SF	$	3	$	50,000		
				Downstream Upper Portal					$	-		

		Horizontal	6,100	SF	$	2	$	10,000
		Inclined	20,500	SF	$	3	$	70,000
		Downstream Lower Portal					$	-
		Horizontal	600	SF	$	2	$	-
		Inclined	5,600	SF	$	3	$	20,000
		Grout Upper Tunnel Plugs					$	-
		Drill Holes	4,100	LF	$	27	$	110,000
		Cement	820	CF	$	81	$	70,000
		Grout Lower Tunnel Permanent Plugs					$	-
		Drill Holes	2,050	LF	$	27	$	50,000
		Cement	410	CF	$	81	$	30,000
0.214	Concrete and Shotcrete						$	-
		Upper Tunnel					$	-
		Concrete Lining	42,400	CY	$	567	$	24,040,000
		Concrete Lining Overbreak 6"	10,200	CY	$	315	$	3,210,000
		Reinforcing Steel	24	TON	$	2,888	$	70,000
		2" Shotcrete	56,000	SF	$	5	$	290,000
		Lower Tunnel					$	-
		Concrete Lining	37,600	CY	$	567	$	21,320,000
		Concrete Lining for Plug	6,200	CY	$	428	$	2,660,000
		Concrete Lining Overbreak 6"	10,000	CY	$	315	$	3,150,000
		Reinforcing Steel	24	TON	$	2,888	$	70,000
		2" Shotcrete	57,900	SF	$	5	$	300,000
		Upstream Upper Portal					$	-
		Concrete Headwall	3,200	CY	$	652	$	2,090,000
		Concrete Lining	1,300	CY	$	652	$	850,000
		Concrete Slab	750	CY	$	652	$	490,000
		Concrete Piers	800	CY	$	652	$	520,000
		Concrete Overbreak 12" H/6"V	300	CY	$	472	$	140,000
		Reinforcing Steel	400	TON	$	2,888	$	1,160,000
		Upstream Lower Portal					$	-
		Concrete Headwall	4,500	CY	$	652	$	2,930,000
		Concrete Lining	3,000	CY	$	652	$	1,960,000
		Concrete Slab	300	CY	$	652	$	200,000
		Concrete Piers	700	CY	$	652	$	460,000
		Concrete Overbreak 12" H/6"V	350	CY	$	472	$	170,000
		Reinforcing Steel	600	TON	$	2,888	$	1,730,000
		Downstream Upper Portal					$	-
		Concrete Headwall	500	CY	$	652	$	330,000
		Concrete Slab	100	CY	$	652	$	70,000
		Concrete Overbreak 12" H/6"V	100	CY	$	472	$	50,000
		Reinforcing Steel	40	TON	$	2,888	$	120,000
		Downstream Lower Portal					$	-
		Concrete Headwall	2,500	CY	$	652	$	1,630,000
		Concrete Slab	100	CY	$	652	$	70,000
		Concrete Overbreak 12" H/6"V	150	CY	$	472	$	70,000
		Reinforcing Steel	170	TON	$	2,888	$	490,000
		Downstream Flip Bucket					$	-
		Concrete Slab	800	CY	$	652	$	520,000
		Concrete Walls	2,300	CY	$	652	$	1,500,000
		Concrete Invert	1,200	CY	$	652	$	780,000
		Concrete Overbreak 12" H/6"V	410	CY	$	42	$	20,000
		Reinforcing Steel	280	TON	$	2,888	$	810,000
		Downstream Retaining Wall					$	-
		Concrete Slab	200	CY	$	652	$	130,000
		Concrete Walls	2,000	CY	$	652	$	1,300,000
		Concrete Overbreak 12" H/6"V	110	CY	$	472	$	50,000
		Reinforcing Steel	90	TON	$	2,888	$	260,000
		Emergency Release Chambers					$	-

			Concrete Plug	15,300	CY	$	756	$ 11,560,000
			4" Shotcrete	2,790	SF	$	10	$ 30,000
			Access Tunnel to Gate Chamber					$ -
			2" Shotcrete	12,800	SF	$	5	$ 70,000
	0.215		Supports and Anchors					$ -
			Lower Tunnel					$ -
			Rockbolts 1" @ 12'	3,650	EA	$	528	$ 1,930,000
			Rockbolts 1" @ 9'	620	EA	$	432	$ 270,000
			Steel Mesh	217,100	SF	$	6	$ 1,380,000
			Steel Support	220	TON	$	12,801	$ 2,820,000
			Upper Tunnel					$ -
			Rockbolts 1" @ 12'	3,530	EA	$	528	$ 1,870,000
			Rockbolts 1" @ 9'	600	EA	$	432	$ 260,000
			Steel Mesh	210,200	SF	$	6	$ 1,340,000
			Steel Support	213	TON	$	12,801	$ 2,730,000
			Upstream Lower Portal					$ -
			Rockbolts 1" @ 15'	240	EA	$	736	$ 180,000
			Anchors 1" @ 25'	290	EA	$	1,235	$ 360,000
			Upstream Upper Portal					$ -
			Rockbolts 1" @ 15'					$ -
			Anchors 1" @ 25'	130	EA	$	736	$ 100,000
			Downstream Lower Portal					$ -
			Rockbolts 1" @ 15'	200	EA	$	736	$ 150,000
			Downstream Upper Portal					$ -
			Rockbolts 1" @ 15'	100	EA	$	736	$ 70,000
			Retaining Wall Anchors 1" @25'	100	EA	$	1,235	$ 120,000
			Emergency Release Chambers					$ -
			Rockbolts 1" @ 25'	100	EA	$	1,235	$ 120,000
			Rockbolts 1" @ 15'	125	EA	$	736	$ 90,000
			Steel Mesh	3,600	SF	$	6	$ 20,000
			Steel Support	14	TON	$	12,801	$ 180,000
			Metal to Roof Anchors 3/4" @ 6'	20	EA	$	342	$ 10,000
			Access Tunnel to Gate Chamber					$ -
			Rockbolts 1" @ 12'	775	EA	$	528	$ 410,000
			Rockbolts 1" @ 9'	240	EA	$	432	$ 100,000
			Steel Mesh	39,900	SF	$	6	$ 250,000
			Steel Support	55	TON	$	12,801	$ 700,000
	0.218		Structural- Misc Steelwork	2,775	SF	$	94	$ 260,000
	0.21c		Mechanical					$ -
			Upstream Lower Gates					$ -
			Gate Equipment	2	EA	$	5,073,120	$ 10,150,000
			Upstream Upper Gates					$ -
			Gate Equipment	2	EA	$	2,840,080	$ 5,680,000
			Trashracks	1	LS	$	1,777,500	$ 1,780,000
			Downstream Lower Outlet					$ -
			Stoplog Guides	1	LS	$	142,200	$ 140,000
			Stoplogs includes follower	1	LS	$	1,967,100	$ 1,970,000
			Downstream Upper Outlet					$ -
			Stoplog Guides	1	LS	$	82,950	$ 80,000
			Low Level Release					$ -
			Slide Gates Include Steel Liner	9	EA	$	3,517,470	$ 31,660,000
								$ -
0.22			Upstream Cofferdam					$ -
	0.221		Excavation					$ -
			Overburden Removal	1,000	CY	$	12	$ 10,000
	0.222		Fill					$ -
			Rock Fill	38,400	CY	$	11	$ 420,000
			Fine Filter	16,600	CY	$	37	$ 610,000
			Coarse Filter	15,900	CY	$	30	$ 480,000

				Rock Shell	196,500	CY	$	11	$	2,060,000
				Closure Dike	58,500	CY	$	11	$	640,000
				Rip Rap	21,200	CY	$	24	$	510,000
		0.223		Cutoff Slurry Wall					$	-
				excavation	4,850	CY	$	5	$	20,000
				slurry wall	43,600	SF	$	72	$	3,160,000
		0.22d		Dewatering					$	-
				Initial Dewatering	1	LS	$	5,807,685	$	5,810,000
				Dewatering Maintenance	1	LS	$	22,377,990	$	22,380,000
	0.23			Down Stream Cofferdam					$	-
		0.231		Excavation					$	-
				overburden	5,000	CY	$	12	$	60,000
				Rock	500	CY	$	10	$	-
				Removal of Cofferdam	14,500	CY	$	13	$	200,000
		0.232		Fill					$	-
				Rip Rap	1,800	CY	$	24	$	40,000
				Closure Dike	15,200	CY	$	11	$	170,000
		0.233		Cutoff Slurry Wall					$	-
				Excavation	1,830	CY	$	5	$	10,000
				Slurry Wall	16,500	SF	$	72	$	1,200,000
0.3				Main Dam					$	-
	0.31			Main Dam					$	-
		0.311		Excavation					$	-
				Overburden above el. 1470	2,026,000	CY	$	12	$	23,360,000
				Overburden below el. 1470	5,320,000	CY	$	11	$	58,840,000
				Rock Usable above el. 1470	1,289,000	CY	$	43	$	55,470,000
				Rock Usable below el. 1470	478,000	CY	$	44	$	20,900,000
				Rock Waste above el. 1470	1,950,000	CY	$	43	$	83,910,000
				Rock Waste below el. 1470	869,500	CY	$	50	$	43,630,000
		0.312		Fill- From 1985 FERC Application					$	-
				Rip Rap (upstream)	733,802	CY	$	23	$	17,100,000
				Gravel (upstream)	11,950,489	CY	$	21	$	245,700,000
				Coarse Filter (upstream)	925,759	CY	$	29	$	26,720,000
				Fine Filter (upstream)	1,045,588	CY	$	38	$	39,640,000
				Core (impervious)	6,300,000	CY	$	25	$	159,830,000
				Fine Filter (downstream)	1,171,412	CY	$	38	$	44,410,000
				Coarse Filter (downstream)	1,074,241	CY	$	29	$	31,000,000
				Shell- Rock and Gravel	5,379,949	CY	$	19	$	103,190,000
				Shell- Rock From Other Sources	2,569,967	CY	$	10	$	25,930,000
				Cobbles (downstream Face)	950,100	CY	$	16	$	15,530,000
				Road Base	12,000	CY	$	34	$	410,000
				Frost Protection					$	-
				Process Protection	960,000	CY	$	10	$	9,900,000
				Place Protection	960,000	CY	$	3	$	3,160,000
				Remove 1' Protect and Waste	93,000	CY	$	7	$	670,000
				Scarify Core Surface	193	ACRE	$	859	$	170,000
				Filter Fabric					$	-
				Filter Fabric	592,000	SF	$	1	$	520,000
		0.313		Surface Prep/ Grouting					$	-
				Surface Preparation					$	-
				Under Core/Filters above el. 1500	1,340,000	SF	$	3	$	4,170,000
				Under Core/Filters below el. 1500	490,000	SF	$	3	$	1,520,000
				Under Shell above el. 1500	4,149,000	SF	$	2	$	8,920,000
				Under Shell below el. 1500	2,067,000	SF	$	2	$	4,440,000
				Consolidation Grout					$	-
				Drill Holes	550,000	LF	$	12	$	6,550,000
				Cement	550,000	CF	$	68	$	37,300,000
				Grout Curtain					$	-
				Drill Holes	372,000	LF	$	27	$	9,950,000

			Cement	149,000	CF	$	81	$	12,080,000
			Dental Concrete					$	-
			Dental Concrete	68,000	CY	$	365	$	24,840,000
	0.317		Drainage					$	-
			Holes	109,000	LF	$	51	$	5,590,000
0.32			Grout Galleries/Portals					$	-
	0.321		Excavation					$	-
			Tunnels/ Shafts- Core Area					$	-
			Rock Horizontal	8,100	CY	$	395	$	3,200,000
			Rock Inclined	9,000	CY	$	553	$	4,980,000
			Rock Vertical	1,600	CY	$	536	$	860,000
			Tunnels/ Shafts- Access					$	-
			Rock Horizontal	10,400	CY	$	395	$	4,110,000
			Rock Inclined	1,600	CY	$	553	$	880,000
			Portals					$	-
			Overburden Rock	2,900	CY	$	17	$	50,000
			Rock	800	CY	$	49	$	40,000
	0.323		Surface Preparation					$	-
			Portals					$	-
			Horizontal	24	SF	$	2	$	-
			Inclined	160	SF	$	3	$	-
								$	-
	0.324		Concrete and Shotcrete					$	-
			Tunnels- Core Area					$	-
			Concrete Plugs	800	CY	$	428	$	340,000
			Concrete Slab	1,800	CY	$	945	$	1,700,000
			Concrete Overbreak 6"	920	CY	$	756	$	700,000
			Reinforcing Steel	64	TON	$	2,888	$	180,000
			2" Shotcrete	12,000	SF	$	5	$	60,000
			Tunnels-Access					$	-
			Concrete Slab	1,280	CY	$	945	$	1,210,000
			Concrete Overbreak 6"	640	CY	$	756	$	480,000
			Reinforcing Steel	48	TON	$	2,888	$	140,000
			2" Shotcrete	4,300	SF	$	5	$	20,000
			Shafts					$	-
			2" Shotcrete	4,000	SF	$	5	$	20,000
			Portals					$	-
			Concrete	16	CY	$	406	$	10,000
			Reinforcing Steel	2	TON	$	2,888	$	-
	0.325		Support and Anchors					$	-
			Tunnels- Core Area					$	-
			Rockbolts 3/4" @6'	1,400	EA	$	327	$	460,000
			Steel Mesh	2,400	SF	$	5	$	10,000
			Steel Support	16	TON	$	12,801	$	200,000
			Tunnels- Access					$	-
			Rockbolts 3/4" @6'	960	EA	$	327	$	310,000
			Steel Mesh	880	SF	$	5	$	-
			Steel Support	16	TON	$	12,801	$	200,000
			Shafts					$	-
			Rockbolts 3/4" @6'	280	EA	$	327	$	90,000
			Steel Mesh	800	SF	$	5	$	-
			Portals					$	-
			Rockbolts 1" @15'	24	EA	$	736	$	20,000
	0.329		Architectural Portal Doors					$	-
			Portal Doors	1	LS	$	33,900	$	30,000
0.33			Instrumentation					$	-
	0.331		Instrumentation	1	LS	$	17,315,220	$	17,320,000
0.4			Relict Channel					$	-
0.41			Shore Protection					$	-

		0.411	Excavation					$	-		
			Overburden Stripping 2' thick	2,200	CY	$	12	$	30,000		
		0.412	Fill					$	-		
			Dump and Spread					$	-		
			Filter Material - 2' layer	2,200	CY	$	32	$	70,000		
			Rock Spalls/ Rip Rap- 3' Ave	3,300	CY	$	10	$	30,000		
			Shore Protection					$	-		
			Rip Rap	24,000	CY	$	24	$	580,000		
			Waste Rock	24,000	CY	$	23	$	550,000		
	0.44		Channel Filter Blanket					$	-		
		0.442	Fill					$	-		
			Coarse Filter	2,900,000	CY	$	34	$	98,170,000		
			Fine Filter	2,180,000	CY	$	44	$	95,160,000		
			Rip Rap	182,000	CY	$	24	$	4,420,000		
		0.443	Surface preparation					$	-		
			Foundation Prep					$	-		
			Clearing and Grubbing	460	ACRE	$	3,963	$	1,820,000		
			Excavation	2,236,000	CY	$	16	$	34,930,000		
										$	**1,718,000,000**
	0.5		Outlet Facilities								
		0.51	Outlet Facilities- (Intake Civil Work Include in Power Intake)	1	LS	$	73,000,000	$	73,000,000		
		0.52	Main (Chute) Spillway (Includes Civil Works for Outlet Facilities)	1	LS	$	182,000,000	$	182,000,000		
		0.53	Emergency Spillway	1	LS	$	164,000,000	$	164,000,000		
	0.6		Power Intake (Inc Inlet exec and Inlet Structure Civil Works for Outlet)	1	LS	$	145,000,000	$	145,000,000		
	0.7		Surge Chamber	1	LS	$	24,000,000	$	24,000,000		
		0.81	Head Race (Based on Penstock costs	1	LS	$	42,000,000	$	42,000,000		
		0.82	Penstocks	1	LS	$	25,000,000	$	25,000,000		
	0.9		Tailrace Works (1 Portal with Combined Tailrace/Diversion Tunnel)	1	LS	$	22,000,000	$	22,000,000		
										$	**677,000,000**
333			**Waterwheels, Turbines and Generators**								
	0.11		Turbines and Governors								
		0.111	Supply	4	EA						
		0.112	Install								
	0.2		Generators and Exciters								
		0.21	Generators and Exciters (Supply and Install)								
		0.211	Generators and Exciters	4	EA						
	0.3		Total Bid From Vendor (includes all equipment in this category)	4	EA	$	74,200,000	$	297,000,000	**$**	**297,000,000**
			Average from acquired quotes								
334			**Accessory Electrical Equipment**								
	0.1		Connections, Supports and Structures								
		0.11	Structures								
		0.111	Structures (included Below)								
		0.12	Conductors and Insulators								
		0.121	Generator Isolated Phase Bus	1	LS	$	3,792,000	$	3,790,000		
		0.122	HV Power Cables and Accessories	1	LS	$	1,540,500	$	1,540,000		
		0.123	LV Power Cables and Accessories	1	LS	$	711,000	$	710,000		
		0.124	Control Cables and Accessories	1	LS	$	1,303,500	$	1,300,000		
		0.125	Grounding System	1	LS	$	177,750	$	180,000		
		0.13	Conduits and Fittings			$	-	$	-		
		0.131	Conduits and Fittings	1	LS	$	474,000	$	470,000		
	0.2		Switchgear and Control Equipment			$	-	$	-		
		0.21	Auxiliary Transformers			$	-	$	-		
		0.211	Auxiliary Transformers	4	EA	$	83,811	$	340,000		
		0.22	Circuit Breakers Generators					$	-		
		0.221	Circuit Breakers Generators	4	EA	$	1,504,300	$	6,020,000		
		0.23	Surge Protectors and Generator Cubicles			$	-	$	-		
		0.231	Surge Protectors and Generator Cubicles	4	EA	$	50,000	$	200,000		
		0.24	Switch boards			$	-	$	-		

		0.241	Switch boards	1	LS	$ 924,300	$ 920,000			
	0.25		Auxiliary Power Equipment			$ -	$ -			
		0.251	Auxiliary Power Equipment	4	EA	$ 100,000	$ 400,000			
0.3			Cubicles and Appurtenances				$ -			
	0.31		Control, relay and meter boards			$ -	$ -			
		0.311	Control, relay and meter boards	4	EA	$ 200,000	$ 800,000			
	0.32		Computer Control System			$ -	$ -			
		0.321	Computer Control System			$ -	$ -			
	0.33		Supervisor and Telemeter System			$ -	$ -			
		0.331	Supervisor and Telemeter System			$ -	$ -			
						$ -	$ -			
0.4			Power Transformers			$ -	$ -			
	0.41		Power Transformers			$ -	$ -			
		0.411	Power Transformers	7	EA	$ 2,571,429	$ 18,000,000			
						$ -	$ -			
0.5			Lighting System			$ -	$ -			
	0.51		Powerhouse and Transformer Gallery			$ -	$ -			
		0.511	Powerhouse and Transformer Gallery	1	LS	$ 1,824,900	$ 1,820,000			
	0.52		Access Tunnels and Roads				$ -			
		0.521	Access Tunnels and Roads	1	LS	$ 402,900	$ 400,000			
							$ -			
0.6			Misc. Electrical Equipment				$ -			
	0.61		Misc. Electrical Equipment				$ -			
		0.611	Misc. Electrical Equipment	1	LS	$ 782,100	$ 780,000			
							$ -			
0.7			Surface Accessory Equipment				$ -			
	0.71		34.5 kV and LV Equipment				$ -			
		0.711	Switchboard	1	LS	$ 213,300	$ 210,000			
		0.712	Cables	1	LS	$ 450,300	$ 450,000			
		0.713	Aux Transformers	1	LS	$ 284,400	$ 280,000			
	0.73		Diesel Generator- Standby				$ -			
		0.731	Diesel Generator- Standby	2	EA	$ 347,550	$ 700,000			
	0.74		Exterior Lighting				$ -			
		0.741	Exterior Lighting	1	LS	$ 355,500	$ 360,000			
	0.75		Mimic Board- Control Building				$ -			
		0.751	Mimic Board- Control Building	1	LS	$ 1,185,000	$ 1,190,000			
							$ -	$	**41,000,000**	
335			**Misc Powerplant Equipment**				$ -			
0.1			Auxiliary Systems- Underground				$ -			
	0.11		Station Water Systems				$ -			
		0.111	Station Water Systems	1	LS	$ 4,977,000	$ 4,980,000			
	0.12		Fire Protection Systems			$ -	$ -			
		0.121	Fire Protection Systems	1	LS	$ 2,844,000	$ 2,840,000			
	0.13		Compressed Air Systems			$ -	$ -			
		0.131	Compressed Air Systems	1	LS	$ 3,555,000	$ 3,560,000			
	0.14		Oil Handling Systems			$ -	$ -			
		0.141	Oil Handling Systems	1	LS	$ 2,370,000	$ 2,370,000			
	0.15		Drainage & Dewatering			$ -	$ -			
		0.151	Drainage & Dewatering	3	EA	$ 1,738,000	$ 5,210,000			
	0.16		Heating, Ventilation and Cooling System			$ -	$ -			
		0.161	Heating, Ventilation and Cooling System	1	LS	$ 3,555,000	$ 3,560,000			
	0.17		Miscellaneous				$ -			
		0.171	Miscellaneous	1	LS	$ 2,370,000	$ 2,370,000			
0.2			Auxiliary Systems- Surface Facilities				$ -			
	0.21		Auxiliary Systems- Surface Facilities				$ -			
		0.211	Auxiliary Systems- Surface Facilities	1	LS	$ 711,000	$ 710,000			
0.3			Auxiliary Equipment				$ -			
	0.31		Powerhouse Cranes			$ -	$ -			
		0.311	Powerhouse Cranes	2	EA	$ 1,800,000	$ 3,600,000			

		0.32		Elevators			$	-	$	-	
			0.321	Elevators	3	EA	$	181,700	$	550,000	
		0.33		Miscellaneous Cranes and Hoists			$	-	$	-	
			0.331	Miscellaneous Cranes and Hoists	1	LS	$	505,500	$	510,000	
		0.34		Machine Shop Equipment			$	-	$	-	
			0.341	Machine Shop Equipment	1	LS	$	2,022,000	$	2,020,000	
	0.4			General Station Equipment			$	-	$	-	
	0.5			Communications Equipment	1	LS	$	106,650	$	110,000	
							$	-	$	-	**$ 32,000,000**
336				**Roads, Rails and Air Facilities**					$	-	
	0.1			Roads							
		0.11		Permanent Roads							
				Cost of road upgrades for 23 mi of Denali Highway	23	Mi	$	1,000,000.00	$	23,000,000.00	
				Cost of New road to 42 Mi of road to Watana	42	Mi	$	3,000,000.00	$	126,000,000.00	
		0.131		Site Roads							
				Construction Roads							
				Site Roads	20	Mile	$	750,000.00	$	15,000,000	
				Maintenance	141	MI/YRS	$	223,092.85	$	31,500,000	
		0.132		Permanent Roads							
				Permanent Roads	6	Mile	$	1,287,997.42	$	7,700,000	
	0.2			Rail							
			0.1	Railhead at Cantwell	1	LS	$	14,000,000.00	$	14,000,000	
	0.3			Airstrip							
		0.31		Airstrip							
				Permanent Airstrip	1	LS	$	13,000,000.00	$	13,000,000	
				Temporary Airstrip	1	LS	$	2,000,000.00	$	2,000,000	
											$ 232,000,000
350-359				**Transmission Plant**	33	MILE	$	5,700,000.00	$	188,100,000.00	
					2	EA	$	18,000,000.00	$	36,000,000.00	
											$ 224,000,000

General Plant

389	**Land and Land Rights**	
	Land and Land Rights	(incl in 330)
390	**Structures and Improvements**	
	Structures and Improvements	(incl in 331.2)
391	**Office Furniture and Equipment**	
	Office Furniture and Equipment	(incl in 399)
392	**Transportation Equipment**	
	Transportation Equipment	(incl in 399)
393	**Stores Equipment**	
	Stores Equipment	(incl in 399)
394	**Tools Shop and Garage Equipment**	
	Tools Shop and Garage Equipment	(incl in 399)
395	**Laboratory Equipment**	
	Laboratory Equipment	(incl in 399)

396		**Power-Operated Equipment**								
		Power-Operated Equipment								
					(incl in 399)					
397		**Communications Equipment**								
		Communications Equipment								
					(incl in 399)					
398		**Miscellaneous Equipment**								
		Miscellaneous Equipment								
					(incl in 399)					
399		**Other Tangible Property**								
		Other Tangible Property	1	LS	$	16,000,000	$	16,000,000		
		Saved Maintenance	1	LS	$	(231,220)	$	(230,000)		
							$	-	**$**	**16,000,000**
		Indirect Costs								
61		**Temporary Construction Facilities**								
		Temporary Construction Facilities			(incl in direct costs)					
62		**Construction Equipment**								
		Construction Equipment			(incl in direct costs)					
63		**Main Construction Camp**								
	0.1	Main Construction Camp	1	LS	$	180,000,000	**$**	**180,000,000**		
									$	**180,000,000**
64		**Labor Expense**								
		Labor Expense								
65		**Superintendence**								
		Superintendence								
66		**Insurance**								
		Insurance								
68		**Mitigation Fishery, Terrestrial and Recrational)- Not Included**								
			1	LS	$	200,000,000			**$**	**-**
69		**Fees**								
		Fees								
Subtotal										
	Contingency (20%)		1	LS	$	821,000,000			**$**	**821,000,000**
Subtotal										
71		**Engineering (4%), Enviornmental (2%), Regulatory(1%)**	1	LS	$	259,000,000			**$**	**259,000,000**
71a		**Construction Management (4%)**	1	LS	$	148,000,000			**$**	**148,000,000**
72		**Legal Expenses**								
75		**Taxes**								
76		**Administrative & Gen. Expenses**								
77		**Interest**								
80		**Earnings/Expenses During Construction**								
Total Project Cost									**$**	**4,925,000,000**
Max Plant Capacity	600									

HDR/AEA Susitna Hydroelectric Project
Cost Estimates based on 1982 quantities
By: HDR
By: Leanne Andruszkiewicz, E.I.T.
Checked By: Kellen Roberts, E.I.T.
Date: 10/15/2009
2008 Dollars
Watana (6 Turbines)

FERC Line #	Sub Categories			Description	Quantity	Units	Unit Price	Line Price	Total
330			**Land and Land Rights**						
	0.1			Land	1	LS	$ 120,870,000	$ 120,870,000	
	0.2			Land Rights	Included Above				
	0.3			Misc Charges in Credit Above	Included Above				
								$ -	**$ 121,000,000**
								$ -	
331			**Powerplant Structure Improvements**					$ -	
	0.1			Powerhouse				$ -	
		0.11		Powerhouse and Draft Tube				$ -	
			0.111	Excavation				$ -	
				Powerhouse Vault Rock	122,500	CY	$ 90	$ 11,040,000	
				Draft Tube Rock	25,200	CY	$ 90	$ 2,270,000	
			0.113	Surface Preparation/ Grouting				$ -	
				Powerhouse	99,000	SF	$ 3	$ 330,000	
				Draft Tube	76,500	SF	$ 3	$ 250,000	
				Grout Curtain- Drill holes	43,800	LF	$ 28	$ 1,210,000	
				Grout Curtain- Cement	17,500	CF	$ 81	$ 1,420,000	
			0.114	Concrete and Shot Crete				$ -	
				Powerhouse Concrete	32,600	CY	$ 693	$ 22,590,000	
				Powerhouse Concrete Overbreak	2,400	CY	$ 447	$ 1,070,000	
				Powerhouse Reinforcing Steel	1,630	TON	$ 2,858	$ 4,660,000	
				Powerhouse 4" Shotcrete	41,000	SF	$ 10	$ 420,000	
				Draft Tube Concrete	12,000	CY	$ 693	$ 8,310,000	
				Draft Tube Concrete Overbreak	2,500	CY	$ 447	$ 1,120,000	
				Draft Tube Reinforcing Steel	990	TON	$ 2,858	$ 2,830,000	
				Draft Tube 2" Shotcrete	6,100	SF	$ 5	$ 30,000	
			0.115	Support and Anchors				$ -	
				Powerhouse Rockbolts 1" @ 25' Hy	970	EA	$ 1,235	$ 1,200,000	
				Powerhouse Rockbolts 1" @ 15'	1,970	EA	$ 736	$ 1,450,000	
				Powerhouse Steel Mesh	44,600	SF	$ 6	$ 260,000	
				Powerhouse Steel Support	137	TON	$ 12,672	$ 1,740,000	
				Draft Tube Rockbolts 1" @ 25' Hy	150	EA	$ 1,235	$ 190,000	
				Draft Tube Rockbolts 1" @ 12'	390	EA	$ 528	$ 210,000	
				Draft Tube Rockbolts 1" @ 9'	190	EA	$ 432	$ 80,000	
				Draft Tube Steel Mesh	18,900	SF	$ 7	$ 120,000	
			0.117	Holes (U/S of Powerhouse)	15,000	LF	$ 51	$ 770,000	
				Holes (Powerhouse Crown)	28,500	LF	$ 51	$ 1,460,000	
			0.118	Structural- Misc Steelwork				$ -	
				Powerhouse and Draft Tube- Steel Crane Rails	1	LS	$ 10,276,309	$ 10,280,000	
			0.119	Architectural- Powerhouse	1	LS	$ 2,927,898	$ 2,930,000	
			0.11c	Mechanical				$ -	
				Draft Tube Gates	4	SETS	$ 427,880	$ 1,710,000	
				Draft Tube Gate Guides	6	SETS	$ 202,680	$ 1,220,000	
				Draft Tube Crane	1	LS	$ 1,140,000	$ 1,140,000	
		0.12		Access Tunnels and Portals				$ -	
			0.121	Excavation				$ -	
				Main Tunnel	50,250	CY	$ 97	$ 4,900,000	
				Transformer Gallery Tunnel	17,750	CY	$ 97	$ 1,730,000	
				Grouting Gallery Tunnel	1,900	CY	$ 396	$ 750,000	
				Surge Chamber Access Tunnel	7,250	CY	$ 145	$ 1,050,000	
				Penstock Access Tunnel	61,500	CY	$ 145	$ 8,930,000	

	Penstock Elbow Access Tunnel	15,000	CY	$	145	$	2,180,000
	Access Shaft Tunnel	1,300	CY	$	145	$	190,000
	Connector Tunnel	1,900	CY	$	379	$	720,000
	Portals Overburden	6,000	CY	$	17	$	100,000
	Portals Rock	3,000	CY	$	49	$	150,000
0.123	Surface Preparation					$	-
	Main Tunnel Slab	53,100	SF	$	2	$	120,000
	Penstock Access Slab	65,200	SF	$	2	$	140,000
	Horizontal Portal	200	SF	$	2	$	-
	Inclined Portal	2,100	SF	$	3	$	10,000
0.124	Concrete and Shot Crete					$	-
	Main Portal					$	-
	Concrete Slab	30	CY	$	406	$	10,000
	Concrete Walls	570	CY	$	406	$	230,000
	Concrete Overbreak	50	CY	$	368	$	20,000
	Reinforcing Steel	40	TON	$	2,888	$	120,000
	Tunnels					$	-
	Concrete Slab Main Tunnel	1,950	CY	$	504	$	980,000
	Concrete Plugs Penstock Elbow ACC	15,000	CY	$	756	$	11,340,000
	Concrete Overbreak Main Tunnel 6"	1,000	CY	$	346	$	350,000
	Reinforcing Steel	70	TON	$	2,888	$	200,000
	2 " Shotcrete Main Tunnel	20,100	SF	$	5	$	110,000
	2 " Shotcrete Transformer Gal	7,100	SF	$	5	$	40,000
	2 " Shotcrete Surge Chamber Acc	3,900	SF	$	5	$	20,000
	2 " Shotcrete Penstock Access	24,700	SF	$	5	$	130,000
	2 " Shotcrete Penstock Elbow Acc	7,100	SF	$	5	$	40,000
	2 " Shotcrete Access Shaft	300	SF	$	5	$	-
	2 " Shotcrete Grout Gallery	800	SF	$	5	$	-
	2 " Shotcrete Connector Tunnel	800	SF	$	5	$	-
0.125	Support and Anchors					$	-
	Main Tunnel					$	-
	Rockbolts 1" @12'	1,200	EA	$	528	$	630,000
	Rockbolts 1" @ 9'	250	EA	$	432	$	110,000
	Steel Mesh	63,000	SF	$	6	$	400,000
	Steel Support	66	TON	$	12,801	$	840,000
	Main Tunnel Portal					$	-
	Rockbolts 1" @15'	50	EA	$	736	$	40,000
	Transformer Gallery Tunnel					$	-
	Rockbolts 1" @12'	410	EA	$	528	$	220,000
	Rockbolts 1" @ 9'	70	EA	$	432	$	30,000
	Steel Mesh	22,500	SF	$	6	$	130,000
	Steel Support	24	TON	$	12,801	$	310,000
	Grouting Gallery Tunnel					$	-
	Rockbolts 3/4" @ 6'	160	EA	$	327	$	50,000
	Steel Mesh	160	SF	$	6	$	-
	Steel Support	2	TON	$	12,801	$	30,000
	Surge Chamber Access Tunnel					$	-
	Rockbolts 1" @12'	230	EA	$	528	$	120,000
	Rockbolts 1" @ 9'	50	EA	$	432	$	20,000
	Steel Mesh	12,050	SF	$	6	$	80,000
	Steel Support	14	TON	$	12,801	$	180,000
	Penstock Access Tunnel					$	-
	Rockbolts 1" @12'	1,430	EA	$	528	$	760,000
	Rockbolts 1" @ 9'	240	EA	$	432	$	100,000
	Steel Mesh	77,500	SF	$	6	$	490,000
	Steel Support	58	TON	$	12,801	$	740,000
	Penstock Elbow Access Tunnel					$	-
	Rockbolts 1" @12'	420	EA	$	528	$	220,000
	Rockbolts 1" @ 9'	120	EA	$	432	$	50,000

		Steel Mesh	22,500	SF	$	6	$	140,000
		Steel Support	30	TON	$	12,801	$	380,000
		Access Shaft Tunnel					$	-
		Rockbolts 1" @12'	20	EA	$	528	$	10,000
		Rockbolts 1" @ 9'	20	EA	$	432	$	10,000
		Steel Mesh	930	SF	$	6	$	10,000
		Steel Support	8	TON	$	12,801	$	100,000
		Connector Tunnel					$	-
		Rockbolts 3/4" @ 6'	160	EA	$	327	$	50,000
		Steel Mesh	160	SF	$	6	$	-
		Steel Support	2	TON	$	12,801	$	30,000
	0.129	Architectural- Main Portal Doors	2	SETS	$	158,372	$	320,000
	0.12c	Mechanical Ventilation System	Included in (63.81 and 63.82)					
0.13		Access Shaft					$	-
	0.131	Excavation Rock	13,700	CY	$	228	$	3,120,000
	0.133	Surface Preparation Shaft	64,000	SF	$	3	$	210,000
	0.134	Concrete and Shot Crete					$	-
		Concrete Lining	3,350	CY	$	945	$	3,170,000
		Concrete Overbreak 6"	1,220	CY	$	551	$	670,000
	0.135	Support and Anchors - Rockbolts 3/4" @ 6'	1,050	EA	$	327	$	340,000
	0.138	Structural Misc Steelwork	50	TON	$	7,395	$	370,000
	0.139	Architectural- control Building					$	-
	0.13c	Mechanical Elevators	1	LS	$	2,368,815	$	2,370,000
0.14		Fire Protection Head Tank					$	-
	0.141	Excavation	1,150	CY	$	589	$	680,000
	0.143	Surface Preparation	2,800	SF	$	2	$	10,000
	0.144	Concrete & Shotcrete					$	-
		Concrete	250	CY	$	964	$	240,000
		Concrete Overbreak 6"	45	CY	$	406	$	20,000
		Reinforcing Steel	10	TON	$	2,858	$	30,000
	0.145	Support and Anchors					$	-
		Rockbolts 1" @12'	25	EA	$	528	$	10,000
		Rockbolts 1" @ 9'	10	EA	$	432	$	-
		Steel Mesh	1,200	SF	$	6	$	10,000
		Steel Support	2	TON	$	12,672	$	30,000
	0.148	Misc Steelwork	1	LS	$	73,298	$	70,000
	0.14c	Mechanical Piping/Valves	(Included in 335.12)					
0.15		Bus Tunnels (totals for 3 Bus Tunnels)					$	-
	0.151	Excavation					$	-
		Rock Horizontal	2,700	CY	$	214	$	580,000
		Rock Inclined	1,300	CY	$	601	$	780,000
	0.153	Surface Preparation- Tunnels	7,100	SF	$	3	$	20,000
	0.154	Concrete and Shotcrete					$	-
		Concrete Slab	350	CY	$	819	$	290,000
		Concrete Overbreak 12"	250	CY	$	472	$	120,000
		Reinforcing Steel	18	TON	$	2,858	$	50,000
		2" Shotcrete	2,200	SF	$	5	$	10,000
	0.155	Supports and Anchors					$	-
		Rockbolts 1" @ 25'	60	EA	$	1,235	$	70,000
		Rockbolts 1" @ 12'	140	EA	$	528	$	70,000
		Rockbolts 1" @ 9'	50	EA	$	432	$	20,000
		Steel Mesh	6,800	SF	$	6	$	40,000
		Steel Support	11	TON	$	12,672	$	140,000
0.16		Transformer Gallery Tunnel					$	-
	0.161	Excavation- Rock	26,800	CY	$	87	$	2,340,000
	0.163	Surface Preparation	24,600	SF	$	2	$	60,000
	0.164	Concrete and Shotcrete					$	-
		Concrete Base Slab	2,400	CY	$	1,228	$	2,950,000

				Concrete Overbreak 12"H/6"V	770	CY	$	378	$	290,000	
				Reinforcing Steel	120	TON	$	2,858	$	340,000	
		0.165		Support and Anchors					$	-	
				Rockbolts 1" @ 25'	600	EA	$	1,235	$	740,000	
				Rockbolts 1" @ 15'	270	EA	$	736	$	200,000	
				Steel Mesh	20,700	SF	$	6	$	120,000	
				Steel Support	29	TON	$	12,672	$	370,000	
		0.167		Drainage Holes	8,300	LF	$	48	$	400,000	
	0.17			Cable Shafts					$	-	
		0.171		Excavation Rock	3,400	CY	$	601	$	2,040,000	
		0.173		Surface Preparation Shafts	41,400	SF	$	3	$	140,000	
		0.174		Concrete and Shotcrete					$	-	
				Concrete Lining	1,040	CY	$	1,764	$	1,830,000	
				Concrete Overbreak 6"	800	CY	$	882	$	710,000	
		0.175		Supports and Anchors- Rockbolts 3/4" @ 6'	650	EA	$	327	$	210,000	
		0.178		Structural Misc Steelwork	18	TON	$	15,602	$	280,000	
		0.179		Architectural- Enclosures	1	LS	$	199,317	$	200,000	
		0.17c		Mechanical Hoist	2	EA	$	476,960	$	950,000	
	0.18			Dewatering (during Construction)					$	-	
		0.181		Dewatering (Power Facilities)	1	LS	$	1,336,799	$	1,340,000	
	0.19			Instrumentation					$	-	
		0.191		Instrumentation	1	LS	$	1,714,814	$	1,710,000	
0.2				Misc Buildings (Control Buildings)	1	LS	$	4,433,085	$	4,430,000	
0.3				Permanent Town	(included in 63.5)						
									$	-	**$ 159,000,000**
332				**Reservoir, Dams and Waterways**					$	-	
0.1				Reservoir					$	-	
	0.11			Reservoir Clearing	37,500	ACRE	$	3,006	$	112,720,000	
0.2				Diversion Tunnels /Cofferdams					$	-	
	0.21			Diversion Tunnels /Portals					$	-	
		0.211		Excavation					$	-	
				Upper Tunnel					$	-	
				Rock	221,000	CY	$	92	$	20,400,000	
				Lower Tunnel					$	-	
				Rock	208,000	CY	$	92	$	19,200,000	
				Excavate Concrete for Plug	700	CY	$	97	$	70,000	
				Upstream Upper Portal					$	-	
				Rock Usable (Face Only)	11,200	CY	$	49	$	550,000	
				Upstream Lower Portal (Including Most excavation for Upper Portal)					$	-	
				Rock Usable	108,000	CY	$	49	$	5,310,000	
				Rock Waste	21,750	CY	$	49	$	1,070,000	
				Downstream Portals					$	-	
				Overburden	17,000	CY	$	17	$	290,000	
				Rock Usable	120,000	CY	$	49	$	5,900,000	
				Rock Waste	28,000	CY	$	49	$	1,380,000	
				Emergency Release Chambers					$	-	
				Excavate Concrete for Plugs	1,800	CY	$	102	$	180,000	
				Gate Chamber	4,700	CY	$	111	$	520,000	
				Access Tunnel to Gate Chamber					$	-	
				Rock	19,100	CY	$	97	$	1,860,000	
		0.212		Fill- Temp for Coffer Dam to Construct Upstream Portals	23,000	CY	$	12	$	270,000	
		0.213		Surface Preparation \ grouting					$	-	
				Upstream Upper Portal					$	-	
				Horizontal	3,200	SF	$	2	$	10,000	
				Inclined	8,600	SF	$	3	$	30,000	
				Upstream Lower Portal					$	-	
				Horizontal	1,300	SF	$	2	$	-	
				Inclined	14,900	SF	$	3	$	50,000	
				Downstream Upper Portal					$	-	
				Horizontal	6,100	SF	$	2	$	10,000	
				Inclined	20,500	SF	$	3	$	70,000	

	Downstream Lower Portal						$	-
	Horizontal	600	SF	$	2	$	-
	Inclined	5,600	SF	$	3	$	20,000
	Grout Upper Tunnel Plugs						$	-
	Drill Holes	4,100	LF	$	27	$	110,000
	Cement	820	CF	$	81	$	70,000
	Grout Lower Tunnel Permanent Plugs						$	-
	Drill Holes	2,050	LF	$	27	$	50,000
	Cement	410	CF	$	81	$	30,000
0.214	Concrete and Shotcrete						$	-
	Upper Tunnel						$	-
	Concrete Lining	42,400	CY	$	567	$	24,040,000
	Concrete Lining Overbreak 6"	10,200	CY	$	315	$	3,210,000
	Reinforcing Steel	24	TON	$	2,888	$	70,000
	2" Shotcrete	56,000	SF	$	5	$	290,000
	Lower Tunnel						$	-
	Concrete Lining	37,600	CY	$	567	$	21,320,000
	Concrete Lining for Plug	6,200	CY	$	428	$	2,660,000
	Concrete Lining Overbreak 6"	10,000	CY	$	315	$	3,150,000
	Reinforcing Steel	24	TON	$	2,888	$	70,000
	2" Shotcrete	57,900	SF	$	5	$	300,000
	Upstream Upper Portal						$	-
	Concrete Headwall	3,200	CY	$	652	$	2,090,000
	Concrete Lining	1,300	CY	$	652	$	850,000
	Concrete Slab	750	CY	$	652	$	490,000
	Concrete Piers	800	CY	$	652	$	520,000
	Concrete Overbreak 12" H/6"V	300	CY	$	472	$	140,000
	Reinforcing Steel	400	TON	$	2,888	$	1,160,000
	Upstream Lower Portal						$	-
	Concrete Headwall	4,500	CY	$	652	$	2,930,000
	Concrete Lining	3,000	CY	$	652	$	1,960,000
	Concrete Slab	300	CY	$	652	$	200,000
	Concrete Piers	700	CY	$	652	$	460,000
	Concrete Overbreak 12" H/6"V	350	CY	$	472	$	170,000
	Reinforcing Steel	600	TON	$	2,888	$	1,730,000
	Downstream Upper Portal						$	-
	Concrete Headwall	500	CY	$	652	$	330,000
	Concrete Slab	100	CY	$	652	$	70,000
	Concrete Overbreak 12" H/6"V	100	CY	$	472	$	50,000
	Reinforcing Steel	40	TON	$	2,888	$	120,000
	Downstream Lower Portal						$	-
	Concrete Headwall	2,500	CY	$	652	$	1,630,000
	Concrete Slab	100	CY	$	652	$	70,000
	Concrete Overbreak 12" H/6"V	150	CY	$	472	$	70,000
	Reinforcing Steel	170	TON	$	2,888	$	490,000
	Downstream Flip Bucket						$	-
	Concrete Slab	800	CY	$	652	$	520,000
	Concrete Walls	2,300	CY	$	652	$	1,500,000
	Concrete Invert	1,200	CY	$	652	$	780,000
	Concrete Overbreak 12" H/6"V	410	CY	$	42	$	20,000
	Reinforcing Steel	280	TON	$	2,888	$	810,000
	Downstream Retaining Wall						$	-
	Concrete Slab	200	CY	$	652	$	130,000
	Concrete Walls	2,000	CY	$	652	$	1,300,000
	Concrete Overbreak 12" H/6"V	110	CY	$	472	$	50,000
	Reinforcing Steel	90	TON	$	2,888	$	260,000
	Emergency Release Chambers						$	-
	Concrete Plug	15,300	CY	$	756	$	11,560,000
	4" Shotcrete	2,790	SF	$	10	$	30,000
	Access Tunnel to Gate Chamber						$	-
	2" Shotcrete	12,800	SF	$	5	$	70,000
0.215	Supports and Anchors						$	-
	Lower Tunnel						$	-

			Rockbolts 1" @ 12'	3,650	EA	$	528	$ 1,930,000
			Rockbolts 1" @ 9'	620	EA	$	432	$ 270,000
			Steel Mesh	217,100	SF	$	6	$ 1,380,000
			Steel Support	220	TON	$	12,801	$ 2,820,000
			Upper Tunnel					$ -
			Rockbolts 1" @ 12'	3,530	EA	$	528	$ 1,870,000
			Rockbolts 1" @ 9'	600	EA	$	432	$ 260,000
			Steel Mesh	210,200	SF	$	6	$ 1,340,000
			Steel Support	213	TON	$	12,801	$ 2,730,000
			Upstream Lower Portal					$ -
			Rockbolts 1" @ 15'	240	EA	$	736	$ 180,000
			Anchors 1" @ 25'	290	EA	$	1,235	$ 360,000
			Upstream Upper Portal					$ -
			Rockbolts 1" @ 15'	(Included in Lower Portal)				
			Anchors 1" @ 25'	130	EA	$	1,235	$ 160,000
			Downstream Lower Portal					$ -
			Rockbolts 1" @ 15'	200	EA	$	736	$ 150,000
			Downstream Upper Portal					$ -
			Rockbolts 1" @ 15'	100	EA	$	736	$ 70,000
			Retaining Wall Anchors 1" @25'	100	EA	$	1,235	$ 120,000
			Emergency Release Chambers					$ -
			Rockbolts 1" @ 25'	100	EA	$	1,235	$ 120,000
			Rockbolts 1" @ 15'	125	EA	$	736	$ 90,000
			Steel Mesh	3,600	SF	$	6	$ 20,000
			Steel Support	14	TON	$	12,801	$ 180,000
			Metal to Roof Anchors 3/4" @ 6'	20	EA	$	342	$ 10,000
			Access Tunnel to Gate Chamber					$ -
			Rockbolts 1" @ 12'	775	EA	$	528	$ 410,000
			Rockbolts 1" @ 9'	240	EA	$	432	$ 100,000
			Steel Mesh	39,900	SF	$	6	$ 250,000
			Steel Support	55	TON	$	12,801	$ 700,000
	0.218		Structural- Misc Steelwork	2,775	SF	$	94	$ 260,000
	0.21c		Mechanical					$ -
			Upstream Lower Gates					$ -
			Gate Equipment	2	EA	$	5,073,120	$ 10,150,000
			Upstream Upper Gates					$ -
			Gate Equipment	2	EA	$	2,840,080	$ 5,680,000
			Trashracks	1	LS	$	1,777,500	$ 1,780,000
			Downstream Lower Outlet					$ -
			Stoplog Guides	1	LS	$	142,200	$ 140,000
			Stoplogs includes follower	1	LS	$	1,967,100	$ 1,970,000
			Downstream Upper Outlet					$ -
			Stoplog Guides	1	LS	$	82,950	$ 80,000
			Low Level Release					$ -
			Slide Gates Include Steel Liner	9	EA	$	3,517,470	$ 31,660,000
								$ -
0.22			Upstream Cofferdam					$ -
	0.221		Excavation					$ -
			Overburden Removal	1,000	CY	$	12	$ 10,000
	0.222		Fill					$ -
			Rock Fill	38,400	CY	$	11	$ 420,000
			Fine Filter	16,600	CY	$	37	$ 610,000
			Coarse Filter	15,900	CY	$	30	$ 480,000
			Rock Shell	196,500	CY	$	11	$ 2,060,000
			Closure Dike	58,500	CY	$	11	$ 640,000
			Rip Rap	21,200	CY	$	24	$ 510,000
	0.223		Cutoff Slurry Wall					$ -
			excavation	4,850	CY	$	5	$ 20,000
			slurry wall	43,600	SF	$	72	$ 3,160,000
	0.22d		Dewatering					$ -
			Initial Dewatering	1	LS	$	5,807,685	$ 5,810,000

				Dewatering Maintenance	1	LS	$	22,377,990	$	22,380,000
	0.23			Down Stream Cofferdam					$	-
		0.231		Excavation					$	-
				overburden	5,000	CY	$	12	$	60,000
				Rock	500	CY	$	10	$	-
				Removal of Cofferdam	14,500	CY	$	13	$	200,000
		0.232		Fill					$	-
				Rip Rap	1,800	CY	$	24	$	40,000
				Closure Dike	15,200	CY	$	11	$	170,000
		0.233		Cutoff Slurry Wall					$	-
				Excavation	1,830	CY	$	5	$	10,000
				Slurry Wall	16,500	SF	$	72	$	1,200,000
0.3			Main Dam						$	-
	0.31			Main Dam					$	-
		0.311		Excavation					$	-
				Overburden above el. 1470	2,026,000	CY	$	12	$	23,360,000
				Overburden below el. 1470	5,320,000	CY	$	11	$	58,840,000
				Rock Usable above el. 1470	1,289,000	CY	$	43	$	55,470,000
				Rock Usable below el. 1470	478,000	CY	$	44	$	20,900,000
				Rock Waste above el. 1470	1,950,000	CY	$	43	$	83,910,000
				Rock Waste below el. 1470	869,500	CY	$	50	$	43,630,000
		0.312		Fill- 1982 Acres Feasibility Study					$	-
				Rip Rap (upstream)	1,547,000	CY	$	23	$	36,050,000
				Gravel (upstream)	25,194,000	CY	$	21	$	517,990,000
				Coarse Filter (upstream)	1,646,000	CY	$	29	$	47,500,000
				Fine Filter (upstream)	2,011,000	CY	$	38	$	76,240,000
				Core (impervious)	8,254,000	CY	$	25	$	209,400,000
				Fine Filter (downstream)	2,253,000	CY	$	38	$	85,410,000
				Coarse Filter (downstream)	1,910,000	CY	$	29	$	55,120,000
				Shell- Rock and Gravel	11,342,000	CY	$	19	$	217,540,000
				Shell- Rock From Other Sources	5,418,000	CY	$	10	$	54,670,000
				Cobbles (downstream Face)	2,003,000	CY	$	16	$	32,750,000
				Road Base	12,000	CY	$	34	$	410,000
				Frost Protection					$	-
				Process Protection	960,000	CY	$	10	$	9,900,000
				Place Protection	960,000	CY	$	3	$	3,160,000
				Remove 1' Protect and Waste	93,000	CY	$	7	$	670,000
				Scarify Core Surface	193	ACRE	$	859	$	170,000
				Filter Fabric					$	-
				Filter Fabric	740,000	SF	$	1	$	650,000
		0.313		Surface Prep/ Grouting					$	-
				Surface Preparation					$	-
				Under Core/Filters above el. 1500	1,675,000	SF	$	3	$	5,210,000
				Under Core/Filters below el. 1500	613,000	SF	$	3	$	1,910,000
				Under Shell above el. 1500	5,186,000	SF	$	2	$	11,150,000
				Under Shell below el. 1500	2,584,000	SF	$	2	$	5,560,000
				Consolidation Grout					$	-
				Drill Holes	687,000	LF	$	12	$	8,180,000
				Cement	687,000	CF	$	68	$	46,590,000
				Grout Curtain					$	-
				Drill Holes	465,000	LF	$	27	$	12,440,000
				Cement	186,000	CF	$	81	$	15,080,000
				Dental Concrete					$	-
				Dental Concrete	85,000	CY	$	365	$	31,050,000
		0.317		Drainage					$	-
				Holes	136,000	LF	$	51	$	6,980,000
	0.32			Grout Galleries/Portals					$	-
		0.321		Excavation					$	-
				Tunnels/ Shafts- Core Area					$	-
				Rock Horizontal	10,100	CY	$	395	$	3,990,000
				Rock Inclined	11,300	CY	$	553	$	6,250,000
				Rock Vertical	2,000	CY	$	536	$	1,070,000
				Tunnels/ Shafts- Access					$	-

				Rock Horizontal	13,000	CY	$	395	$	5,130,000
				Rock Inclined	2,000	CY	$	553	$	1,110,000
				Portals					$	-
				Overburden Rock	3,600	CY	$	17	$	60,000
				Rock	1,000	CY	$	49	$	50,000
		0.323		Surface Preparation					$	-
				Portals					$	-
				Horizontal	30	SF	$	2	$	-
				Inclined	200	SF	$	3	$	-
									$	-
		0.324		Concrete and Shotcrete					$	-
				Tunnels- Core Area					$	-
				Concrete Plugs	1,000	CY	$	428	$	430,000
				Concrete Slab	2,300	CY	$	945	$	2,170,000
				Concrete Overbreak 6"	1,150	CY	$	756	$	870,000
				Reinforcing Steel	80	TON	$	2,888	$	230,000
				2" Shotcrete	15,000	SF	$	5	$	80,000
				Tunnels-Access					$	-
				Concrete Slab	1,600	CY	$	945	$	1,510,000
				Concrete Overbreak 6"	800	CY	$	756	$	600,000
				Reinforcing Steel	60	TON	$	2,888	$	170,000
				2" Shotcrete	5,400	SF	$	5	$	30,000
				Shafts					$	-
				2" Shotcrete	5,000	SF	$	5	$	30,000
				Portals					$	-
				Concrete	20	CY	$	406	$	10,000
				Reinforcing Steel	2	TON	$	2,888	$	10,000
		0.325		Support and Anchors					$	-
				Tunnels- Core Area					$	-
				Rockbolts 3/4" @6'	1,800	EA	$	327	$	590,000
				Steel Mesh	3,000	SF	$	5	$	20,000
				Steel Support	20	TON	$	12,801	$	260,000
				Tunnels- Access					$	-
				Rockbolts 3/4" @6'	1,200	EA	$	327	$	390,000
				Steel Mesh	1,100	SF	$	5	$	10,000
				Steel Support	20	TON	$	12,801	$	260,000
				Shafts					$	-
				Rockbolts 3/4" @6'	350	EA	$	327	$	110,000
				Steel Mesh	1,000	SF	$	5	$	10,000
				Portals					$	-
				Rockbolts 1" @15'	30	EA	$	736	$	20,000
		0.329		Architectural Portal Doors					$	-
				Portal Doors	2	EA	$	42,124	$	80,000
	0.33			Instrumentation					$	-
		0.331		Instrumentation	1	LS	$	21,643,077	$	21,640,000
0.4				Relict Channel					$	-
	0.41			Shore Protection					$	-
		0.411		Excavation					$	-
				Overburden Stripping 2' thick	2,200	CY	$	12	$	30,000
		0.412		Fill					$	-
				Dump and Spread					$	-
				Filter Material - 2' layer	2,200	CY	$	32	$	70,000
				Rock Spalls/ Rip Rap- 3' Ave	3,300	CY	$	10	$	30,000
				Shore Protection					$	-
				Rip Rap	24,000	CY	$	24	$	580,000
				Waste Rock	24,000	CY	$	23	$	550,000
	0.44			Channel Filter Blanket					$	-
		0.442		Fill					$	-
				Coarse Filter	2,900,000	CY	$	34	$	98,170,000
				Fine Filter	2,180,000	CY	$	44	$	95,160,000
				Rip Rap	182,000	CY	$	24	$	4,420,000
		0.443		Surface preparation					$	-
				Foundation Prep					$	-

			Clearing and Grubbing	460	ACRE	$	3,963	$	1,820,000	
			Excavation	2,236,000	CY	$	16	$	34,930,000	
0.5										**$ 2,424,000,000**
0.5			Outlet Facilities							
	0.51		Outlet Facilities- (Intake Civil Work Include in Power Intake)	1	LS	$	73,000,000	$	73,000,000	
	0.52		Main (Chute) Spillway (Includes Civil Works for Outlet Facilities)	1	LS	$	182,000,000	$	182,000,000	
	0.53		Emergency Spillway	1	LS	$	164,000,000	$	164,000,000	
0.6			Power Intake (Inc Inlet exec and Inlet Structure Civil Works for Outlet)	1	LS	$	145,000,000	$	145,000,000	
0.7			Surge Chamber	1	LS	$	24,000,000	$	24,000,000	
	0.81		Head Race (Based on Penstock costs	1	LS	$	42,000,000	$	42,000,000	
	0.82		Penstocks	1	LS	$	25,000,000	$	25,000,000	
0.9			Tailrace Works (1 Portal with Combined Tailrace/Diversion Tunnel)	1	LS	$	22,000,000	$	22,000,000	
										$ 677,000,000
333		**Waterwheels, Turbines and Generators**								
	0.11		Turbines and Governors							
		0.111	Supply	6	EA					
		0.112	Install	6	EA					
0.2			Generators and Exciters							
	0.21		Generators and Exciters (Supply and Install)							
		0.211	Generators and Exciters	6	EA	$	79,100,000	$	475,000,000	
			Average from acquired quotes							**$ 475,000,000**
334		**Accessory Electrical Equipment**								
0.1			Connections, Supports and Structures							
	0.11		Structures							
		0.111	Structures (included Below)	(Included Below)						
	0.12		Conductors and Insulators							
		0.121	Generator Isolated Phase Bus	1	LS	$	7,584,000	$	7,580,000	
		0.122	HV Power Cables and Accessories	1	LS	$	3,081,000	$	3,080,000	
		0.123	LV Power Cables and Accessories	1	LS	$	1,422,000	$	1,420,000	
		0.124	Control Cables and Accessories	1	LS	$	2,607,000	$	2,610,000	
		0.125	Grounding System	1	LS	$	355,500	$	360,000	
	0.13		Conduits and Fittings					$	-	
		0.131	Conduits and Fittings	1	LS	$	948,000	$	950,000	
0.2			Switchgear and Control Equipment					$	-	
	0.21		Auxiliary Transformers					$	-	
		0.211	Auxiliary Transformers	4	EA	$	83,811	$	340,000	
	0.22		Circuit Breakers Generators					$	-	
		0.221	Circuit Breakers Generators	6	EA	$	1,504,300	$	9,030,000	
	0.23		Surge Protectors and Generator Cubicles					$	-	
		0.231	Surge Protectors and Generator Cubicles	6	EA	$	50,000	$	300,000	
	0.24		Switch boards					$	-	
		0.241	Switch boards	1	LS	$	1,848,600	$	1,850,000	
	0.25		Auxiliary Power Equipment					$	-	
		0.251	Auxiliary Power Equipment	6	EA	$	100,000	$	600,000	
0.3			Cubicles and Appurtenances					$	-	
	0.31		Control, relay and meter boards					$	-	
		0.311	Control, relay and meter boards	6	EA	$	200,000	$	1,200,000	
	0.32		Computer Control System					$	-	
		0.321	Computer Control System	(Included in Trans-Ems)						
	0.33		Supervisor and Telemeter System							
		0.331	Supervisor and Telemeter System	Included in Trans EMS)						
								$	-	
0.4			Power Transformers					$	-	
	0.41		Power Transformers					$	-	
		0.411	Power Transformers	10	EA	$	3,600,000	$	36,000,000	
								$	-	
0.5			Lighting System					$	-	

	0.51		Powerhouse and Transformer Gallery				$	-			
		0.511	Powerhouse and Transformer Gallery	1	LS	$	1,824,900	$	1,820,000		
	0.52		Access Tunnels and Roads					$	-		
		0.521	Access Tunnels and Roads	1	LS	$	402,900	$	400,000		
								$	-		
	0.6		Misc. Electrical Equipment					$	-		
	0.61		Misc. Electrical Equipment					$	-		
		0.611	Misc. Electrical Equipment	1	LS	$	782,100	$	780,000		
								$	-		
	0.7		Surface Accessory Equipment					$	-		
	0.71		34.5 kV and LV Equipment					$	-		
		0.711	Switchboard	1	LS	$	213,300	$	210,000		
		0.712	Cables	1	LS	$	450,300	$	450,000		
		0.713	Aux Transformers	1	LS	$	284,400	$	280,000		
	0.73		Diesel Generator- Standby					$	-		
		0.731	Diesel Generator- Standby	2	EA	$	347,550	$	700,000		
	0.74		Exterior Lighting					$	-		
		0.741	Exterior Lighting	1	LS	$	355,500	$	360,000		
	0.75		Mimic Board- Control Building					$	-		
		0.751	Mimic Board- Control Building	1	LS	$	1,185,000	$	1,190,000		
								$	-	**$**	**72,000,000**
335			**Misc Powerplant Equipment**					$	-		
	0.1		Auxiliary Systems- Underground					$	-		
	0.11		Station Water Systems					$	-		
		0.111	Station Water Systems	1	LS	$	4,977,000	$	4,980,000		
	0.12		Fire Protection Systems					$	-		
		0.121	Fire Protection Systems	1	LS	$	2,844,000	$	2,840,000		
	0.13		Compressed Air Systems					$	-		
		0.131	Compressed Air Systems	1	LS	$	3,555,000	$	3,560,000		
	0.14		Oil Handling Systems					$	-		
		0.141	Oil Handling Systems	1	LS	$	2,370,000	$	2,370,000		
	0.15		Drainage & Dewatering					$	-		
		0.151	Drainage & Dewatering	3	EA	$	1,738,000	$	5,210,000		
	0.16		Heating, Ventilation and Cooling System					$	-		
		0.161	Heating, Ventilation and Cooling System	1	LS	$	3,555,000	$	3,560,000		
	0.17		Miscellaneous					$	-		
		0.171	Miscellaneous	1	LS	$	2,370,000	$	2,370,000		
	0.2		Auxiliary Systems- Surface Facilities					$	-		
	0.21		Auxiliary Systems- Surface Facilities					$	-		
		0.211	Auxiliary Systems- Surface Facilities	1	LS	$	711,000	$	710,000		
	0.3		Auxiliary Equipment					$	-		
	0.31		Powerhouse Cranes					$	-		
		0.311	Powerhouse Cranes	2	EA	$	1,800,000	$	3,600,000		
	0.32		Elevators					$	-		
		0.321	Elevators	3	EA	$	181,700	$	550,000		
	0.33		Miscellaneous Cranes and Hoists					$	-		
		0.331	Miscellaneous Cranes and Hoists	1	LS	$	505,500	$	510,000		
	0.34		Machine Shop Equipment					$	-		
		0.341	Machine Shop Equipment	1	LS	$	2,022,000	$	2,020,000		
	0.4		General Station Equipment	(Included in Mechanical And Electrical Systems)							
	0.5		Communications Equipment	1	LS	$	213,300	$	210,000		
								$	-	**$**	**32,000,000**
336			**Roads, Rails and Air Facilities**								
	0.1		Roads								
	0.11		Permanent Roads								
			Cost of road upgrades for 23 mi of Denali Highway	23	Mi	$	1,000,000.00	$	23,000,000.00		
			Cost of New road to 42 Mi of road to Watana	42	Mi	$	3,000,000.00	$	126,000,000.00		
	0.131		Site Roads								
			Construction Roads								

			Site Roads	20	Mile	$	750,000.00	$	15,000,000	
			Maintenance	141	MI/YRS	$	223,092.85	$	31,500,000	
	0.132		Permanent Roads							
			Permanent Roads	6	Mile	$	1,287,997.42	$	7,700,000	
0.2		Rail								
	0.1		Railhead at Cantwell	1	LS	$	14,000,000.00	$	14,000,000	
0.3		Airstrip								
	0.31		Airstrip							
			Permanent Airstrip	1	LS	$	13,000,000.00	$	13,000,000	
			Temporary Airstrip	1	LS	$	2,000,000.00	$	2,000,000	
	Additional Maintenance			1	LS	$	48,000,000.00	$	48,000,000	
										$ 280,000,000
350-359		**Transmission Plant**		33	MILE	$	9,000,000.00	$	297,000,000.00	
				2	EA	$	28,000,000.00	$	56,000,000.00	
										$ 353,000,000.00
		General Plant						$	-	
								$	-	
389		**Land and Land Rights**						$	-	
		Land and Land Rights						$	-	
								$	-	
390		**Structures and Improvements**						$	-	
		Structures and Improvements						$	-	
								$	-	
391		**Office Furniture and Equipment**						$	-	
		Office Furniture and Equipment						$	-	
								$	-	
392		**Transportation Equipment**						$	-	
		Transportation Equipment						$	-	
								$	-	
393		**Stores Equipment**						$	-	
		Stores Equipment						$	-	
								$	-	
394		**Tools Shop and Garage Equipment**						$	-	
		Tools Shop and Garage Equipment						$	-	
								$	-	
395		**Laboratory Equipment**						$	-	
		Laboratory Equipment						$	-	
								$	-	
396		**Power-Operated Equipment**						$	-	
		Power-Operated Equipment						$	-	
								$	-	
397		**Communications Equipment**						$	-	
		Communications Equipment						$	-	
								$	-	
398		**Miscellaneous Equipment**						$	-	
		Miscellaneous Equipment						$	-	
								$	-	
399		**Other Tangible Property**						$	-	
		Other Tangible Property		1	LS	$	20,000,000	$	20,000,000	
		Saved Maintenance		1	LS	$	(231,220)	$	(230,000)	
								$	-	**$ 20,000,000**
		Indirect Costs						$	-	
								$	-	

	61	**Temporary Construction Facilities**				$	-		
		Temporary Construction Facilities				$	-		
						$	-		
	62	**Construction Equipment**				$	-		
		Construction Equipment				$	-		
						$	-		
	63	**Main Construction Camp**				$	-		
		Main Construction Camp	1	LS	$ 210,000,000	$	210,000,000		
	64	**Labor Expense**						**$**	**210,000,000**
		Labor Expense	(Included In Direct Costs)						
	65	**Superintendence**							
		Superintendence	(Included In Direct Costs)						
	66	**Insurance**							
		Insurance	(Included In Direct Costs)						
	68	**Mitigation Fishery, Terrestrial and Recreational)- Not Included**							
								$	**-**
	69	**Fees**							
		Fees							
Subtotal									
			20 %					**$**	**1,071,000,000**
Subtotal									
	71	**Engineering (4%), Environmental (2%), Regulatory(1%)**	1	LS	$ 338,000,000			**$**	**338,000,000**
	71a	**Construction Management (4%)**	1	LS	$ 193,000,000			**$**	**193,000,000**
	72	**Legal Expenses**	**0** **%**						
	75	**Taxes**	**0** **%**						
	76	**Administrative & Gen. Expenses**	**0** **%**						
	77	**Interest**	**0** **%**						
	80	**Earnings/Expenses During Construction**	**0** **%**						
Total Project Cost								**$**	**6,425,000,000**
Max Plant Capacity	1200								

HDR/AEA Susitna Hydroelectric Project
Cost Estimates based on 1982 quantities
By: HDR
By: Leanne Andruszkiewicz, E.I.T.
Checked By: Kellen Roberts, E.I.T.
Date: 10/15/2009
2008 Dollars

Watana-Devil Canyon (6 Turbines Watana 4 Turbines Devil Canyon)

Watana

FERC Line #	Sub Categories		Description	Quantity	Units	2008 Unit Price	Line Price	Total
330			**Land and Land Rights**					
	0.1		Land	1	LS	$ 120,870,000.00	$ 120,900,000	
	0.2		Land Rights				$ -	
	0.3		Misc Charges in Credit Above				$ -	
							$ -	**$ 121,000,000**
							$ -	
331			**Powerplant Structure Improvements**				$ -	
	0.1		Powerhouse				$ -	
		0.11	Powerhouse and Draft Tube				$ -	
		0.111	Excavation				$ -	
			Powerhouse Vault Rock	122,500	CY	$ 90	$ 11,040,000	
			Draft Tube Rock	25,200	CY	$ 90	$ 2,270,000	
		0.113	Surface Preparation/ Grouting				$ -	
			Powerhouse	99,000	SF	$ 3	$ 330,000	
			Draft Tube	76,500	SF	$ 3	$ 250,000	
			Grout Curtain- Drill holes	43,800	LF	$ 28	$ 1,210,000	
			Grout Curtain- Cement	17,500	CF	$ 81	$ 1,420,000	
		0.114	Concrete and Shot Crete				$ -	
			Powerhouse Concrete	32,600	CY	$ 693	$ 22,590,000	
			Powerhouse Concrete Overbreak	2,400	CY	$ 447	$ 1,070,000	
			Powerhouse Reinforcing Steel	1,630	TON	$ 2,858	$ 4,660,000	
			Powerhouse 4" Shotcrete	41,000	SF	$ 10	$ 420,000	
			Draft Tube Concrete	12,000	CY	$ 693	$ 8,310,000	
			Draft Tube Concrete Overbreak	2,500	CY	$ 447	$ 1,120,000	
			Draft Tube Reinforcing Steel	990	TON	$ 2,858	$ 2,830,000	
			Draft Tube 2" Shotcrete	6,100	SF	$ 5	$ 30,000	
		0.115	Support and Anchors				$ -	
			Powerhouse Rockbolts 1" @ 25' Hy	970	EA	$ 1,235	$ 1,200,000	
			Powerhouse Rockbolts 1" @ 15'	1,970	EA	$ 736	$ 1,450,000	
			Powerhouse Steel Mesh	44,600	SF	$ 6	$ 260,000	
			Powerhouse Steel Support	137	TON	$ 12,672	$ 1,740,000	
			Draft Tube Rockbolts 1" @ 25' Hy	150	EA	$ 1,235	$ 190,000	
			Draft Tube Rockbolts 1" @ 12'	390	EA	$ 528	$ 210,000	
			Draft Tube Rockbolts 1" @ 9'	190	EA	$ 432	$ 80,000	
			Draft Tube Steel Mesh	18,900	SF	$ 7	$ 120,000	
		0.117	Holes (U/S of Powerhouse)	15,000	LF	$ 51	$ 770,000	
			Holes (Powerhouse Crown)	28,500	LF	$ 51	$ 1,460,000	
		0.118	Structural- Misc Steelwork				$ -	
			Powerhouse and Draft Tube- Steel Crane Rails	1	LS	$ 10,276,309	$ 10,280,000	
		0.119	Architectural- Powerhouse	1	LS	$ 2,927,898	$ 2,930,000	
		0.11c	Mechanical				$ -	
			Draft Tube Gates	4	SETS	$ 427,880	$ 1,710,000	
			Draft Tube Gate Guides	6	SETS	$ 202,680	$ 1,220,000	
			Draft Tube Crane	1	LS	$ 1,140,000	$ 1,140,000	
		0.12	Access Tunnels and Portals				$ -	
		0.121	Excavation				$ -	
			Main Tunnel	50,250	CY	$ 97	$ 4,900,000	
			Transformer Gallery Tunnel	17,750	CY	$ 97	$ 1,730,000	
			Grouting Gallery Tunnel	1,900	CY	$ 396	$ 750,000	
			Surge Chamber Access Tunnel	7,250	CY	$ 145	$ 1,050,000	

	Penstock Access Tunnel	61,500	CY	$	145	$	8,930,000
	Penstock Elbow Access Tunnel	15,000	CY	$	145	$	2,180,000
	Access Shaft Tunnel	1,300	CY	$	145	$	190,000
	Connector Tunnel	1,900	CY	$	379	$	720,000
	Portals Overburden	6,000	CY	$	17	$	100,000
	Portals Rock	3,000	CY	$	49	$	150,000
0.123	Surface Preparation					$	-
	Main Tunnel Slab	53,100	SF	$	2	$	120,000
	Penstock Access Slab	65,200	SF	$	2	$	140,000
	Horizontal Portal	200	SF	$	2	$	-
	Inclined Portal	2,100	SF	$	3	$	10,000
0.124	Concrete and Shot Crete					$	-
	Main Portal					$	-
	Concrete Slab	30	CY	$	406	$	10,000
	Concrete Walls	570	CY	$	406	$	230,000
	Concrete Overbreak	50	CY	$	368	$	20,000
	Reinforcing Steel	40	TON	$	2,888	$	120,000
	Tunnels					$	-
	Concrete Slab Main Tunnel	1,950	CY	$	504	$	980,000
	Concrete Plugs Penstock Elbow ACC	15,000	CY	$	756	$	11,340,000
	Concrete Overbreak Main Tunnel 6"	1,000	CY	$	346	$	350,000
	Reinforcing Steel	70	TON	$	2,888	$	200,000
	2 " Shotcrete Main Tunnel	20,100	SF	$	5	$	110,000
	2 " Shotcrete Transformer Gal	7,100	SF	$	5	$	40,000
	2 " Shotcrete Surge Chamber Acc	3,900	SF	$	5	$	20,000
	2 " Shotcrete Penstock Access	24,700	SF	$	5	$	130,000
	2 " Shotcrete Penstock Elbow Acc	7,100	SF	$	5	$	40,000
	2 " Shotcrete Access Shaft	300	SF	$	5	$	-
	2 " Shotcrete Grout Gallery	800	SF	$	5	$	-
	2 " Shotcrete Connector Tunnel	800	SF	$	5	$	-
0.125	Support and Anchors					$	-
	Main Tunnel					$	-
	Rockbolts 1" @12'	1,200	EA	$	528	$	630,000
	Rockbolts 1" @ 9'	250	EA	$	432	$	110,000
	Steel Mesh	63,000	SF	$	6	$	400,000
	Steel Support	66	TON	$	12,801	$	840,000
	Main Tunnel Portal					$	-
	Rockbolts 1" @15'	50	EA	$	736	$	40,000
	Transformer Gallery Tunnel					$	-
	Rockbolts 1" @12'	410	EA	$	528	$	220,000
	Rockbolts 1" @ 9'	70	EA	$	432	$	30,000
	Steel Mesh	22,500	SF	$	6	$	130,000
	Steel Support	24	TON	$	12,801	$	310,000
	Grouting Gallery Tunnel					$	-
	Rockbolts 3/4" @ 6'	160	EA	$	327	$	50,000
	Steel Mesh	160	SF	$	6	$	-
	Steel Support	2	TON	$	12,801	$	30,000
	Surge Chamber Access Tunnel					$	-
	Rockbolts 1" @12'	230	EA	$	528	$	120,000
	Rockbolts 1" @ 9'	50	EA	$	432	$	20,000
	Steel Mesh	12,050	SF	$	6	$	80,000
	Steel Support	14	TON	$	12,801	$	180,000
	Penstock Access Tunnel					$	-
	Rockbolts 1" @12'	1,430	EA	$	528	$	760,000
	Rockbolts 1" @ 9'	240	EA	$	432	$	100,000
	Steel Mesh	77,500	SF	$	6	$	490,000
	Steel Support	58	TON	$	12,801	$	740,000
	Penstock Elbow Access Tunnel					$	-
	Rockbolts 1" @12'	420	EA	$	528	$	220,000

			Rockbolts 1" @ 9'	120	EA	$	432	$ 50,000
			Steel Mesh	22,500	SF	$	6	$ 140,000
			Steel Support	30	TON	$	12,801	$ 380,000
			Access Shaft Tunnel					$ -
			Rockbolts 1" @12'	20	EA	$	528	$ 10,000
			Rockbolts 1" @ 9'	20	EA	$	432	$ 10,000
			Steel Mesh	930	SF	$	6	$ 10,000
			Steel Support	8	TON	$	12,801	$ 100,000
			Connector Tunnel					$ -
			Rockbolts 3/4" @ 6'	160	EA	$	327	$ 50,000
			Steel Mesh	160	SF	$	6	$ -
			Steel Support	2	TON	$	12,801	$ 30,000
	0.129		Architectural- Main Portal Doors	2	SETS	$	158,372	$ 320,000
	0.12c		Mechanical Ventilation System	Included in (63.81 and 63.82)				
0.13			Access Shaft					$ -
	0.131		Excavation Rock	13,700	CY	$	228	$ 3,120,000
	0.133		Surface Preparation Shaft	64,000	SF	$	3	$ 210,000
	0.134		Concrete and Shot Crete					$ -
			Concrete Lining	3,350	CY	$	945	$ 3,170,000
			Concrete Overbreak 6"	1,220	CY	$	551	$ 670,000
	0.135		Support and Anchors - Rockbolts 3/4" @ 6'	1,050	EA	$	327	$ 340,000
	0.138		Structural Misc Steelwork	50	TON	$	7,395	$ 370,000
	0.139		Architectural- control Building					$ -
	0.13c		Mechanical Elevators	1	LS	$	2,368,815	$ 2,370,000
0.14			Fire Protection Head Tank					$ -
	0.141		Excavation	1,150	CY	$	589	$ 680,000
	0.143		Surface Preparation	2,800	SF	$	2	$ 10,000
	0.144		Concrete & Shotcrete					$ -
			Concrete	250	CY	$	964	$ 240,000
			Concrete Overbreak 6"	45	CY	$	406	$ 20,000
			Reinforcing Steel	10	TON	$	2,858	$ 30,000
	0.145		Support and Anchors					$ -
			Rockbolts 1" @12'	25	EA	$	528	$ 10,000
			Rockbolts 1" @ 9'	10	EA	$	432	$ -
			Steel Mesh	1,200	SF	$	6	$ 10,000
			Steel Support	2	TON	$	12,672	$ 30,000
	0.148		Misc Steelwork	1	LS	$	73,298	$ 70,000
	0.14c		Mechanical Piping/Valves	(Included in 335.12)				
0.15			Bus Tunnels (totals for 3 Bus Tunnels)					$ -
	0.151		Excavation					$ -
			Rock Horizontal	2,700	CY	$	214	$ 580,000
			Rock Inclined	1,300	CY	$	601	$ 780,000
	0.153		Surface Preparation- Tunnels	7,100	SF	$	3	$ 20,000
	0.154		Concrete and Shotcrete					$ -
			Concrete Slab	350	CY	$	819	$ 290,000
			Concrete Overbreak 12"	250	CY	$	472	$ 120,000
			Reinforcing Steel	18	TON	$	2,858	$ 50,000
			2" Shotcrete	2,200	SF	$	5	$ 10,000
	0.155		Supports and Anchors					$ -
			Rockbolts 1" @ 25'	60	EA	$	1,235	$ 70,000
			Rockbolts 1" @ 12'	140	EA	$	528	$ 70,000
			Rockbolts 1" @ 9'	50	EA	$	432	$ 20,000
			Steel Mesh	6,800	SF	$	6	$ 40,000
			Steel Support	11	TON	$	12,672	$ 140,000
0.16			Transformer Gallery Tunnel					$ -
	0.161		Excavation- Rock	26,800	CY	$	87	$ 2,340,000
	0.163		Surface Preparation	24,600	SF	$	2	$ 60,000
	0.164		Concrete and Shotcrete					$ -
			Concrete Base Slab	2,400	CY	$	1,228	$ 2,950,000

				Concrete Overbreak 12"H/6"V	770	CY	$	378	$	290,000		
				Reinforcing Steel	120	TON	$	2,858	$	340,000		
		0.165		Support and Anchors					$	-		
				Rockbolts 1" @ 25'	600	EA	$	1,235	$	740,000		
				Rockbolts 1" @ 15'	270	EA	$	736	$	200,000		
				Steel Mesh	20,700	SF	$	6	$	120,000		
				Steel Support	29	TON	$	12,672	$	370,000		
		0.167		Drainage Holes	8,300	LF	$	48	$	400,000		
	0.17			Cable Shafts					$	-		
		0.171		Excavation Rock	3,400	CY	$	601	$	2,040,000		
		0.173		Surface Preparation Shafts	41,400	SF	$	3	$	140,000		
		0.174		Concrete and Shotcrete					$	-		
				Concrete Lining	1,040	CY	$	1,764	$	1,830,000		
				Concrete Overbreak 6"	800	CY	$	882	$	710,000		
		0.175		Supports and Anchors- Rockbolts 3/4" @ 6'	650	EA	$	327	$	210,000		
		0.178		Structural Misc Steelwork	18	TON	$	15,602	$	280,000		
		0.179		Architectural- Enclosures	1	LS	$	199,317	$	200,000		
		0.17c		Mechanical Hoist	2	EA	$	476,960	$	950,000		
	0.18			Dewatering (during Construction)					$	-		
		0.181		Dewatering (Power Facilities)	1	LS	$	1,336,799	$	1,340,000		
	0.19			Instrumentation					$	-		
		0.191		Instrumentation	1	LS	$	1,714,814	$	1,710,000		
0.2				Misc Buildings (Control Buildings)	1	LS	$	4,433,085	$	4,430,000		
0.3				Permanent Town	(included in 63.5)							
									$	-	**$**	**159,000,000**
332				**Reservoir, Dams and Waterways**					$	-		
0.1				Reservoir					$	-		
	0.11			Reservoir Clearing	37,500	ACRE	$	3,005.85	$	112,700,000		
0.2				Diversion Tunnels /Cofferdams					$	-		
	0.21			Diversion Tunnels /Portals					$	-		
		0.211		Excavation					$	-		
				Upper Tunnel					$	-		
				Rock	221,000	CY	$	92.33	$	20,400,000		
				Lower Tunnel					$	-		
				Rock	208,000	CY	$	92.33	$	19,200,000		
				Excavate Concrete for Plug	700	CY	$	96.92	$	100,000		
				Upstream Upper Portal					$	-		
				Rock Usable (Face Only)	11,200	CY	$	49.16	$	600,000		
				Upstream Lower Portal					$	-		
				Rock Usable	108,000	CY	$	49.16	$	5,300,000		
				Rock Waste	21,750	CY	$	49.16	$	1,100,000		
				Downstream Portals					$	-		
				Overburden	17,000	CY	$	17.14	$	300,000		
				Rock Usable	120,000	CY	$	49.16	$	5,900,000		
				Rock Waste	28,000	CY	$	49.16	$	1,400,000		
				Emergency Release Chambers					$	-		
				Excavate Concrete for Plugs	1,800	CY	$	101.98	$	200,000		
				Gate Chamber	4,700	CY	$	110.73	$	500,000		
				Access Tunnel to Gate Chamber					$	-		
				Rock	19,100	CY	$	97.15	$	1,900,000		
		0.212		Fill- Temp for Coffer to Construct Upstream Portals	23,000	CY	$	11.66	$	300,000		
		0.213		Surface Preparation \ grouting					$	-		
				Upstream Upper Portal					$	-		
				Horizontal	3,200	SF	$	2.30	$	-		
				Inclined	8,600	SF	$	3.33	$	-		
				Upstream Lower Portal					$	-		
				Horizontal	1,300	SF	$	2.30	$	-		
				Inclined	14,900	SF	$	3.33	$	-		
				Downstream Upper Portal					$	-		

		Horizontal	6,100	SF	$	2.30	$	-
		Inclined	20,500	SF	$	3.33	$	100,000
		Downstream Lower Portal					$	-
		Horizontal	600	SF	$	2.30	$	-
		Inclined	5,600	SF	$	3.33	$	-
		Grout Upper Tunnel Plugs					$	-
		Drill Holes	4,100	LF	$	26.76	$	100,000
		Cement	820	CF	$	81.10	$	100,000
		Grout Lower Tunnel Permanent Plugs					$	-
		Drill Holes	2,050	LF	$	26.76	$	100,000
		Cement	410	CF	$	81.10	$	-
0.214	Concrete and Shotcrete						$	-
		Upper Tunnel					$	-
		Concrete Lining	42,400	CY	$	566.89	$	24,000,000
		Concrete Lining Overbreak 6"	10,200	CY	$	314.94	$	3,200,000
		Reinforcing Steel	24	TON	$	2,887.51	$	100,000
		2" Shotcrete	56,000	SF	$	5.26	$	300,000
		Lower Tunnel					$	-
		Concrete Lining	37,600	CY	$	566.89	$	21,300,000
		Concrete Lining for Plug	6,200	CY	$	428.32	$	2,700,000
		Concrete Lining Overbreak 6"	10,000	CY	$	314.94	$	3,100,000
		Reinforcing Steel	24	TON	$	2,887.51	$	100,000
		2" Shotcrete	57,900	SF	$	5.26	$	300,000
		Upstream Upper Portal					$	-
		Concrete Headwall	3,200	CY	$	651.93	$	2,100,000
		Concrete Lining	1,300	CY	$	651.93	$	800,000
		Concrete Slab	750	CY	$	651.93	$	500,000
		Concrete Piers	800	CY	$	651.93	$	500,000
		Concrete Overbreak 12" H/6"V	300	CY	$	472.41	$	100,000
		Reinforcing Steel	400	TON	$	2,887.51	$	1,200,000
		Upstream Lower Portal					$	-
		Concrete Headwall	4,500	CY	$	651.93	$	2,900,000
		Concrete Lining	3,000	CY	$	651.93	$	2,000,000
		Concrete Slab	300	CY	$	651.93	$	200,000
		Concrete Piers	700	CY	$	651.93	$	500,000
		Concrete Overbreak 12" H/6"V	350	CY	$	472.41	$	200,000
		Reinforcing Steel	600	TON	$	2,887.51	$	1,700,000
		Downstream Upper Portal					$	-
		Concrete Headwall	500	CY	$	651.93	$	300,000
		Concrete Slab	100	CY	$	651.93	$	100,000
		Concrete Overbreak 12" H/6"V	100	CY	$	472.41	$	-
		Reinforcing Steel	40	TON	$	2,887.51	$	100,000
		Downstream Lower Portal					$	-
		Concrete Headwall	2,500	CY	$	651.93	$	1,600,000
		Concrete Slab	100	CY	$	651.93	$	100,000
		Concrete Overbreak 12" H/6"V	150	CY	$	472.41	$	100,000
		Reinforcing Steel	170	TON	$	2,887.51	$	500,000
		Downstream Flip Bucket					$	-
		Concrete Slab	800	CY	$	651.93	$	500,000
		Concrete Walls	2,300	CY	$	651.93	$	1,500,000
		Concrete Invert	1,200	CY	$	651.93	$	800,000
		Concrete Overbreak 12" H/6"V	410	CY	$	42.41	$	-
		Reinforcing Steel	280	TON	$	2,887.51	$	800,000
		Downstream Retaining Wall					$	-
		Concrete Slab	200	CY	$	651.93	$	100,000
		Concrete Walls	2,000	CY	$	651.93	$	1,300,000
		Concrete Overbreak 12" H/6"V	110	CY	$	472.41	$	100,000
		Reinforcing Steel	90	TON	$	2,887.51	$	300,000
		Emergency Release Chambers					$	-

		Concrete Plug	15,300	CY	$	755.86	$	11,600,000
		4" Shotcrete	2,790	SF	$	10.13	$	-
		Access Tunnel to Gate Chamber					$	-
		2" Shotcrete	12,800	SF	$	5.26	$	100,000
	0.215	Supports and Anchors					$	-
		Lower Tunnel					$	-
		Rockbolts 1" @ 12'	3,650	EA	$	528.34	$	1,900,000
		Rockbolts 1" @ 9'	620	EA	$	432.12	$	300,000
		Steel Mesh	217,100	SF	$	6.37	$	1,400,000
		Steel Support	220	TON	$	12,801.49	$	2,800,000
		Upper Tunnel					$	-
		Rockbolts 1" @ 12'	3,530	EA	$	528.34	$	1,900,000
		Rockbolts 1" @ 9'	600	EA	$	432.12	$	300,000
		Steel Mesh	210,200	SF	$	6.37	$	1,300,000
		Steel Support	213	TON	$	12,801.49	$	2,700,000
		Upstream Lower Portal					$	-
		Rockbolts 1" @ 15'	240	EA	$	735.81	$	200,000
		Anchors 1" @ 25'	290	EA	$	1,234.86	$	400,000
		Anchors 1" @ 25'	130	EA	$	1,234.86	$	200,000
		Downstream Lower Portal					$	-
		Rockbolts 1" @ 15'	200	EA	$	735.81	$	100,000
		Downstream Upper Portal					$	-
		Rockbolts 1" @ 15'	100	EA	$	735.81	$	100,000
		Retaining Wall Anchors 1" @25'	100	EA	$	1,234.86	$	100,000
		Emergency Release Chambers					$	-
		Rockbolts 1" @ 25'	100	EA	$	1,234.86	$	100,000
		Rockbolts 1" @ 15'	125	EA	$	735.77	$	100,000
		Steel Mesh	3,600	SF	$	6.37	$	-
		Steel Support	14	TON	$	12,801.49	$	200,000
		Metal to Roof Anchors 3/4" @ 6'	20	EA	$	342.42	$	-
		Access Tunnel to Gate Chamber					$	-
		Rockbolts 1" @ 12'	775	EA	$	528.34	$	400,000
		Rockbolts 1" @ 9'	240	EA	$	432.12	$	100,000
		Steel Mesh	39,900	SF	$	6.37	$	300,000
		Steel Support	55	TON	$	12,801.49	$	700,000
	0.218	Structural- Misc Steelwork	2,775	SF	$	93.61	$	300,000
	0.21c	Mechanical					$	-
		Upstream Lower Gates					$	-
		Gate Equipment	2	EA	$	5,073,120.00	$	10,100,000
		Upstream Upper Gates					$	-
		Gate Equipment	2	EA	$	2,840,080.00	$	5,700,000
		Trashracks	1	LS	$	1,777,500.00	$	1,800,000
		Downstream Lower Outlet					$	-
		Stoplog Guides	1	LS	$	142,200.00	$	100,000
		Stoplogs includes follower	1	LS	$	1,967,100.00	$	2,000,000
		Downstream Upper Outlet					$	-
		Stoplog Guides	1	LS	$	82,950.00	$	100,000
		Low Level Release					$	-
		Slide Gates Include Steel Liner	9	EA	$	3,517,470.00	$	31,700,000
							$	-
0.22		Upstream Cofferdam					$	-
	0.221	Excavation					$	-
		Overburden Removal	1,000	CY	$	11.56	$	-
	0.222	Fill					$	-
		Rock Fill	38,400	CY	$	10.90	$	400,000
		Fine Filter	16,600	CY	$	36.84	$	600,000
		Coarse Filter	15,900	CY	$	30.05	$	500,000
		Rock Shell	196,500	CY	$	10.50	$	2,100,000
		Closure Dike	58,500	CY	$	10.90	$	600,000

			Rip Rap	21,200	CY	$	24.26	$	500,000
		0.223	Cutoff Slurry Wall					$	-
			excavation	4,850	CY	$	4.88	$	-
			slurry wall	43,600	SF	$	72.44	$	3,200,000
		0.22d	Dewatering					$	-
			Initial Dewatering	1	LS	$	5,807,685.00	$	5,800,000
			Dewatering Maintenance	1	LS	$	22,377,990.00	$	22,400,000
	0.23		Down Stream Cofferdam					$	-
		0.231	Excavation					$	-
			overburden	5,000	CY	$	11.56	$	100,000
			Rock	500	CY	$	9.91	$	-
			Removal of Cofferdam	14,500	CY	$	13.48	$	200,000
		0.232	Fill					$	-
			Rip Rap	1,800	CY	$	24.26	$	-
			Closure Dike	15,200	CY	$	10.90	$	200,000
		0.233	Cutoff Slurry Wall					$	-
			Excavation	1,830	CY	$	4.60	$	-
			Slurry Wall	16,500	SF	$	72.44	$	1,200,000
0.3			Main Dam					$	-
	0.31		Main Dam					$	-
		0.311	Excavation					$	-
			Overburden above el. 1470	2,026,000	CY	$	11.53	$	23,400,000
			Overburden below el. 1470	5,320,000	CY	$	11.06	$	58,800,000
			Rock Usable above el. 1470	1,289,000	CY	$	43.03	$	55,500,000
			Rock Usable below el. 1470	478,000	CY	$	43.72	$	20,900,000
			Rock Waste above el. 1470	1,950,000	CY	$	43.03	$	83,900,000
			Rock Waste below el. 1470	869,500	CY	$	50.18	$	43,600,000
		0.312	Fill					$	-
			Rip Rap (upstream)	1,547,000	CY	$	23.30	$	36,000,000
			Gravel (upstream)	25,194,000	CY	$	20.56	$	518,000,000
			Coarse Filter (upstream)	1,646,000	CY	$	28.86	$	47,500,000
			Fine Filter (upstream)	2,011,000	CY	$	37.91	$	76,200,000
			Core (impervious)	8,254,000	CY	$	25.37	$	209,400,000
			Fine Filter (downstream)	2,253,000	CY	$	37.91	$	85,400,000
			Coarse Filter (downstream)	1,910,000	CY	$	28.86	$	55,100,000
			Shell- Rock and Gravel	11,342,000	CY	$	19.18	$	217,500,000
			Shell- Rock From Other Sources	5,418,000	CY	$	10.09	$	54,700,000
			Cobbles (downstream Face)	2,003,000	CY	$	16.35	$	32,700,000
			Road Base	12,000	CY	$	34.42	$	400,000
			Frost Protection					$	-
			Process Protection	960,000	CY	$	10.31	$	9,900,000
			Place Protection	960,000	CY	$	3.29	$	3,200,000
			Remove 1' Protect and Waste	93,000	CY	$	7.21	$	700,000
			Scarify Core Surface	193	ACRE	$	858.77	$	200,000
			Filter Fabric					$	-
			Filter Fabric	740,000	SF	$	0.88	$	700,000
		0.313	Surface Prep/ Grouting					$	-
			Surface Preparation					$	-
			Under Core/Filters above el. 1500	1,675,000	SF	$	3.11	$	5,200,000
			Under Core/Filters below el. 1500	613,000	SF	$	3.11	$	1,900,000
			Under Shell above el. 1500	5,186,000	SF	$	2.15	$	11,100,000
			Under Shell below el. 1500	2,584,000	SF	$	2.15	$	5,600,000
			Consolidation Grout					$	-
			Drill Holes	687,000	LF	$	11.91	$	8,200,000
			Cement	687,000	CF	$	67.81	$	46,600,000
			Grout Curtain					$	-
			Drill Holes	465,000	LF	$	26.76	$	12,400,000
			Cement	186,000	CF	$	81.10	$	15,100,000
			Dental Concrete					$	-

			Dental Concrete	85,000	CY	$	365.33	$	31,100,000
	0.317		Drainage					$	-
			Holes	136,000	LF	$	51.32	$	7,000,000
0.32			Grout Galleries/Portals					$	-
	0.321		Excavation					$	-
			Tunnels/ Shafts- Core Area					$	-
			Rock Horizontal	10,100	CY	$	394.80	$	4,000,000
			Rock Inclined	11,300	CY	$	552.93	$	6,200,000
			Rock Vertical	2,000	CY	$	536.19	$	1,100,000
			Tunnels/ Shafts- Access					$	-
			Rock Horizontal	13,000	CY	$	394.80	$	5,100,000
			Rock Inclined	2,000	CY	$	552.93	$	1,100,000
			Portals					$	-
			Overburden Rock	3,600	CY	$	17.16	$	100,000
			Rock	1,000	CY	$	49.16	$	-
	0.323		Surface Preparation					$	-
			Portals					$	-
			Horizontal	30	SF	$	2.30	$	-
			Inclined	200	SF	$	3.33	$	-
								$	-
	0.324		Concrete and Shotcrete					$	-
			Tunnels- Core Area					$	-
			Concrete Plugs	1,000	CY	$	428.32	$	400,000
			Concrete Slab	2,300	CY	$	944.82	$	2,200,000
			Concrete Overbreak 6"	1,150	CY	$	755.86	$	900,000
			Reinforcing Steel	80	TON	$	2,887.51	$	200,000
			2" Shotcrete	15,000	SF	$	5.26	$	100,000
			Tunnels-Access					$	-
			Concrete Slab	1,600	CY	$	944.82	$	1,500,000
			Concrete Overbreak 6"	800	CY	$	755.86	$	600,000
			Reinforcing Steel	60	TON	$	2,887.51	$	200,000
			2" Shotcrete	5,400	SF	$	5.26	$	-
			Shafts					$	-
			2" Shotcrete	5,000	SF	$	5.26	$	-
			Portals					$	-
			Concrete	20	CY	$	406.36	$	-
			Reinforcing Steel	2	TON	$	2,887.51	$	-
	0.325		Support and Anchors					$	-
			Tunnels- Core Area					$	-
			Rockbolts 3/4" @6'	1,800	EA	$	327.15	$	600,000
			Steel Mesh	3,000	SF	$	5.37	$	-
			Steel Support	20	TON	$	12,801.49	$	300,000
			Tunnels- Access					$	-
			Rockbolts 3/4" @6'	1,200	EA	$	327.15	$	400,000
			Steel Mesh	1,100	SF	$	5.37	$	-
			Steel Support	20	TON	$	12,801.49	$	300,000
			Shafts					$	-
			Rockbolts 3/4" @6'	350	EA	$	327.15	$	100,000
			Steel Mesh	1,000	SF	$	5.37	$	-
			Portals					$	-
			Rockbolts 1" @15'	30	EA	$	735.81	$	-
	0.329		Architectural Portal Doors					$	-
			Portal Doors	2	EA	$	42,123.66	$	100,000
	0.33		Instrumentation					$	-
		0.331	Instrumentation	1	LS	$	21,643,077.00	$	21,600,000
0.4			Relict Channel					$	-
	0.41		Shore Protection					$	-
		0.411	Excavation					$	-
			Overburden Stripping 2' thick	2,200	CY	$	11.56	$	-

		0.412	Fill					$ -		
			Dump and Spread					$ -		
			Filter Material - 2' layer	2,200	CY	$	31.93	$ 100,000		
			Rock Spalls/ Rip Rap- 3' Ave	3,300	CY	$	9.86	$ -		
			Shore Protection					$ -		
			Rip Rap	24,000	CY	$	24.26	$ 600,000		
			Waste Rock	24,000	CY	$	22.78	$ 500,000		
	0.44		Channel Filter Blanket					$ -		
		0.442	Fill					$ -		
			Coarse Filter	2,900,000	CY	$	33.85	$ 98,200,000		
			Fine Filter	2,180,000	CY	$	43.65	$ 95,200,000		
			Rip Rap	182,000	CY	$	24.26	$ 4,400,000		
		0.443	Surface preparation					$ -		
			Foundation Prep					$ -		
			Clearing and Grubbing	460	ACRE	$	3,963.11	$ 1,800,000		
			Excavation	2,236,000	CY	$	15.62	$ 34,900,000		
								$ -		
								$ -	**$**	**2,424,000,000**
	0.5		Outlet Facilities							
		0.51	Outlet Facilities- (Intake Civil Work Include in Power Intake)	1	LS	$	73,000,000	$ 73,000,000		
		0.52	Main (Chute) Spillway (Includes Civil Works for Outlet Facilities)	1	LS	$	182,000,000	$ 182,000,000		
		0.53	Emergency Spillway	1	LS	$	164,000,000	$ 164,000,000		
	0.6		Power Intake (Inc Inlet exec and Inlet Structure Civil Works for Outlet)	1	LS	$	145,000,000	$ 145,000,000		
	0.7		Surge Chamber	1	LS	$	24,000,000	$ 24,000,000		
		0.81	Head Race (Based on Penstock costs	1	LS	$	42,000,000	$ 42,000,000		
		0.82	Penstocks	1	LS	$	25,000,000	$ 25,000,000		
	0.9		Tailrace Works (1 Portal with Combined Tailrace/Diversion Tunnel)	1	LS	$	22,000,000	$ 22,000,000		
									$	**677,000,000**
333			**Waterwheels, Turbines and Generators**					$ -		
		0.11	Turbines and Governors					$ -		
			0.111 Supply							
			0.112 Install							
	0.2		Generators and Exciters							
		0.21	Generators and Exciters (Supply and Install)							
			0.211 Generators and Exciters	6	EA	$	79,200,000.00	$ 475,200,000		
	0.3		Total Bid From Vendor (includes all equipment in this category)					$ -	**$**	**475,000,000**
			Price from Voith Bid					$ -		
								$ -		
334			**Accessory Electrical Equipment**							
	0.1		Connections, Supports and Structures							
		0.11	Structures							
			0.111 Structures (included Below)	(Included Below)						
		0.12	Conductors and Insulators							
			0.121 Generator Isolated Phase Bus	1	LS	$	7,584,000	$ 7,580,000		
			0.122 HV Power Cables and Accessories	1	LS	$	3,081,000	$ 3,080,000		
			0.123 LV Power Cables and Accessories	1	LS	$	1,422,000	$ 1,420,000		
			0.124 Control Cables and Accessories	1	LS	$	2,607,000	$ 2,610,000		
			0.125 Grounding System	1	LS	$	355,500	$ 360,000		
		0.13	Conduits and Fittings					$ -		
			0.131 Conduits and Fittings	1	LS	$	948,000	$ 950,000		
	0.2		Switchgear and Control Equipment					$ -		
		0.21	Auxiliary Transformers					$ -		
			0.211 Auxiliary Transformers	4	EA	$	83,811	$ 340,000		
		0.22	Circuit Breakers Generators					$ -		
			0.221 Circuit Breakers Generators	6	EA	$	1,504,300	$ 9,030,000		
		0.23	Surge Protectors and Generator Cubicles					$ -		
			0.231 Surge Protectors and Generator Cubicles	6	EA	$	50,000	$ 300,000		
		0.24	Switch boards					$ -		
			0.241 Switch boards	1	LS	$	1,848,600	$ 1,850,000		

	0.25		Auxiliary Power Equipment				$	-		
		0.251	Auxiliary Power Equipment	6	EA	$ 100,000	$	600,000		
0.3			Cubicles and Appurtenances				$	-		
	0.31		Control, relay and meter boards				$	-		
		0.311	Control, relay and meter boards	6	EA	$ 200,000	$	1,200,000		
	0.32		Computer Control System				$	-		
		0.321	Computer Control System	(Included in Trans-Ems)						
	0.33		Supervisor and Telemeter System							
		0.331	Supervisor and Telemeter System	Included in Trans EMS)						
							$	-		
0.4			Power Transformers				$	-		
	0.41		Power Transformers				$	-		
		0.411	Power Transformers	10	EA	$ 3,600,000	$	36,000,000		
							$	-		
0.5			Lighting System				$	-		
	0.51		Powerhouse and Transformer Gallery				$	-		
		0.511	Powerhouse and Transformer Gallery	1	LS	$ 1,824,900	$	1,820,000		
	0.52		Access Tunnels and Roads				$	-		
		0.521	Access Tunnels and Roads	1	LS	$ 402,900	$	400,000		
							$	-		
0.6			Misc. Electrical Equipment				$	-		
	0.61		Misc. Electrical Equipment				$	-		
		0.611	Misc. Electrical Equipment	1	LS	$ 782,100	$	780,000		
							$	-		
0.7			Surface Accessory Equipment				$	-		
	0.71		34.5 kV and LV Equipment				$	-		
		0.711	Switchboard	1	LS	$ 213,300	$	210,000		
		0.712	Cables	1	LS	$ 450,300	$	450,000		
		0.713	Aux Transformers	1	LS	$ 284,400	$	280,000		
	0.73		Diesel Generator- Standby				$	-		
		0.731	Diesel Generator- Standby	2	EA	$ 347,550	$	700,000		
	0.74		Exterior Lighting				$	-		
		0.741	Exterior Lighting	1	LS	$ 355,500	$	360,000		
	0.75		Mimic Board- Control Building				$	-		
		0.751	Mimic Board- Control Building	1	LS	$ 1,185,000	$	1,190,000		
							$	-	**$**	**72,000,000**
335			**Misc Powerplant Equipment**				$	-		
0.1			Auxiliary Systems- Underground				$	-		
	0.11		Station Water Systems				$	-		
		0.111	Station Water Systems	1	LS	$ 4,977,000	$	4,980,000		
	0.12		Fire Protection Systems				$	-		
		0.121	Fire Protection Systems	1	LS	$ 2,844,000	$	2,840,000		
	0.13		Compressed Air Systems				$	-		
		0.131	Compressed Air Systems	1	LS	$ 3,555,000	$	3,560,000		
	0.14		Oil Handling Systems				$	-		
		0.141	Oil Handling Systems	1	LS	$ 2,370,000	$	2,370,000		
	0.15		Drainage & Dewatering				$	-		
		0.151	Drainage & Dewatering	3	EA	$ 1,738,000	$	5,210,000		
	0.16		Heating, Ventilation and Cooling System				$	-		
		0.161	Heating, Ventilation and Cooling System	1	LS	$ 3,555,000	$	3,560,000		
	0.17		Miscellaneous				$	-		
		0.171	Miscellaneous	1	LS	$ 2,370,000	$	2,370,000		
0.2			Auxiliary Systems- Surface Facilities				$	-		
	0.21		Auxiliary Systems- Surface Facilities				$	-		
		0.211	Auxiliary Systems- Surface Facilities	1	LS	$ 711,000	$	710,000		
0.3			Auxiliary Equipment				$	-		
	0.31		Powerhouse Cranes				$	-		
		0.311	Powerhouse Cranes	2	EA	$ 1,800,000	$	3,600,000		
	0.32		Elevators				$	-		

		0.321	Elevators	3	EA	$	181,700	$	550,000		
	0.33		Miscellaneous Cranes and Hoists					$	-		
		0.331	Miscellaneous Cranes and Hoists	1	LS	$	505,500	$	510,000		
	0.34		Machine Shop Equipment					$	-		
		0.341	Machine Shop Equipment	1	LS	$	2,022,000	$	2,020,000		
0.4			General Station Equipment	(Included in Mechanical And Electrical Systems)							
0.5			Communications Equipment	1	LS	$	213,300	$	210,000		
								$	-	**$**	**32,000,000**
336			**Roads, Rails and Air Facilities**								
0.1			Roads								
	0.11		Permanent Roads								
			Cost of road upgrades for 23 mi of Denali Highway	23	Mi	$	1,000,000.00	$	23,000,000.00		
			Cost of New road to 42 Mi of road to Watana	42	Mi	$	3,000,000.00	$	126,000,000.00		
			Cost of New road to 41 Mi of road to Devil Canyon	41	Mi	$	3,000,000.00	$	123,000,000.00		
	0.131		Site Roads								
			Construction Roads								
			Site Roads	20	Mile	$	750,000.00	$	15,000,000		
			Maintenance	141	MI/YRS	$	223,092.85	$	31,500,000		
	0.132		Permanent Roads								
			Permanent Roads	6	Mile	$	1,287,997.42	$	7,700,000		
0.2			Rail								
		0.1	Railhead at Cantwell	1	LS	$	14,000,000.00	$	14,000,000		
0.3			Airstrip								
	0.31		Airstrip								
			Permanent Airstrip	1	LS	$	13,000,000.00	$	13,000,000		
			Temporary Airstrip	1	LS	$	2,000,000.00	$	2,000,000		
			Permanent Roads	6	MILE	$	1,287,997.42	$	7,700,000		
										$	**363,000,000**
350-359			**Transmission Plant**								
			Transmission Line per mile	33	MILE	$	11,400,000.00	$	376,200,000.00		
			Substations (1 at Watana 1 at Gold Creek)	2	EA	$	35,000,000.00	$	70,000,000.00		
										$	**446,000,000.00**
								$	-		
389			**Land and Land Rights**					$	-		
			Land and Land Rights					$	-		
								$	-		
390			**Structures and Improvements**					$	-		
			Structures and Improvements					$	-		
								$	-		
391			**Office Furniture and Equipment**					$	-		
			Office Furniture and Equipment					$	-		
								$	-		
392			**Transportation Equipment**					$	-		
			Transportation Equipment					$	-		
								$	-		
393			**Stores Equipment**					$	-		
			Stores Equipment					$	-		
								$	-		
394			**Tools Shop and Garage Equipment**					$	-		
			Tools Shop and Garage Equipment					$	-		
								$	-		
395			**Laboratory Equipment**					$	-		
			Laboratory Equipment					$	-		

							$	-		
	396		**Power-Operated Equipment**				$	-		
			Power-Operated Equipment				$	-		
							$	-		
	397		**Communications Equipment**				$	-		
			Communications Equipment				$	-		
							$	-		
	398		**Miscellaneous Equipment**				$	-		
			Miscellaneous Equipment				$	-		
							$	-		
	399		**Other Tangible Property**				$	-		
			Other Tangible Property- See items 391-398	1 LS	$	20,000,000.00	$	20,000,000		
							$	-	**$**	**20,000,000**
Indirect Costs							$	-		
							$	-		
	61		**Temporary Construction Facilities**				$	-		
			Temporary Construction Facilities				$	-		
							$	-		
	62		**Construction Equipment**				$	-		
			Construction Equipment				$	-		
							$	-		
	63		**Main Construction Camp**				$	-		
		0.1	Main Construction Camp	1 LS	$	210,000,000	$	210,000,000		
							$	-	**$**	**210,000,000**
	64		**Labor Expense**				$	-		
			Labor Expense	(Included In Direct Costs)						
	65		**Superintendence**				$	-		
			Superintendence	(Included In Direct Costs)						
	66		**Insurance**				$	-		
			Insurance	(Included In Direct Costs)						
	68		**Mitigation Fishery, Terrestrial and Recreational)**							
			Mitigation	(Not included in 1982 study)						
	69		**Fees**				$	-		
			Fees	(Included In Direct Costs)						
Subtotal							$	-		
			Subtotal						**$**	**4,999,000,000**
			Contingency	**20** %			$	-	**$**	**1,000,000,000**
Subtotal							$	-		
	71A		**Engineering (4%), Environmental (2%), Regulatory (1%)**	**7 %**			$	-	**$**	**350,000,000**
	71B		**Construction Management (4%)**	**4 %**					**$**	**200,000,000**
	72		**Legal Expenses**	**0 %**			$	-		
	75		**Taxes**	**0 %**			$	-		
	76		**Administrative & Gen. Expenses**	**0 %**			$	-		
	77		**Interest**	**0 %**			$	-		
	80		**Earnings/Expenses During Construction**	**0 %**			$	-		
Total Project Cost									**$**	**6,549,000,000**

Devil Canyon

FERC Line #	Sub Categories	Description	Quantity	Units	2008 Unit Price	2008 Line Price	Category Total
330		**Land and Land Rights**					
	0.1	Land	1	LS	$ 52,258,500.00	$ 52,258,500.00	
	0.2	Land Rights				$ -	
	0.3	Misc. Charges and Credits				$ -	
						$ -	**$ 52,000,000**
						$ -	
331		**Powerplant Structure Improvements**				$ -	
	0.1	Powerhouse				$ -	
	0.11	Powerhouse and Draft Tube				$ -	
	0.111	Excavation				$ -	
		Powerhouse Vault Rock	95800	CY	$ 90.12	$ 8,633,486.00	
		Draft Tube Rock	16800	CY	$ 90.12	$ 1,514,014.00	
	0.113	Surface Preparation/Grouting				$ -	
		Powerhouse				$ -	
		Surface Preparation	88700	SF	$ 3.56	$ 315,609.00	
		Draft Tube				$ -	
		Surface Preparation	51300	SF	$ 3.56	$ 182,534.00	
		Grout Curtain-(U/S of P-H)				$ -	
		Drill Holes	43800	LF	$ 28.59	$ 1,252,389.00	
		Cement	17500	CY	$ 86.68	$ 1,516,979.00	
	0.114	Concrete and Shotcrete				$ -	
		Powerhouse				$ -	
		Concrete	23800	CY	$ 740.65	$ 17,627,518.00	
		Concrete Overbreak 12"H/6"V	1800	CY	$ 478.06	$ 860,503.00	
		Reinforcing Steel	1200	TON	$ 3,086.65	$ 3,703,974.00	
		2" Shotcrete	1900	SF	$ 5.63	$ 10,688.00	
		3" Shotcrete	3400	SF	$ 8.21	$ 27,915.00	
		Draft Tube				$ -	
		Concrete	8000	CY	$ 740.65	$ 5,925,216.00	
		Concrete Overbreak 6"	1650	CY	$ 478.06	$ 788,794.00	
		Reinforcing Steel	660	TON	$ 3,086.65	$ 2,037,186.00	
		2" Shotcrete	800	SF	$ 5.63	$ 4,500.00	
	0.115	Support and Anchors				$ -	
		Powerhouse				$ -	
		Rockbolts 1" @ 25'	780	EACH	$ 1,320.04	$ 1,029,629.00	
		Rockbolts 1" @ 15'	500	EACH	$ 786.58	$ 393,289.00	
		Steel Mesh	31000	SF	$ 6.26	$ 194,095.00	
		Steel Support	105	TON	$ 13,684.35	$ 1,436,857.00	
		Draft Tube				$ -	
		Rockbolts 1" @ 25'	100	EACH	$ 1,320.04	$ 132,004.00	
		Rockbolts 1" @ 12'	140	EACH	$ 564.79	$ 79,071.00	
		Rockbolts 1" @ 9'	70	EACH	$ 461.90	$ 32,333.00	
		Steel Mesh	12600	SF	$ 6.26	$ 78,890.00	
	0.117	Drainage				$ -	
		Holes (U/S of Powerhouse)	15000	LF	$ 54.88	$ 823,219.00	
		Holes (Powerhouse Crown)	21960	LF	$ 54.88	$ 1,205,192.00	
	0.118	Structural - Misc Steelwork				$ -	
		Powerhouse and Draft Tube				$ -	
		Structural Steel/Crane Rails	1	LS	$ 5,050,602.00	$ 5,050,602.00	
		Steel Comp. Water Pipe (8')	1	LS	$ 6,659,963.00	$ 6,659,963.00	
	0.119	Architectural				$ -	
		Powerhouse				$ -	
		Architectural	1	LS	$ 1,777,974.00	$ 1,777,974.00	
	.11C	Mechanical				$ -	
		Draft Tube Gates	2	Sets	$ 608,040.00	$ 1,216,080.00	
		Draft Tube Gate Guides	4	Sets	$ 247,720.00	$ 990,880.00	

			Draft Tube Crane	1	EACH	$	1,013,400.00	$ 1,013,400.00
			Pump Intake Trashracks and Guides	1	LS	$	379,200.00	$ 379,200.00
			Pump Outlet Stoplogs/Guides	1	LS	$	165,000.00	$ 165,000.00
0.12		Access Tunnels and Portals						$ -
	0.121	Excavation						$ -
		Tunnels - Rock						$ -
			Main Tunnel	106000	CY	$	114.16	$ 12,100,994.00
			Transformer Gallery Tunnel	17000	CY	$	96.30	$ 1,637,144.00
			Grouting Gallery Tunnel	2300	CY	$	463.96	$ 1,067,110.00
			Surge Chamber Access Tunnel	7800	CY	$	166.60	$ 1,299,503.00
			Penstock Access Tunnel	50000	CY	$	170.11	$ 8,505,552.00
			Penstock Elbow Access Tunnel	10000	CY	$	170.11	$ 1,701,110.00
			Access shaft Tunnel	3300	CY	$	444.28	$ 1,466,133.00
			Connector Tunnel	1600	CY	$	460.65	$ 737,035.00
			Comp. Water Tunnel 10'D	2200	CY	$	460.65	$ 1,013,423.00
			Comp. Water Tunnel 35'D	27000	CY	$	116.77	$ 3,152,687.00
		Main Portal						$ -
			Rock	5000	CY	$	52.56	$ 262,781.00
		Comp. Water Portal						$ -
			Rock	301	CY	$	52.55	$ 15,819.00
								$ -
	0.123	Surface Preparation						$ -
		Tunnels						$ -
			Main Tunnel Slab	112000	SF	$	2.37	$ 265,158.00
			Comp. Water Tunnel 35'D Slab	28400	SF	$	2.45	$ 69,713.00
			Penstock ACC Tunnel Slab	52560	SF	$	2.37	$ 124,435.00
		Main Portal						$ -
			Horizontal	200	SF	$	2.46	$ 491.00
			Vertical	2100	SF	$	3.56	$ 7,472.00
		Comp. Water Portal						$ -
			Horizontal	200	SF	$	2.46	$ 491.00
			Vertical	2100	SF	$	3.56	$ 7,472.00
	0.124	Concrete and Shotcrete						$ -
		Main Portal						$ -
			Concrete Slab	30	CY	$	434.30	$ 13,029.00
			Concrete Walls	570	CY	$	434.29	$ 247,546.00
			Concrete Overbreak 12"H/6"V	40	CY	$	393.90	$ 15,756.00
			Reinforcing Steel	40	TON	$	3,086.65	$ 123,466.00
		Comp. Water Portal						$ -
			Concrete Slab	30	CY	$	434.30	$ 13,029.00
			Concrete Walls	570	CY	$	434.29	$ 247,546.00
			Concrete Overbreak 12'H/6"V	40	CY	$	393.90	$ 15,756.00
			Reinforcing Steel	40	TON	$	3,086.65	$ 123,466.00
		Tunnels						$ -
			Concrete Slab Main Tunnel	4030	CY	$	538.66	$ 2,170,784.00
			Concrete Plugs Pens Elbow Access	10000	CY	$	837.74	$ 8,377,440.00
			Concrete Comp Water Slab 35'D	1030	CY	$	907.56	$ 934,783.00
			Concrete Overbreak Main Tunnel 6"	2130	CY	$	383.97	$ 817,848.00
			Concrete Comp Water Slab 6"O/B	540	CY	$	534.06	$ 288,393.00
			Reinforcing Steel Main Tunnel	140	TON	$	3,090.99	$ 432,739.00
			Reinforcing Steel Comp Water Slab	40	TON	$	3,091.00	$ 123,640.00
			2" Shotcrete Main Tunnel	7950	SF	$	5.63	$ 44,723.00
			2" Shotcrete Transformer Gal	1260	SF	$	5.63	$ 7,088.00
			2" Shotcrete Surge Chamber Access	800	SF	$	5.63	$ 4,500.00
			2" Shotcrete Penstock Access	3750	SF	$	5.63	$ 21,096.00
			2" Shotcrete Penstock Elbow Acc	3750	SF	$	5.63	$ 21,096.00
			2" Shotcrete Access Shaft	750	SF	$	5.63	$ 4,219.00
			2" Shotcrete Grout Gallery	470	SF	$	5.63	$ 2,644.00
			2" Shotcrete Connector Tunnel	330	SF	$	5.62	$ 1,856.00
			2" Shotcrete Comp Water 35'D	2050	SF	$	5.63	$ 11,532.00
			2" Shotcrete Comp Water 10'D	450	SF	$	5.62	$ 2,531.00
	0.125	Support and Anchors						$ -
		Main Tunnel						$ -

			Rockbolts 1" @ 12'	1440	EACH	$	564.79	$ 813,301.00
			Rockbolts 1" @ 9'	190	EACH	$	461.91	$ 87,762.00
			Steel Mesh	132500	SF	$	6.87	$ 910,254.00
			Steel Support	120	TON	$	13,684.35	$ 1,642,122.00
			Main Tunnel Portal					$ -
			Rockbolts 1" @ 15'	50	EACH	$	786.58	$ 39,329.00
			Transformer Gallery Tunnel					$ -
			Rockbolts 1" @ 12'	230	EACH	$	564.79	$ 129,902.00
			Rockbolts 1" @ 9'	30	EACH	$	461.90	$ 13,857.00
			Steel Mesh	20940	SF	$	6.87	$ 143,854.00
			Steel Support	20	TON	$	13,684.35	$ 273,687.00
			Grouting Gallery Tunnel					$ -
			Rockbolts 3/4" @ 6'	220	EACH	$	349.70	$ 76,934.00
			Steel Support	3	TON	$	13,684.33	$ 41,053.00
			Steel Mesh	100	SF	$	6.87	$ 687.00
			Surge Chamber Tunnel					$ -
			Rockbolts 1" @ 12'	150	EACH	$	564.79	$ 84,719.00
			Rockbolts 1" @ 9'	30	EACH	$	461.90	$ 13,857.00
			Steel Support	13	TON	$	13,684.38	$ 177,897.00
			Steel Mesh	13200	SF	$	6.87	$ 90,682.00
			Penstock Access Tunnel					$ -
			Rockbolts 1" @ 12'	680	EACH	$	564.79	$ 384,059.00
			Rockbolts 1" @ 9'	90	EACH	$	461.90	$ 41,571.00
			Steel Support	60	TON	$	13,684.35	$ 821,061.00
			Steel Mesh	62150	SF	$	6.87	$ 426,961.00
			Penstock Elbow Access Tunnel					$ -
			Rockbolts 1" @ 12'	280	EACH	$	564.79	$ 158,142.00
			Rockbolts 1" @ 9'	80	EACH	$	461.90	$ 36,952.00
			Steel Support	20	TON	$	13,684.35	$ 273,687.00
			Steel Mesh	14760	SF	$	6.87	$ 101,399.00
			Access Shaft Tunnel					$ -
			Rockbolts 1" @ 12'	50	EACH	$	564.80	$ 28,240.00
			Rockbolts 1" @ 9'	50	EACH	$	461.90	$ 23,095.00
			Steel Support	20	TON	$	13,684.35	$ 273,687.00
			Steel Mesh	2500	SF	$	6.87	$ 17,175.00
			Connector Tunnel					$ -
			Rockbolts 3/4" @ 6'	160	EACH	$	349.70	$ 55,952.00
			Steel Support	2	TON	$	13,684.50	$ 27,369.00
			Steel Mesh	70	SF	$	6.87	$ 481.00
			Comp. Water Tunnel 35' D					$ -
			Rockbolts 1" @ 12'	370	EACH	$	564.79	$ 208,973.00
			Rockbolts 1" @ 9'	50	EACH	$	461.90	$ 23,095.00
			Steel Support	30	TON	$	13,684.37	$ 410,531.00
			Steel Mesh	33600	SF	$	6.87	$ 230,827.00
			Comp. Water Tunnel Portal					$ -
			Rockbolts 1" @ 15'	40	EACH	$	786.58	$ 31,463.00
			Comp. Water Tunnel 10' D					$ -
			Rockbolts 3/4" @ 6'	210	CY	$	195.49	$ 41,053.00
			Steel Support	3	CY	$	206.00	$ 618.00
			Steel Mesh	90	CY	$	1,278.98	$ 115,108.00
	0.129		Architectural					$ -
			Main Portal Doors	2	SETS	$	194,294.00	$ 388,588.00
			Comp. Water Portal Door	1	LS	$	58,776.00	$ 58,776.00
	.12C		Mechanical					$ -
			Ventilating System					$ -
			(included In 63.71 and 63.72)					$ -
0.13			Access Shaft					$ -
	0.131		Excavation					$ -
			Rock	14500	CY	$	227.67	$ 3,301,225.00
	0.133		Surface Preparation					$ -
			Shaft	70200	SF	$	3.56	$ 249,783.00
	0.134		Concrete and Shotcrete					$ -
			Concrete Lining	3600	CY	$	1,009.98	$ 3,635,928.00

		Concrete Overbreak 6"	1300	CY	$	589.16	$	765,902.00
	0.135	Support and Anchors					$	-
		Rockbolts 3/4" @ 6'	1120	EACH	$	349.70	$	391,664.00
	0.138	Structural - Misc Steelwork					$	-
		Miscellaneous Steelwork	50	TON	$	7,905.38	$	395,269.00
	0.139	Architectural					$	-
		(included in 331.2 Control Bldg)					$	-
	.13C	Mechanical					$	-
		Elevators	1	LS	$	2,370,000.00	$	2,370,000.00
0.14		Access Shaft					$	-
	0.141	Excavation					$	-
		Rock	1150	CY	$	592.92	$	681,853.00
	0.143	Surface Preparation					$	-
		Head Tank	2800	SF	$	2.36	$	6,617.00
	0.144	Concrete and Shotcrete					$	-
		Concrete Lining	250	CY	$	1,030.18	$	257,545.00
		Concrete Overbreak 6"	45	CY	$	434.29	$	19,543.00
		Reinforcing Steel	10	TON	$	3,055.40	$	30,554.00
	0.145	Support and Anchors					$	-
		Rockbolts 1" @ 12'	25	EACH	$	564.80	$	14,120.00
		Rockbolts 1" @ 9'	10	EACH	$	461.90	$	4,619.00
		Steel Mesh	1200	SF	$	6.80	$	8,160.00
		Steel Support	2	TON	$	13,546.00	$	27,092.00
	0.148	Structural - Misc Steelwork					$	-
		Miscellaneous Steelwork	1	LS	$	78,353.00	$	78,353.00
	.14C	Mechanical					$	-
		Piping/Valves					$	-
		(Included in 335.12)					$	-
0.15		Bus Tunnels					$	-
		(Totals for 4 Bus Tunnels)					$	-
	0.151	Excavation					$	-
		Rock Horizontal	3200	CY	$	213.70	$	683,832.00
		Rock Inclined	2000	CY	$	601.04	$	1,202,083.00
	0.153	Surface Preparation					$	-
		Tunnel	11300	SF	$	2.45	$	27,738.00
	0.154	Concrete and Shotcrete					$	-
		Concrete Slab	800	CY	$	875.32	$	700,253.00
		Concrete Overbreak 12"	360	CY	$	504.99	$	181,796.00
		Reinforcing Steel	40	TON	$	3,055.40	$	122,216.00
		2" Shotcrete	520	SF	$	5.63	$	2,925.00
	0.155	Support and Anchors					$	-
		Rockbolts 1" @ 25'	80	EACH	$	1,320.04	$	105,603.00
		Rockbolts 1" @ 12'	110	EACH	$	564.79	$	62,127.00
		Rockbolts 1" @ 9'	30	EACH	$	461.90	$	13,857.00
		Steel Mesh	8600	SF	$	6.80	$	58,483.00
		Steel Support	14	TON	$	13,545.86	$	189,642.00
0.16		Transformer Gallery					$	-
	0.161	Excavation					$	-
		Rock	28800	CY	$	373.35	$	10,752,414.00
	0.163	Surface Preparation					$	-
		Transformer Gallery	26500	SF	$	2.36	$	62,623.00
	0.164	Concrete and Shotcrete					$	-
		Concrete Slab	2810	CY	$	1,312.97	$	3,689,457.00
		Concrete Overbreak 12"H/6"V	820	CY	$	403.99	$	331,273.00
		Reinforcing Steel	140	TON	$	3,055.41	$	427,757.00
		3" Shotcrete	1100	SF	$	8.21	$	9,031.00
	0.165	Support and Anchors					$	-
		Rockbolts 1" @ 25'	170	EACH	$	1,320.04	$	224,406.00
		Rockbolts 1" @ 15'	90	EACH	$	786.58	$	70,792.00
		Steel Mesh	22200	SF	$	6.20	$	137,590.00
		Steel Support	17	TON	$	13,545.88	$	230,280.00
	0.161	Drainage					$	-
		Holes (In Gallery Crown)	8900	LF	$	54.88	$	488,443.00

	0.17		Cable Shafts					$	-		
			(Totals for 2 Shafts)					$	-		
		0.171	Excavation					$	-		
			Rock	3000	CY	$	642.47	$	1,927,396.00		
		0.173	Surface Preparation					$	-		
			Shafts	36000	SF	$	3.56	$	128,094.00		
		0.174	Concrete and Shotcrete					$	-		
			Concrete Lining	920	CY	$	1,885.30	$	1,734,472.00		
			Concrete Overbreak 6"	670	CY	$	942.65	$	631,574.00		
		0.175	Support and Anchors					$	-		
			Rockbolts 3/4" @ 6'	570	EACH	$	349.70	$	199,329.00		
		0.178	Structural - Misc Steelwork					$	-		
			Miscellaneous Steelwork	13	TON	$	16,678.00	$	216,814.00		
		0.179	Architectural					$	-		
			Enclosures	1	LS	$	213,063.00	$	213,063.00		
		.17C	Mechanical					$	-		
			Man hoist	2	EACH	$	517,960.00	$	1,035,920.00		
	0.18		Dewatering (During Construct)					$	-		
		0.181	Dewatering (Power Facilities)					$	-		
			Dewatering	1	LS	$	1,653,075.00	$	1,653,075.00		
	0.19		Cable Shafts					$	-		
		0.191	Excavation					$	-		
			Rock	1	LS	$	1,532,978.00	$	1,532,978.00		
	0.2		Misc Buildings and Structures					$	-		
			Misc Buildings and Structures	1	LS	$	473,882.00	$	473,882.00		
								$	-	**$**	**165,000,000**
332			**Reservoir, Dams and Waterways**					$	-		
	0.1		Reservoir					$	-		
		0.11	Clearing					$	-		
			Clearing	6350	Acre	$	3,072.12	$	19,507,935.00		
	0.2		Diversion Tunnels/Cofferdams					$	-		
		0.21	Diversion Tunnels/Portals					$	-		
		0.211	Excavation					$	-		
			Tunnel					$	-		
			Rock	48300	CY	$	116.81	$	5,641,889.00		
			Excavate Concrete for Plug	450	CY	$	122.62	$	55,177.00		
			Upstream Portal					$	-		
			Overburden	1950	CY	$	18.33	$	35,750.00		
			Rock	50200	CY	$	52.56	$	2,638,325.00		
			Downstream Portal					$	-		
			Overburden	6600	CY	$	18.33	$	121,001.00		
			Rock	54000	CY	$	52.56	$	2,838,039.00		
		0.213	Surface Preparation/Grouting					$	-		
			Upstream Portal					$	-		
			Horizontal	4400	SF	$	2.45	$	10,801.00		
			Inclined	15300	SF	$	3.56	$	54,440.00		
			Downstream Portal					$	-		
			Horizontal	1300	SF	$	2.45	$	3,191.00		
			Inclined	2900	SF	$	3.56	$	10,319.00		
			Grout Tunnel Plug					$	-		
			Drill Holes	2050	LF	$	12.73	$	26,095.00		
			Cement	410	CF	$	72.48	$	29,717.00		
		0.214	Concrete and Shotcrete					$	-		
			Tunnel					$	-		
			Concrete Lining	8100	CY	$	605.99	$	4,908,503.00		
			Concrete Plug	3000	CY	$	457.86	$	1,373,573.00		
			Concrete Overbreak 6"	3200	CY	$	336.66	$	1,077,312.00		
			Reinforcing Steel	15	TON	$	3,086.67	$	46,300.00		
			2" Shotcrete	4400	SF	$	5.63	$	24,752.00		
			Upstream Portal					$	-		
			Concrete Headwall	2800	CY	$	696.89	$	1,951,281.00		
			Concrete Lining	1550	CY	$	253.73	$	393,281.00		
			Concrete Pier	400	CY	$	605.99	$	242,395.00		

				Overbreak 12"H/6"V	500	CY	$	523.59	$ 261,795.00
				Reinforcing Steel	310	TON	$	3,086.65	$ 956,860.00
				Downstream Portal					$ -
				Concrete Headwall	1000	CY	$	696.89	$ 696,886.00
				Overbreak 12"H6"V	100	CY	$	523.59	$ 52,359.00
				Reinforcing Steel	65	TON	$	3,086.65	$ 200,632.00
		0.215		Support and Anchors					$ -
				Tunnels					$ -
				Rockbolts 1" @ 12'	800	EACH	$	564.79	$ 451,834.00
				Rockbolts 1" @ 9'	90	EACH	$	461.90	$ 41,571.00
				Steel Mesh	76900	SF	$	6.87	$ 528,291.00
				Steel Support	90	TON	$	13,684.36	$ 1,231,592.00
				Upstream Portal					$ -
				Rockbolts 1" @ 15'	80	EACH	$	786.58	$ 62,926.00
				Rock Anchors 1" @ 25'	40	EACH	$	1,320.03	$ 52,801.00
				Rock Dowels	60	EACH	$	503.02	$ 30,181.00
				Downstream Portal					$ -
				Rockbolts 1" @ 15'	120	EACH	$	786.58	$ 94,389.00
				Rock Anchors 1" @ 25'	30	EACH	$	1,320.03	$ 39,601.00
		.21C		Mechanical					$ -
				Upstream Gate					$ -
				Gate Equipment	2	EACH	$	2,775,040.00	$ 5,550,080.00
				Downstream Outlet					$ -
				Stoplog Guides	1	SET	$	78,820.00	$ 78,820.00
				Stoplogs Including Followers	1	LS	$	-	$ -
	0.22			Upstream Cofferdam					$ -
		0.222		Fill					$ -
				Core	4600	CY	$	11.64	$ 53,522.00
				Fine/Filter	2800	CY	$	39.37	$ 110,222.00
				Course Filter	2700	CY	$	32.13	$ 86,746.00
				Rock Shell	19800	CY	$	11.21	$ 222,044.00
				Closure Dike	41900	CY	$	11.64	$ 487,512.00
				Rip Rap	7000	CY	$	25.92	$ 181,449.00
		0.223		Surface Preparation/Grouting					$ -
				Cutoff and Grout					$ -
				Holes	1600	LF	$	30.60	$ 48,967.00
				Grout	256000	CF	$	86.68	$ 22,191,237.00
		.22D		Dewatering					$ -
				Initial Dewatering	1	LS	$	1,796,709.00	$ 1,796,709.00
				Dewatering Maintenance	1	LS	$	9,171,995.00	$ 9,171,995.00
	0.23			Downstream Cofferdam					$ -
		0.231		Excavation					$ -
				Removal of Cofferdam	42000	CY	$	14.37	$ 603,519.00
		0.232		Fill					$ -
				Rip Rap	1650	CY	$	25.92	$ 42,770.00
				Closure Dike	47000	CY	$	11.64	$ 546,851.00
		0.233		Surface Prep/Grouting					$ -
				Cutoff and Grout					$ -
				Holes	2300	LF	$	30.60	$ 70,391.00
				Cement	368000	CF	$	10.60	$ 3,899,903.00
0.3				Main Dam					$ -
	0.31			Main Dam					$ -
		0.311		Excavation					$ -
				Overburden	35600	CY	$	12.35	$ 439,642.00
				Rock	320700	CY	$	53.47	$ 17,146,273.00
		0.313		Surface Preparation/Grouting					$ -
				Surface Preparation					$ -
				Under Dam/Thrust Blocks	171000	SF	$	3.32	$ 568,459.00
				Consolidation Grout					$ -
				Drill Holes	176900	LF	$	12.73	$ 2,251,795.00
				Cement	176900	CF	$	72.48	$ 12,821,648.00
				Grout Curtain					$ -
				Drill Holes	259000	LF	$	28.59	$ 7,405,680.00

		Cement	103600	CF	$	86.68	$	8,980,516.00
	0.314	Concrete and Shotcrete					$	-
		Dam					$	-
		Concrete	1281000	CY	$	437.66	$	560,639,898.00
		Concrete Overbreak	10400	CY	$	437.66	$	4,551,643.00
		Reinforcing steel	4500	TON	$	3,086.65	$	13,889,903.00
		Thrust blocks					$	-
		Concrete	105500	CY	$	437.66	$	46,172,919.00
		Concrete Overbreak	1100	CY	$	437.66	$	481,424.00
		Reinforcing steel	375	TON	$	3,086.65	$	1,157,492.00
		Joint Grouting					$	-
		Grouting	1	LS	$	6,024,540.00	$	6,024,540.00
	0.315	Support and Anchors					$	-
		Rockbolts 1" @ 25'	580	EACH	$	1,320.04	$	765,621.00
		Steel Mesh (on slopes)	275000	SF	$	5.28	$	1,452,776.00
	0.317	Drainage					$	-
		Holes	65800	LF	$	54.88	$	3,611,186.00
0.32		Grout Galleries/Portals					$	-
	0.321	Excavation					$	-
		Tunnels/Shafts - Core Area					$	-
		Rock Horizontal	13100	CY	$	422.05	$	5,528,863.00
		Rock inclined	5300	CY	$	591.06	$	3,132,621.00
		Rock Vertical	3400	CY	$	573.18	$	1,948,811.00
		Tunnels/Shafts Access					$	-
		Rock Horizontal	12400	CY	$	422.05	$	5,233,428.00
		Portals					$	-
		Overburden	28700	CY	$	18.33	$	526,171.00
		Rock	16500	CY	$	52.56	$	867,179.00
	0.323	Surface Preparation					$	-
		Portals					$	-
		Horizontal	50	SF	$	2.46	$	123.00
		Vertical	410	SF	$	3.56	$	1,459.00
	0.324	Concrete and Shotcrete					$	-
		Tunnels - Core Area					$	-
		Concrete Slab	1800	CY	$	6,565.54	$	11,817,964.00
		Concrete Overbreak 6"	900	CY	$	807.98	$	727,186.00
		Reinforcing Steel	62	TON	$	3,086.65	$	191,372.00
		2"Shotcrete	3300	SF	$	5.63	$	18,564.00
		Tunnels - Access					$	-
		Concrete Slab	1400	CY	$	1,009.98	$	1,413,972.00
		Concrete Overbreak 6"	700	CY	$	807.98	$	565,589.00
		Reinforcing Steel	50	TON	$	3,086.64	$	154,332.00
		2" Shotcrete	2500	SF	$	5.63	$	14,064.00
		Shafts - Core Area					$	-
		2" Shotcrete	6500	SF	$	5.63	$	36,566.00
		Portals (4 Portals)					$	-
		Concrete	40	CY	$	434.30	$	17,372.00
		Reinforcing Steel	3	TON	$	3,086.67	$	9,260.00
	0.325	Support and Anchors					$	-
		Tunnels - Core Area					$	-
		Rockbolts 1" @ 12'	150	EACH	$	564.79	$	84,719.00
		Rockbolts 1" @ 9'	30	EACH	$	461.90	$	13,857.00
		Rockbolts 3/4" @ 6'	1250	EACH	$	349.70	$	437,125.00
		Steel Mesh	12200	SF	$	7.04	$	85,934.00
		Steel support	27	TON	$	13,684.37	$	369,478.00
		Tunnels - Access					$	-
		Rockbolts 3/4" @ 6'	1200	EACH	$	349.70	$	419,640.00
		Steel Mesh	500	SF	$	7.04	$	3,522.00
		Steel support	12	TON	$	13,684.33	$	164,212.00
		Shafts - Core Area					$	-
		Rockbolts 3/4" @ 6'	300	EACH	$	349.70	$	104,910.00
		Steel Mesh	1300	SF	$	7.04	$	9,157.00
		Portals					$	-

			Rockbolts 1" @ 15'	150	EACH	$	786.58	$	117,987.00		
		0.328	Structural Steel - Misc Steelwork					$	-		
			Steel/Guides Shaft	50	TON	$	7,905.38	$	395,269.00		
			Steel Stairway	1	LS	$	316,022.00	$	316,022.00		
		0.329	Architectural					$	-		
			Portal Doors	4	EACH	$	45,028.75	$	180,115.00		
			Headshaft Structure	1	LS	$	1,028,580.00	$	1,028,580.00		
		0.32C	Mechanical					$	-		
			Elevator	1	LS	$	1,777,500.00	$	1,777,500.00		
			Overhead Crane	1	LS	$	1,449,100.00	$	1,449,100.00		
			Misc Mechanical Equipment	1	LS	$	284,400.00	$	284,400.00		
	0.33		Instrumentation					$	-		
		0.331	Instrumentation (Dam)					$	-		
			Instrumentation	1	LS	$	9,257,220.00	$	9,257,220.00		
0.4			Saddle Dam					$	-		
	0.41		Main Saddle Dam					$	-		
		0.411	Excavation					$	-		
			Overburden	1145000	CY	$	11.16	$	12,778,554.00		
			Rock	301000	CY	$	38.37	$	11,549,381.00		
		0.412	Fill					$	-		
			Impervious Core	313500	CY	$	19.05	$	5,970,802.00		
			Fine Filter	231000	CY	$	45.33	$	10,471,868.00		
			Course Filter	193000	CY	$	37.66	$	7,268,689.00		
			Rock Shell (Upstream)	534000	CY	$	9.52	$	5,085,472.00		
			Rip Rap	174500	CY	$	25.92	$	4,523,263.00		
			Rock Shell (Downstream)	345000	CY	$	9.52	$	3,285,558.00		
			Rockfill	127000	CY	$	9.52	$	1,209,466.00		
			Filter Fabric					$	-		
			Filter Fabric	190000	SF	$	1.89	$	359,419.00		
		0.413	Surface Preparation/Grouting					$	-		
			Surface Preparation					$	-		
			Under Dam Core	191500	SF	$	3.32	$	636,607.00		
			Under Dam Shell	432500	SF	$	2.29	$	991,878.00		
			Dental Concrete					$	-		
			Dental Concrete	7100	CY	$	390.53	$	2,772,732.00		
			Consolidation Grout					$	-		
			Drill Holes	57500	LF	$	12.73	$	731,929.00		
			Cement	57500	CF	$	72.48	$	4,167,579.00		
			Grout Curtain (See 332.313					$	-		
		0.417	Drainage (See 332.317)					$	-	**$**	**900,000,000**
0.5			Outlet Facility Valves (In Dam)					$	-		
	0.51		Outlet Facility Valves					$	-		
		.51C	Mechanical					$	-		
			Trashracks Guides	1	LS	$	4,384,500.00	$	4,384,500.00		
			Bulkhead Gate Guides	1	LS	$	2,891,400.00	$	2,891,400.00		
			Bulkhead Gates and Followers	2	EACH	$	495,440.00	$	990,880.00		
			Gantry Crane	1	LS	$	1,659,000.00	$	1,659,000.00		
			Fixed Cone Valves	1	LS	$	3,000,000.00	$	3,000,000.00		
			(7 Plus 2 Spare)	1	LS	$	7,584,000.00	$	7,584,000.00		
			Ring Follower Gates (7)	1	LS	$	14,931,000.00	$	14,931,000.00		
			Misc. Mechanical Equipment	1	LS	$	1,896,000.00	$	1,896,000.00		
			Misc. Electrical Systems	1	LS	$	237,000.00	$	237,000.00		
	0.52		Main (Chute) Spillway					$	-		
		0.521	Excavation					$	-		
			Approach					$	-		
			Overburden	44000	CY	$	15.92	$	700,352.00		
			Rock Useable	80000	CY	$	38.37	$	3,069,603.00		
			Rock Waste	17000	CY	$	38.37	$	652,291.00		
			Control Structure					$	-		
			(To end of Rollway)					$	-		
			Overburden	21500	CY	$	15.92	$	342,218.00		
			Rock Useable	87000	CY	$	39.60	$	3,444,768.00		
			Rock Waste	15000	CY	$	35.41	$	531,095.00		

	Chute and Flip					$	-
	(End Rollway to End Flip)					$	-
	Overburden	128500	CY	$	15.92	$	2,045,347.00
	Rock Useable (Inclined)	38000	CY	$	49.00	$	1,861,994.00
	Rock Useable (Vertical)	401000	CY	$	49.00	$	19,648,936.00
	Rock Waste	93500	CY	$	38.37	$	3,587,598.00
	Outfall					$	-
	(From end of Basin)					$	-
	Overburden	44500	CY	$	15.92	$	708,311.00
	Rock Useable	141500	CY	$	42.22	$	5,974,533.00
	Rock Waste	41500	CY	$	31.57	$	1,310,291.00
	Drain Tunnel					$	-
	Rock Horizontal	1500	CY	$	422.05	$	633,076.00
	Rock Inclined	2300	CY	$	591.06	$	1,359,439.00
	River Channel					$	-
	Alluvium Excavation	67000	CY	$	13.44	$	900,448.00
0.523	Surface Preparation/Grouting					$	-
	Surface Preparation					$	-
	Spillway					$	-
	Rock Horizontal	108000	SF	$	2.29	$	247,683.00
	Rock Inclined	41500	SF	$	3.32	$	137,959.00
	Consolidation Grout					$	-
	Drill Holes	22000	LF	$	12.73	$	280,042.00
	Cement	22000	CF	$	72.48	$	1,594,552.00
	Grout Curtain (See 332.313)					$	-
0.524	Concrete & Shotcrete					$	-
	Concrete Structure					$	-
	(To end of Rollway)					$	-
	(Including Storage Areas)					$	-
	Concrete outer Walls	15500	CY	$	471.32	$	7,305,522.00
	Concrete Piers (Full Length)	7700	CY	$	471.32	$	3,629,195.00
	Concrete Deck	1600	CY	$	471.32	$	754,118.00
	Concrete Rollway Slab	33000	CY	$	471.32	$	15,553,692.00
	Concrete Overbreak (12"H/6"V	1400	CY	$	370.33	$	518,456.00
	Reinforcing Steel	2300	TON	$	3,086.65	$	7,099,284.00
	Concrete Chute & Flip					$	-
	(End Rollway to End Flip)					$	-
	(Including Box Drain Galleries)					$	-
	Concrete Slabs	13000	CY	$	481.42	$	6,258,509.00
	Concrete Walls	20500	CY	$	511.72	$	10,490,326.00
	Concrete Overbreak 18"H/6"V	6300	CY	$	336.66	$	2,120,958.00
	Reinforcing Steel	1300	TON	$	3,086.65	$	4,012,639.00
	Concrete Drain Gallery					$	-
	Concrete Slab	400	CY	$	1,009.98	$	403,992.00
	Concrete Overbreak 6"	200	CY	$	605.99	$	121,198.00
	Reinforcing Steel	14	TON	$	3,086.64	$	43,213.00
	2" Shotcrete Dome	2500	SF	$	5.63	$	14,064.00
0.525	Support and Anchors					$	-
	Drainage Tunnel					$	-
	Steel Support	4	TON	$	13,684.25	$	54,737.00
	Steel Mesh	500	SF	$	7.04	$	3,522.00
	Rockbolts Drainage Gallery					$	-
	3/4" @6'	400	EACH	$	352.95	$	141,180.00
	Rockbolts Approach					$	-
	1" @ 15'	140	EACH	$	792.43	$	110,940.00
	Rockbolts Chute & Structure					$	-
	1" @ 15'	85	EACH	$	792.42	$	67,356.00
	Slab/Wall Anchors					$	-
	1" @ 10'	3700	EACH	$	506.75	$	1,874,969.00
0.527	Drainage					$	-
	Drill Holes					$	-
	Box Drains (To Drain Tunnel)	28000	LF	$	51.27	$	1,435,685.00
	3" relief	500	LF	$	52.93	$	26,466.00

		.52C	Mechanical					$	-
			Gate Equipment	3	EACH	$	4,010,800.00	$	12,032,400.00
			Stop Log Guides	3	SETS	$	101,340.00	$	304,020.00
			StopLogs Including Followers	1	SET	$	1,080,960.00	$	1,080,960.00
			Miscellaneous Electrical	1	LS	$	237,000.00	$	237,000.00
	0.53		Emergency spillway					$	-
		0.531	Excavation (Including -					$	-
			Bridge and Fuse Plug)					$	-
			Overburden	281500	CY	$	7.04	$	1,980,662.00
			Rock Useable	1019000	CY	$	39.81	$	40,568,805.00
			Rock Waste	215500	CY	$	39.04	$	8,413,510.00
		0.532	Fill					$	-
			Fuse Plug	26000	CY	$	22.27	$	579,079.00
								$	-
		0.533	Surface Preparation/Grouting					$	-
			Surface prep (under Fuse Plug)					$	-
			Horizontal	75500	SF	$	2.45	$	185,328.00
			Inclined	2500	SF	$	3.56	$	8,895.00
			Consolidation Grouting					$	-
			Drill Holes	23000	LF	$	12.73	$	292,772.00
			Cement	23000	CF	$	72.48	$	1,667,032.00
			Grout Curtain (See 332.313)					$	-
		0.534	Concrete					$	-
			Ground Slab	6000	CY	$	370.33	$	2,221,956.00
			Concrete Overbreak 12"H/12"V	3000	CY	$	370.33	$	1,110,978.00
			Reinforcing Steel	210	TON	$	3,086.64	$	648,195.00
		0.535	Support & Anchors					$	-
			Rockbolts 1" @ 15'	300	EACH	$	786.58	$	235,973.00
			Rock Anchors 1" @ 25'	760	EACH	$	1,320.04	$	1,003,228.00
		.53B	Bridge					$	-
			Bridge	1	LS	$	2,962,678.00	$	2,962,678.00
0.6			Power Intakes					$	-
	0.61		Power Intake Structures & App					$	-
		0.611	Excavation					$	-
			Overburden	99000	CY	$	15.92	$	1,575,793.00
			Rock	201600	CY	$	39.60	$	7,982,358.00
		0.613	Surface Preparation					$	-
			Horizontal	12100	SF	$	2.46	$	29,766.00
			Inclined	58000	SF	$	3.56	$	206,480.00
		0.614	Concrete and Shotcrete					$	-
			Structure					$	-
			Concrete Structure	14500	CY	$	582.42	$	8,445,116.00
			Concrete Overbreak 12"H/6"V	1530	CY	$	360.23	$	551,146.00
			Reinforcing Steel	940	TON	$	3,086.64	$	2,901,446.00
		0.615	Support & Anchors					$	-
			Approach					$	-
			Rockbolts 1" @ 15'	140	EACH	$	786.58	$	110,121.00
		.61C	Mechanical					$	-
			Trashracks/Guides	4	SETS	$	382,840.00	$	1,531,360.00
			Bulkhead Gate Guides	4	SETS	$	168,900.00	$	675,600.00
			Bulkhead Gates & Followers	1	SETS	$	619,300.00	$	619,300.00
			Intake Gantry Crane	1	EACH	$	2,815,000.00	$	2,815,000.00
			Intake Gate Equipment	4	EACH	$	2,049,320.00	$	8,197,280.00
			Miscellaneous Electrical	1	LS	$	237,000.00	$	237,000.00
		.61D	Intake Building					$	-
			Intake Building	1	LS	$	473,882.00	$	473,882.00
0.7			Surge Chambers					$	-
	0.71		Surge Chamber					$	-
		0.711	Excavation					$	-
			Chamber Rock	153800	CY	$	96.04	$	14,771,512.00
			Vent Shaft Rock	2300	CY	$	641.49	$	1,475,434.00
		0.713	Surface Preparations	6,100	SF	$	2.45	$	14,974.00
		0.714	Concrete and Shotcrete					$	-

			Chamber					$	-
			Concrete Chamber	1,300	CY	$	548.76	$	713,383.00
			Concrete Overbreak	140	CY	$	471.32	$	65,985.00
			Reinforcing Steel	65	TON	$	3,086.65	$	200,632.00
			3" Shotcrete	3,200	SF	$	8.21	$	26,273.00
			2" Shotcrete	2,300	SF	$	5.63	$	12,939.00
			Vent Shaft					$	-
			2" Shotcrete	6,300	SF	$	5.63	$	35,441.00
		0.715	Support and Anchors					$	-
			Chamber					$	-
			Rockbolts 1" @ 25'	725	EACH	$	1,320.04	$	957,027.00
			Rockbolts 1" @ 15'	600	EACH	$	786.58	$	471,947.00
			Steel Mesh	29,400	SF	$	6.26	$	184,077.00
			Steel Support	70	TON	$	13,684.36	$	957,905.00
			Vent Shaft					$	-
			Rockbolts 3/4" @ 6'	400	EACH	$	349.70	$	139,880.00
			Steel Mesh	1,300	SF	$	6.80	$	8,846.00
		0.717	Drainage Holes (In Chamber Crown)	13,650	LF	$	-	$	-
0.8			Penstocks					$	-
	0.81		Penstocks					$	-
		0.811	Excavation Tunnels					$	-
			Rock Horizontal	10,500	CY	$	164.79	$	1,730,245.00
			Rock Inclined	44,600	CY	$	325.72	$	14,527,123.00
		0.813	Surface Preparations/Grouting					$	-
			Surface Preparation					$	-
			Tunnels	173,500	SF	$	2.45	$	425,887.00
			Contact Grouting	1	LS	$	191,022.00	$	191,022.00
			Consolidation Grouting	1	LS	$	525,311.00	$	525,311.00
		0.814	Concrete and Shotcrete					$	-
			Concrete Liner	17,600	CY	$	1,036.91	$	18,249,665.00
			Concrete Plug	10,000	CY	$	807.98	$	8,079,840.00
			Concrete Overbreak 6"	4,700	CY	$	740.65	$	3,481,064.00
			Concrete Overbreak Plug	860	CY	$	740.65	$	636,961.00
			Reinforcing Steel	18	TON	$	3,055.39	$	54,997.00
			2" Shotcrete	19,100	SF	$	5.63	$	107,447.00
		0.815	Support and Anchors					$	-
			Rockbolts 1" @ 25'	100	EACH	$	1,320.04	$	132,004.00
			Rockbolts 1" @ 6'	1,350	EACH	$	349.70	$	472,095.00
			Steel Mesh	86,800	SF	$	6.80	$	590,268.00
		0.818	Structural- Misc Steelwork					$	-
			Steel Liner	2,000	TON	$	10,340.36	$	20,680,720.00
0.9			Tailrace Works					$	-
	0.91		Tailrace Tunnels/Portals					$	-
		0.911	Excavation					$	-
			Tunnels					$	-
			Rocks	329,300	CY	$	99.01	$	32,603,116.00
			Portal					$	-
			Overburden	40,000	CY	$	18.33	$	733,340.00
			Rock	21,000	CY	$	52.56	$	1,103,682.00
		0.913	Surface Preparation					$	-
			Tunnels					$	-
			Tunnel	582,000	SF	$	3.56	$	2,070,849.00
			Portal					$	-
			Horizontal	400	SF	$	2.46	$	982.00
			Inclined	2,700	SF	$	3.56	$	9,607.00
		0.914	Concrete and Shotcrete					$	-
			Tunnels					$	-
			Concrete Lining	31,700	CY	$	471.32	$	14,940,971.00
			Concrete Overbreak 6"	16,200	CY	$	349.06	$	5,654,772.00
			Reinforcing Steel	13	TON	$	3,086.62	$	40,126.00
			2" Shotcrete	17,500	SF	$	5.63	$	98,446.00
			Portal					$	-
			Concrete Base Slab	100	CY	$	696.89	$	69,689.00

				Concrete Walls	650	CY	$	696.89	$	452,976.00	
				Concrete Overbreak 12"H/6"V	50	CY	$	523.60	$	26,180.00	
				Reinforcing Steel	50	TON	$	3,086.64	$	154,332.00	
		0.915		Supports and Anchors					$	-	
				Tunnels					$	-	
				Rockbolts 1" @ 12'	3,160	EACH	$	564.79	$	1,784,744.00	
				Rockbolts 1" @ 9'	490	EACH	$	461.91	$	226,334.00	
				Steel Mesh	291,000	SF	$	6.87	$	1,999,123.00	
				Steel Support	232	TON	$	13,684.35	$	3,174,770.00	
				Portal					$	-	
				Rockbolts 1" @ 15'	100	EACH	$	786.58	$	78,658.00	
		0.916		Mechanical					$	-	
				Stoplog Guides	1	LS	$	97,170.00	$	97,170.00	
									$	-	**$ 416,000,000**
333			**Waterwheels, Turbines, and Generators**						$	-	
	0.1			Turbines and Governors					$	-	
		0.11		Turbines and Governors					$	-	
			0.111	Supply	4	EACH	$	73,750,000.00	$	295,000,000.00	
			0.112	Install	4	EACH	$	-	$	-	
	0.2			Generators and Exciters					$	-	
		0.21		Generators and Exciters					$	-	
			0.211	Generators and Exciters	4	EACH			$	-	
	0.3			Total Bid From Vendor (includes all equipment in this category)					$	-	**$ 295,000,000**
				Price from Voith Bid					$	-	
									$	-	
334			**Accessory Electrical Equipment**						$	-	
	0.1			Connections, Supports, and Structures.					$	-	
		0.11		Structures					$	-	
			0.111	Structures (Incl. Below)					$	-	
		0.12		Conductors and Insulators					$	-	
			0.121	Generator Isolated Bus	1	LS	$	4,740,000.00	$	4,740,000.00	
			0.122	HV Power Cables and Access.	1	LS	$	2,844,000.00	$	2,844,000.00	
			0.123	LV Power Cables and Access.	1	LS	$	948,000.00	$	948,000.00	
			0.124	Control Cables and Accessories	1	LS	$	1,422,000.00	$	1,422,000.00	
			0.125	Grounding System	1	LS	$	355,500.00	$	355,500.00	
		0.13		Conduits and Fittings					$	-	
			0.131	Conduits and Fittings	1	LS	$	711,000.00	$	711,000.00	
	0.2			Switchgear and Control Equipment					$	-	
		0.21		Auxiliary Transformers					$	-	
			0.211	Auxiliary Transformers	4	EACH	$	65,040.00	$	260,160.00	
		0.22		Circuit Breakers					$	-	
			0.221	Circuit Breakers (not required)					$	-	
		0.23		Surge Protection and Generator Cubicles					$	-	
			0.231	Surge Protection and Generator Cubicles	1	LS	$	734,700.00	$	734,700.00	
		0.24		Switchboards					$	-	
			0.241	Switchboards	1	LS	$	1,706,400.00	$	1,706,400.00	
		0.25		Aux. Power Equipment Incl. Battery					$	-	
			0.251	Aux. Power Equipment	1	LS	$	521,400.00	$	521,400.00	
	0.3			Cubicles and Appurtenances					$	-	
		0.31		Control, Relay, and Meter Boards					$	-	
			0.311	Control, Relay, and Meter Boards	1	LS	$	1,659,000.00	$	1,659,000.00	
		0.32		Computer Control System					$	-	
			0.321	Computer Control System (incl. in 353)					$	-	
		0.33		Supervisory. And Telemeter System					$	-	
			0.331	Supervisory. And Telemeter System (included in 353)					$	-	
	0.4			Power Transformers					$	-	
		0.41		Power Transformers					$	-	
			0.411	Power Transformers	13	EACH	$	1,300,000.00	$	16,900,000.00	
	0.5			Lighting System					$	-	
		0.51		Powerhouse and Transformer Gallery					$	-	
			0.511	Powerhouse and Transformer Gallery	1	LS	$	1,564,200.00	$	1,564,200.00	
		0.52		Access Tunnels and Roads					$	-	
			0.521	Access Tunnels and Roads	1	LS	$	402,900.00	$	402,900.00	

	0.6		Misc. Electrical Equipment					$ -			
		0.61	Misc. Electrical Equipment					$ -			
			0.611 Misc. Electrical Equipment	1	LS	$	521,400.00	$ 521,400.00			
	0.7		Surface Accessory Elec. Equipment					$ -			
		0.71	4.16 kV and LV Equipment					$ -			
			0.711 Switchboards	1	LS	$	165,900.00	$ 165,900.00			
			0.712 Cables	1	LS	$	521,400.00	$ 521,400.00			
			0.713 Aux. Transformers	1	LS	$	284,400.00	$ 284,400.00			
		0.73	Diesel Generators - Standby					$ -			
			0.731 Diesel Generators - Standby	2	EACH	$	337,800.00	$ 675,600.00			
		0.74	Exterior Lighting					$ -			
			0.741 Exterior Lighting	1	LS	$	592,500.00	$ 592,500.00			
								$ -		**$**	**38,000,000**
335			**Misc. Power Plant Equipment**					$ -			
	0.1		Auxiliary Systems - Underground					$ -			
		0.11	Station Water Systems					$ -			
			0.111 Station Water Systems	1	LS	$	3,081,000.00	$ 3,081,000.00			
		0.12	Fire Protection Systems					$ -			
			0.121 Fire Protection Systems	1	LS	$	2,370,000.00	$ 2,370,000.00			
		0.13	Compressed Air Systems					$ -			
			0.131 Compressed Air Systems	1	LS	$	3,318,000.00	$ 3,318,000.00			
		0.14	Oil Handling Systems					$ -			
			0.141 Oil Handling Systems	1	LS	$	2,370,000.00	$ 2,370,000.00			
		0.15	Drainage And Dewatering					$ -			
			0.151 Drainage And Dewatering	1	LS	$	3,555,000.00	$ 3,555,000.00			
		0.16	Heat, Vent, and Cooling System					$ -			
			0.161 Heat, Vent, and Cooling System	1	LS	$	2,844,000.00	$ 2,844,000.00			
		0.17	Miscellaneous					$ -			
			0.171 Miscellaneous	1	LS	$	2,133,000.00	$ 2,133,000.00			
	0.2		Auxiliary Systems - Surface Facilities					$ -			
		0.21	Auxiliary Systems - Surface Facilities					$ -			
			0.211 Auxiliary Systems - Surface Facilities	1	LS	$	355,500.00	$ 355,500.00			
	0.3		Auxiliary Equipment					$ -			
		0.31	Powerhouse Cranes					$ -			
			0.311 Powerhouse Cranes	2	EACH	$	1,936,800.00	$ 3,873,600.00	ok		
		0.32	Elevators					$ -			
			0.321 Elevators	1	LS	$	545,100.00	$ 545,100.00			
		0.33	Misc. Cranes and Hoist					$ -			
			0.331 Misc. Cranes and Hoist	1	LS	$	505,500.00	$ 505,500.00			
		0.34	Compensation Pumps					$ -			
			0.341 Pumps and Motors	2	EACH	$	1,300,800.00	$ 2,601,600.00			
			0.342 Valves	4	EACH	$	151,760.00	$ 607,040.00			
		0.35	Machine Shop Equipment					$ -			
			0.351 Machine Shop Equipment	1	LS	$	474,000.00	$ 474,000.00			
	0.4		General Station Equipment (Included in Mechanical and Electrical Systems)					$ -			
	0.5		Communication Equipment	1	LS	$	213,300.00	$ 213,300.00			
								$ -		**$**	**29,000,000**
336			**Roads**					$ -			
	0.1		Roads					$ -			
		0.12	Site Roads					$ -			
			Site Roads	7	MILE	$	750,000.00	$ 5,250,000.00			
			Maintenance	60	MI/YRS	$	205,489.98	$ 12,329,399.00			
		0.13	Trans Dam Crossing					$ -			
			Trans Dam Crossing (7.26 Miles)					$ -			
			Clearing	45	ACRE	$	10,953.82	$ 492,922.00			
			Waste Excavation	132,300	CY	$	9.12	$ 1,206,206.00			
			Common Excavation	114,500	CY	$	7.99	$ 914,752.00			
			Rock Excavation	12,200	CY	$	28.21	$ 344,153.00			
			Borrow	90,200	CY	$	12.14	$ 1,095,035.00			
			NFS Subbase Material	27,960	CY	$	18.17	$ 508,135.00			
			Grade "A" Base Material	15,260	CY	$	33.92	$ 517,565.00			
			D-1 Base Material	6,370	TON	$	43.62	$ 277,833.00			
			A.C. Surfacing	5,830	TON	$	195.78	$ 1,141,374.00			

		Guardrail	2,640	LF	$	89.20	$	235,489.00		
		18" Culverts	1,785	LF	$	60.01	$	107,122.00		
		Thaw Pipes	1,785	LF	$	89.84	$	160,368.00		
		Topsoil and Seed	29	ACRE	$	7,266.03	$	210,715.00		
		Traffic Control Devices	3	MILE	$	37,438.33	$	112,315.00		
		Maintenance					$	-		
		Maintenance	7	MI/YRS	$	29,276.29	$	204,934.00		
							$	-	**$**	**25,000,000**
350-359		**Transmission Plant**								
		Substations per EPS Cost Estimate (1 at Devil Canyon)	1	EA	$	35,000,000.00	$	35,000,000.00		
									$	**35,000,000.00**
General Plant							$	-		
389		**Land and Land Rights (Included in 330)**					$	-		
							$	-		
390		**Structures and Improvements (Included in 331.2)**					$	-		
							$	-		
391		**Office Furniture/Equipment (Included in 399)**					$	-		
							$	-		
392		**Transportation Equipment (Included in 399)**					$	-		
							$	-		
393		**Stores Equipment (Included in 399)**					$	-		
							$	-		
394		**Tools Shop and Garage Equipment (Included in 399)**					$	-		
							$	-		
395		**Laboratory Equipment (Included in 399)**					$	-		
							$	-		
396		**Power Operated Equipment (Included in 399)**					$	-		
							$	-		
397		**Communications Equipment (Included in 399)**					$	-		
							$	-		
398		**Miscellaneous Equipment (Included in 399)**					$	-		
							$	-		
399		**Other Tangible Property**	1	LS	$	16,000,000.00	$	16,000,000.00		
							$	-	**$**	**16,000,000**
Indirect Costs							$	-		
61		**Temporary Construction Facilities (Included in Direct Costs)**					$	-		
62		**Construction Equipment (Included in Direct Costs)**					$	-		
63		**Main Construction Camp**	1	LS	$	180,000,000.00	$	180,000,000.00		
	0.1								**$**	**180,000,000**
64		**Labor Expense (Included in Direct Costs)**					$	-		
65		**Superintendence (Included in Direct Costs)**					$	-		
66		**Insurance (Included in Direct Costs)**					$	-		
68		**Mitigation Fishery, Terrestrial and Recreational)**					$	-		
69		**Fees (Included in Direct Costs)**					$	-		
		Subtotal							**$**	**2,151,000,000**
		Contingency	**20**	%			$	-	**$**	**430,000,000**
Subtotal							$	-		
71A		**Engineering (4%), Environmental (2%), Regulatory (1%)**	**7**	**%**			$	-	**$**	**151,000,000**
71B		**Construction Management (4%)**	**4**	**%**					**$**	**86,000,000**
72		**Legal Expenses**	**0**	**%**			$	-		
75		**Taxes**	**0**	**%**			$	-		
76		**Administrative & Gen. Expenses**	**0**	**%**			$	-		
77		**Interest**	**0**	**%**			$	-		
80		**Earnings/Expenses During Construction**	**0**	**%**			$	-		
Total Project Cost									**$**	**2,818,000,000**

HDR/AEA Susitna Hydroelectric Project
Cost Estimates for 1982 quantities
By: HDR
By: Leanne Andruszkiewicz, EIT
Checked By: David Elwood, E.I.T.
Alternatives- 2008 Dollars
Date: 11/13/2009
Staged Development (6 Turbines Watana 4 Turbines Devil Canyon)
Watana I

FERC Lin	Sub Categories			Description	Quantity	Units	Unit Price	Line Price	Total
330			**Land and Land Rights**						
	0.1			Land	1	LS	$ 120,870,000.00	$ 120,870,000	
	0.2			Land Rights				$ -	
	0.3			Misc Charges in Credit Above				$ -	
								$ -	**$ 121,000,000**
								$ -	
331			**Powerplant Structure Improvements**					$ -	
	0.1			Powerhouse				$ -	
		0.11		Powerhouse and Draft Tube				$ -	
			0.111	Excavation				$ -	
				Powerhouse Vault Rock	122,500	CY	$ 90.12	$ 11,040,000	
				Draft Tube Rock	25,200	CY	$ 90.12	$ 2,270,000	
			0.113	Surface Preparation/ Grouting				$ -	
				Powerhouse	99,000	SF	$ 3.33	$ 330,000	
				Draft Tube	76,500	SF	$ 3.33	$ 250,000	
				Grout Curtain- Drill holes	43,800	LF	$ 27.63	$ 1,210,000	
				Grout Curtain- Cement	17,500	CF	$ 81.10	$ 1,420,000	
			0.114	Concrete and Shot Crete				$ -	
				Powerhouse Concrete	32,600	CY	$ 692.87	$ 22,590,000	
				Powerhouse Concrete Overbreak	2,400	CY	$ 447.21	$ 1,070,000	
				Powerhouse Reinforcing Steel	1,630	TON	$ 2,858.29	$ 4,660,000	
				Powerhouse 4" Shotcrete	41,000	SF	$ 10.14	$ 420,000	
				Draft Tube Concrete	12,000	CY	$ 692.87	$ 8,310,000	
				Draft Tube Concrete Overbreak	2,500	CY	$ 447.21	$ 1,120,000	
				Draft Tube Reinforcing Steel	990	TON	$ 2,858.29	$ 2,830,000	
				Draft Tube 2" Shotcrete	6,100	SF	$ 5.45	$ 30,000	
			0.115	Support and Anchors				$ -	
				Powerhouse Rockbolts 1" @ 25' Hy	970	EA	$ 1,234.86	$ 1,200,000	
				Powerhouse Rockbolts 1" @ 15'	1,970	EA	$ 735.81	$ 1,450,000	
				Powerhouse Steel Mesh	44,600	SF	$ 5.81	$ 260,000	
				Powerhouse Steel Support	137	TON	$ 12,671.94	$ 1,740,000	
				Draft Tube Rockbolts 1" @ 25' Hy	150	EA	$ 1,234.86	$ 190,000	
				Draft Tube Rockbolts 1" @ 12'	390	EA	$ 528.34	$ 210,000	
				Draft Tube Rockbolts 1" @ 9'	190	EA	$ 432.12	$ 80,000	
				Draft Tube Steel Mesh	18,900	SF	$ 6.55	$ 120,000	
			0.117	Holes (U/S of Powerhouse)	15,000	LF	$ 51.32	$ 770,000	
				Holes (Powerhouse Crown)	28,500	LF	$ 51.32	$ 1,460,000	
			0.118	Structural- Misc Steelwork				$ -	
				Powerhouse and Draft Tube- Steel Crane Rails	1	LS	$ 10,276,309.00	$ 10,280,000	
			0.119	Architectural- Powerhouse	1	LS	$ 2,927,898.00	$ 2,930,000	
			0.11c	Mechanical				$ -	
				Draft Tube Gates	4	SETS	$ 427,880.00	$ 1,710,000	
				Draft Tube Gate Guides	6	SETS	$ 202,680.00	$ 1,220,000	

			Draft Tube Crane	1	LS	$	1,140,000.00	$	1,140,000
0.12		Access Tunnels and Portals						$	-
	0.121	Excavation						$	-
			Main Tunnel	50,250	CY	$	97.45	$	4,900,000
			Transformer Gallery Tunnel	17,750	CY	$	97.45	$	1,730,000
			Grouting Gallery Tunnel	1,900	CY	$	396.04	$	750,000
			Surge Chamber Access Tunnel	7,250	CY	$	145.22	$	1,050,000
			Penstock Access Tunnel	61,500	CY	$	145.22	$	8,930,000
			Penstock Elbow Access Tunnel	15,000	CY	$	145.22	$	2,180,000
			Access Shaft Tunnel	1,300	CY	$	145.22	$	190,000
			Connector Tunnel	1,900	CY	$	379.26	$	720,000
			Portals Overburden	6,000	CY	$	17.14	$	100,000
			Portals Rock	3,000	CY	$	49.31	$	150,000
	0.123	Surface Preparation						$	-
			Main Tunnel Slab	53,100	SF	$	2.21	$	120,000
			Penstock Access Slab	65,200	SF	$	2.21	$	140,000
			Horizontal Portal	200	SF	$	2.30	$	-
			Inclined Portal	2,100	SF	$	3.33	$	10,000
	0.124	Concrete and Shot Crete						$	-
			Main Portal					$	-
			Concrete Slab	30	CY	$	406.27	$	10,000
			Concrete Walls	570	CY	$	406.27	$	230,000
			Concrete Overbreak	50	CY	$	368.48	$	20,000
			Reinforcing Steel	40	TON	$	2,887.51	$	120,000
			Tunnels					$	-
			Concrete Slab Main Tunnel	1,950	CY	$	503.90	$	980,000
			Concrete Plugs Penstock Elbow Acc	15,000	CY	$	755.86	$	11,340,000
			Concrete Overbreak Main Tunnel 6"	1,000	CY	$	346.43	$	350,000
			Reinforcing Steel	70	TON	$	2,887.51	$	200,000
			2 " Shotcrete Main Tunnel	20,100	SF	$	5.26	$	110,000
			2 " Shotcrete Transformer Gallery	7,100	SF	$	5.26	$	40,000
			2 " Shotcrete Surge Chamber Acc	3,900	SF	$	5.26	$	20,000
			2 " Shotcrete Penstock Access	24,700	SF	$	5.26	$	130,000
			2 " Shotcrete Penstock Elbow Acc	7,100	SF	$	5.26	$	40,000
			2 " Shotcrete Access Shaft	300	SF	$	5.26	$	-
			2 " Shotcrete Grout Gallery	800	SF	$	5.26	$	-
			2 " Shotcrete Connector Tunnel	800	SF	$	5.26	$	-
	0.125	Support and Anchors						$	-
			Main Tunnel					$	-
			Rockbolts 1" @12'	1,200	EA	$	528.34	$	630,000
			Rockbolts 1" @ 9'	250	EA	$	432.12	$	110,000
			Steel Mesh	63,000	SF	$	6.37	$	400,000
			Steel Support	66	TON	$	12,801.49	$	840,000
			Main Tunnel Portal					$	-
			Rockbolts 1" @15'	50	EA	$	735.79	$	40,000
			Transformer Gallery Tunnel					$	-
			Rockbolts 1" @12'	410	EA	$	528.34	$	220,000
			Rockbolts 1" @ 9'	70	EA	$	432.12	$	30,000
			Steel Mesh	22,500	SF	$	5.89	$	130,000
			Steel Support	24	TON	$	12,801.49	$	310,000
			Grouting Gallery Tunnel					$	-
			Rockbolts 3/4" @ 6'	160	EA	$	327.15	$	50,000
			Steel Mesh	160	SF	$	6.37	$	-

			Steel Support	2	TON	$ 12,801.49	$	30,000
			Surge Chamber Access Tunnel				$	-
			Rockbolts 1" @12'	230	EA	$ 528.34	$	120,000
			Rockbolts 1" @ 9'	50	EA	$ 432.12	$	20,000
			Steel Mesh	12,050	SF	$ 6.37	$	80,000
			Steel Support	14	TON	$ 12,801.49	$	180,000
			Penstock Access Tunnel				$	-
			Rockbolts 1" @12'	1,430	EA	$ 528.34	$	760,000
			Rockbolts 1" @ 9'	240	EA	$ 432.12	$	100,000
			Steel Mesh	77,500	SF	$ 6.37	$	490,000
			Steel Support	58	TON	$ 12,801.49	$	740,000
			Penstock Elbow Access Tunnel				$	-
			Rockbolts 1" @12'	420	EA	$ 528.34	$	220,000
			Rockbolts 1" @ 9'	120	EA	$ 432.12	$	50,000
			Steel Mesh	22,500	SF	$ 6.37	$	140,000
			Steel Support	30	TON	$ 12,801.49	$	380,000
			Access Shaft Tunnel				$	-
			Rockbolts 1" @12'	20	EA	$ 528.34	$	10,000
			Rockbolts 1" @ 9'	20	EA	$ 432.12	$	10,000
			Steel Mesh	930	SF	$ 6.37	$	10,000
			Steel Support	8	TON	$ 12,801.49	$	100,000
			Connector Tunnel				$	-
			Rockbolts 3/4" @ 6'	160	EA	$ 327.15	$	50,000
			Steel Mesh	160	SF	$ 6.37	$	-
			Steel Support	2	TON	$ 12,801.49	$	30,000
	0.129		Architectural- Main Portal Doors	2	SETS	$ 158,371.90	$	320,000
	0.12c		Mechanical Ventilation System				$	-
0.13		Access Shaft					$	-
	0.131		Excavation Rock	13,700	CY	$ 227.67	$	3,120,000
	0.133		Surface Preparation Shaft	64,000	SF	$ 3.33	$	210,000
	0.134		Concrete and Shot Crete				$	-
			Concrete Lining	3,350	CY	$ 944.82	$	3,170,000
			Concrete Overbreak 6"	1,220	CY	$ 551.14	$	670,000
	0.135		Support and Anchors - Rockbolts 3/4" @ 6'	1,050	EA	$ 327.15	$	340,000
	0.138		Structural Misc Steelwork	50	TON	$ 7,395.00	$	370,000
	0.139		Architectural- control Building				$	-
	0.13c		Mechanical Elevators	1	LS	$ 2,368,815.00	$	2,370,000
0.14		Fire Protection Head Tank					$	-
	0.141		Excavation	1,150	CY	$ 588.80	$	680,000
	0.143		Surface Preparation	2,800	SF	$ 2.30	$	10,000
	0.144		Concrete & Shotcrete				$	-
			Concrete	250	CY	$ 963.72	$	240,000
			Concrete Overbreak 6"	45	CY	$ 406.27	$	20,000
			Reinforcing Steel	10	TON	$ 2,858.29	$	30,000
	0.145		Support and Anchors				$	-
			Rockbolts 1" @12'	25	EA	$ 528.34	$	10,000
			Rockbolts 1" @ 9'	10	EA	$ 432.12	$	-
			Steel Mesh	1,200	SF	$ 6.30	$	10,000
			Steel Support	2	TON	$ 12,671.95	$	30,000
	0.148		Misc Steelwork	1	LS	$ 73,297.50	$	70,000
	0.14c		Mechanical Piping/Valves				$	-
0.15		Bus Tunnels (totals for 3 Bus Tunnels)					$	-
	0.151		Excavation				$	-

				Rock Horizontal	2,700	CY	$	213.70	$	580,000	
				Rock Inclined	1,300	CY	$	601.04	$	780,000	
		0.153		Surface Preparation- Tunnels	7,100	SF	$	3.33	$	20,000	
		0.154		Concrete and Shotcrete					$	-	
				Concrete Slab	350	CY	$	818.84	$	290,000	
				Concrete Overbreak 12"	250	CY	$	472.41	$	120,000	
				Reinforcing Steel	18	TON	$	2,858.29	$	50,000	
				2" Shotcrete	2,200	SF	$	5.26	$	10,000	
		0.155		Supports and Anchors					$	-	
				Rockbolts 1" @ 25'	60	EA	$	1,234.86	$	70,000	
				Rockbolts 1" @ 12'	140	EA	$	528.34	$	70,000	
				Rockbolts 1" @ 9'	50	EA	$	432.12	$	20,000	
				Steel Mesh	6,800	SF	$	6.30	$	40,000	
				Steel Support	11	TON	$	12,671.94	$	140,000	
	0.16			Transformer Gallery Tunnel					$	-	
		0.161		Excavation- Rock	26,800	CY	$	87.44	$	2,340,000	
		0.163		Surface Preparation	24,600	SF	$	2.30	$	60,000	
		0.164		Concrete and Shotcrete					$	-	
				Concrete Base Slab	2,400	CY	$	1,228.27	$	2,950,000	
				Concrete Overbreak 12"H/6"V	770	CY	$	377.93	$	290,000	
				Reinforcing Steel	120	TON	$	2,858.29	$	340,000	
		0.165		Support and Anchors					$	-	
				Rockbolts 1" @ 25'	600	EA	$	1,234.86	$	740,000	
				Rockbolts 1" @ 15'	270	EA	$	735.81	$	200,000	
				Steel Mesh	20,700	SF	$	5.81	$	120,000	
				Steel Support	29	TON	$	12,671.94	$	370,000	
		0.167		Drainage Holes	8,300	LF	$	47.95	$	400,000	
	0.17			Cable Shafts					$	-	
		0.171		Excavation Rock	3,400	CY	$	601.04	$	2,040,000	
		0.173		Surface Preparation Shafts	41,400	SF	$	3.33	$	140,000	
		0.174		Concrete and Shotcrete					$	-	
				Concrete Lining	1,040	CY	$	1,763.66	$	1,830,000	
				Concrete Overbreak 6"	800	CY	$	881.83	$	710,000	
		0.175		Supports and Anchors- Rockbolts 3/4" @ 6'	650	EA	$	327.15	$	210,000	
		0.178		Structural Misc Steelwork	18	TON	$	15,602.00	$	280,000	
		0.179		Architectural- Enclosures	1	LS	$	199,317.00	$	200,000	
		0.17c		Mechanical Hoist	2	EA	$	476,960.00	$	950,000	
	0.18			Dewatering (during Construction)					$	-	
		0.181		Dewatering (Power Facilities)	1	LS	$	1,336,798.50	$	1,340,000	
	0.19			Instrumentation					$	-	
		0.191		Instrumentation	1	LS	$	1,714,813.50	$	1,710,000	
	0.2			Misc Buildings (Control Buildings)	1	LS	$	4,433,085.00	$	4,430,000	
	0.3			Permanent Town	(included in 63.5)						
									$	-	**$ 159,000,000**
332				**Reservoir, Dams and Waterways**					$	-	
	0.1			Reservoir					$	-	
		0.11		Reservoir Clearing	23,000	ACRE	$	3,006	$	69,130,000	
	0.2			Diversion Tunnels /Cofferdams					$	-	
		0.21		Diversion Tunnels /Portals					$	-	
		0.211		Excavation					$	-	
				Upper Tunnel					$	-	
				Rock	221,000	CY	$	92	$	20,400,000	
				Lower Tunnel					$	-	

		Rock	208,000	CY	$	92	$	19,200,000
		Excavate Concrete for Plug	700	CY	$	97	$	70,000
		Upstream Upper Portal					$	-
		Rock Usable (Face Only)	11,200	CY	$	49	$	550,000
		Upstream Lower Portal (Including Most Excavation. for Upper Portal)					$	-
		Rock Usable	108,000	CY	$	49	$	5,310,000
		Rock Waste	21,750	CY	$	49	$	1,070,000
		Downstream Portals					$	-
		Overburden	17,000	CY	$	17	$	290,000
		Rock Usable	120,000	CY	$	49	$	5,900,000
		Rock Waste	28,000	CY	$	49	$	1,380,000
		Emergency Release Chambers					$	-
		Excavate Concrete for Plugs	1,800	CY	$	102	$	180,000
		Gate Chamber	4,700	CY	$	111	$	520,000
		Access Tunnel to Gate Chamber					$	-
		Rock	19,100	CY	$	97	$	1,860,000
0.212	Fill- Temp for Coffer Dam to Construct Upstream Portals		23,000	CY	$	12	$	270,000
0.213	Surface Preparation \ grouting						$	-
		Upstream Upper Portal					$	-
		Horizontal	3,200	SF	$	2	$	10,000
		Inclined	8,600	SF	$	3	$	30,000
		Upstream Lower Portal					$	-
		Horizontal	1,300	SF	$	2	$	-
		Inclined	14,900	SF	$	3	$	50,000
		Downstream Upper Portal					$	-
		Horizontal	6,100	SF	$	2	$	10,000
		Inclined	20,500	SF	$	3	$	70,000
		Downstream Lower Portal					$	-
		Horizontal	600	SF	$	2	$	-
		Inclined	5,600	SF	$	3	$	20,000
		Grout Upper Tunnel Plugs					$	-
		Drill Holes	4,100	LF	$	27	$	110,000
		Cement	820	CF	$	81	$	70,000
		Grout Lower Tunnel Permanent Plugs					$	-
		Drill Holes	2,050	LF	$	27	$	50,000
		Cement	410	CF	$	81	$	30,000
0.214	Concrete and Shotcrete						$	-
		Upper Tunnel					$	-
		Concrete Lining	42,400	CY	$	567	$	24,040,000
		Concrete Lining Overbreak 6"	10,200	CY	$	315	$	3,210,000
		Reinforcing Steel	24	TON	$	2,888	$	70,000
		2" Shotcrete	56,000	SF	$	5	$	290,000
		Lower Tunnel					$	-
		Concrete Lining	37,600	CY	$	567	$	21,320,000
		Concrete Lining for Plug	6,200	CY	$	428	$	2,660,000
		Concrete Lining Overbreak 6"	10,000	CY	$	315	$	3,150,000
		Reinforcing Steel	24	TON	$	2,888	$	70,000
		2" Shotcrete	57,900	SF	$	5	$	300,000
		Upstream Upper Portal					$	-
		Concrete Headwall	3,200	CY	$	652	$	2,090,000
		Concrete Lining	1,300	CY	$	652	$	850,000
		Concrete Slab	750	CY	$	652	$	490,000
		Concrete Piers	800	CY	$	652	$	520,000

		Concrete Overbreak 12" H/6"V	300	CY	$ 472	$	140,000
		Reinforcing Steel	400	TON	$ 2,888	$	1,160,000
		Upstream Lower Portal				$	-
		Concrete Headwall	4,500	CY	$ 652	$	2,930,000
		Concrete Lining	3,000	CY	$ 652	$	1,960,000
		Concrete Slab	300	CY	$ 652	$	200,000
		Concrete Piers	700	CY	$ 652	$	460,000
		Concrete Overbreak 12" H/6"V	350	CY	$ 472	$	170,000
		Reinforcing Steel	600	TON	$ 2,888	$	1,730,000
		Downstream Upper Portal				$	-
		Concrete Headwall	500	CY	$ 652	$	330,000
		Concrete Slab	100	CY	$ 652	$	70,000
		Concrete Overbreak 12" H/6"V	100	CY	$ 472	$	50,000
		Reinforcing Steel	40	TON	$ 2,888	$	120,000
		Downstream Lower Portal				$	-
		Concrete Headwall	2,500	CY	$ 652	$	1,630,000
		Concrete Slab	100	CY	$ 652	$	70,000
		Concrete Overbreak 12" H/6"V	150	CY	$ 472	$	70,000
		Reinforcing Steel	170	TON	$ 2,888	$	490,000
		Downstream Flip Bucket				$	-
		Concrete Slab	800	CY	$ 652	$	520,000
		Concrete Walls	2,300	CY	$ 652	$	1,500,000
		Concrete Invert	1,200	CY	$ 652	$	780,000
		Concrete Overbreak 12" H/6"V	410	CY	$ 42	$	20,000
		Reinforcing Steel	280	TON	$ 2,888	$	810,000
		Downstream Retaining Wall				$	-
		Concrete Slab	200	CY	$ 652	$	130,000
		Concrete Walls	2,000	CY	$ 652	$	1,300,000
		Concrete Overbreak 12" H/6"V	110	CY	$ 472	$	50,000
		Reinforcing Steel	90	TON	$ 2,888	$	260,000
		Emergency Release Chambers				$	-
		Concrete Plug	15,300	CY	$ 756	$	11,560,000
		4" Shotcrete	2,790	SF	$ 10	$	30,000
		Access Tunnel to Gate Chamber				$	-
		2" Shotcrete	12,800	SF	$ 5	$	70,000
0.215	Supports and Anchors					$	-
		Lower Tunnel				$	-
		Rockbolts 1" @ 12'	3,650	EA	$ 528	$	1,930,000
		Rockbolts 1" @ 9'	620	EA	$ 432	$	270,000
		Steel Mesh	217,100	SF	$ 6	$	1,380,000
		Steel Support	220	TON	$ 12,801	$	2,820,000
		Upper Tunnel				$	-
		Rockbolts 1" @ 12'	3,530	EA	$ 528	$	1,870,000
		Rockbolts 1" @ 9'	600	EA	$ 432	$	260,000
		Steel Mesh	210,200	SF	$ 6	$	1,340,000
		Steel Support	213	TON	$ 12,801	$	2,730,000
		Upstream Lower Portal				$	-
		Rockbolts 1" @ 15'	240	EA	$ 736	$	180,000
		Anchors 1" @ 25'	290	EA	$ 1,235	$	360,000
		Upstream Upper Portal				$	-
		Rockbolts 1" @ 15'				$	-
		Anchors 1" @ 25'	130	EA	$ 736	$	100,000
		Downstream Lower Portal				$	-

			Rockbolts 1" @ 15'	200	EA	$	736	$	150,000
			Downstream Upper Portal					$	-
			Rockbolts 1" @ 15'	100	EA	$	736	$	70,000
			Retaining Wall Anchors 1" @25'	100	EA	$	1,235	$	120,000
			Emergency Release Chambers					$	-
			Rockbolts 1" @ 25'	100	EA	$	1,235	$	120,000
			Rockbolts 1" @ 15'	125	EA	$	736	$	90,000
			Steel Mesh	3,600	SF	$	6	$	20,000
			Steel Support	14	TON	$	12,801	$	180,000
			Metal to Roof Anchors 3/4" @ 6'	20	EA	$	342	$	10,000
			Access Tunnel to Gate Chamber					$	-
			Rockbolts 1" @ 12'	775	EA	$	528	$	410,000
			Rockbolts 1" @ 9'	240	EA	$	432	$	100,000
			Steel Mesh	39,900	SF	$	6	$	250,000
			Steel Support	55	TON	$	12,801	$	700,000
	0.218		Structural- Misc Steelwork	2,775	SF	$	94	$	260,000
	0.21c		Mechanical					$	-
			Upstream Lower Gates					$	-
			Gate Equipment	2	EA	$	5,073,120	$	10,150,000
			Upstream Upper Gates					$	-
			Gate Equipment	2	EA	$	2,840,080	$	5,680,000
			Trashracks	1	LS	$	1,777,500	$	1,780,000
			Downstream Lower Outlet					$	-
			Stoplog Guides	1	LS	$	142,200	$	140,000
			Stoplogs includes follower	1	LS	$	1,967,100	$	1,970,000
			Downstream Upper Outlet					$	-
			Stoplog Guides	1	LS	$	82,950	$	80,000
			Low Level Release					$	-
			Slide Gates Include Steel Liner	9	EA	$	3,517,470	$	31,660,000
								$	-
0.22		Upstream Cofferdam						$	-
	0.221		Excavation					$	-
			Overburden Removal	1,000	CY	$	12	$	10,000
	0.222		Fill					$	-
			Rock Fill	38,400	CY	$	11	$	420,000
			Fine Filter	16,600	CY	$	37	$	610,000
			Coarse Filter	15,900	CY	$	30	$	480,000
			Rock Shell	196,500	CY	$	11	$	2,060,000
			Closure Dike	58,500	CY	$	11	$	640,000
			Rip Rap	21,200	CY	$	24	$	510,000
	0.223		Cutoff Slurry Wall					$	-
			excavation	4,850	CY	$	5	$	20,000
			slurry wall	43,600	SF	$	72	$	3,160,000
	0.22d		Dewatering					$	-
			Initial Dewatering	1	LS	$	5,807,685	$	5,810,000
			Dewatering Maintenance	1	LS	$	22,377,990	$	22,380,000
0.23		Down Stream Cofferdam						$	-
	0.231		Excavation					$	-
			overburden	5,000	CY	$	12	$	60,000
			Rock	500	CY	$	10	$	-
			Removal of Cofferdam	14,500	CY	$	13	$	200,000
	0.232		Fill					$	-
			Rip Rap	1,800	CY	$	24	$	40,000

				Closure Dike	15,200	CY	$	11	$	170,000
		0.233		Cutoff Slurry Wall					$	-
				Excavation	1,830	CY	$	5	$	10,000
				Slurry Wall	16,500	SF	$	72	$	1,200,000
0.3			Main Dam						$	-
	0.31		Main Dam						$	-
		0.311		Excavation					$	-
				Overburden above el. 1470	#######	CY	$	12	$	23,360,000
				Overburden below el. 1470	#######	CY	$	11	$	58,840,000
				Rock Usable above el. 1470	#######	CY	$	43	$	55,470,000
				Rock Usable below el. 1470	478,000	CY	$	44	$	20,900,000
				Rock Waste above el. 1470	#######	CY	$	43	$	83,910,000
				Rock Waste below el. 1470	869,500	CY	$	50	$	43,630,000
		0.312		Fill- From 1985 FERC Application					$	-
				Rip Rap (upstream)	733,802	CY	$	23	$	17,100,000
				Gravel (upstream)	#######	CY	$	21	$	245,700,000
				Coarse Filter (upstream)	925,759	CY	$	29	$	26,720,000
				Fine Filter (upstream)	#######	CY	$	38	$	39,640,000
				Core (impervious)	#######	CY	$	25	$	159,830,000
				Fine Filter (downstream)	#######	CY	$	38	$	44,410,000
				Coarse Filter (downstream)	#######	CY	$	29	$	31,000,000
				Shell- Rock and Gravel	#######	CY	$	19	$	103,190,000
				Shell- Rock From Other Sources	#######	CY	$	10	$	25,930,000
				Cobbles (downstream Face)	950,100	CY	$	16	$	15,530,000
				Road Base	12,000	CY	$	34	$	410,000
				Frost Protection					$	-
				Process Protection	960,000	CY	$	10	$	9,900,000
				Place Protection	960,000	CY	$	3	$	3,160,000
				Remove 1' Protect and Waste	93,000	CY	$	7	$	670,000
				Scarify Core Surface	193	ACRE	$	859	$	170,000
				Filter Fabric					$	-
				Filter Fabric	592,000	SF	$	1	$	520,000
		0.313		Surface Prep/ Grouting					$	-
				Surface Preparation					$	-
				Under Core/Filters above el. 1500	#######	SF	$	3	$	4,170,000
				Under Core/Filters below el. 1500	490,000	SF	$	3	$	1,520,000
				Under Shell above el. 1500	#######	SF	$	2	$	8,920,000
				Under Shell below el. 1500	#######	SF	$	2	$	4,440,000
				Consolidation Grout					$	-
				Drill Holes	550,000	LF	$	12	$	6,550,000
				Cement	550,000	CF	$	68	$	37,300,000
				Grout Curtain					$	-
				Drill Holes	372,000	LF	$	27	$	9,950,000
				Cement	149,000	CF	$	81	$	12,080,000
				Dental Concrete					$	-
				Dental Concrete	68,000	CY	$	365	$	24,840,000
		0.317		Drainage					$	-
				Holes	109,000	LF	$	51	$	5,590,000
	0.32			Grout Galleries/Portals					$	-
		0.321		Excavation					$	-
				Tunnels/ Shafts- Core Area					$	-
				Rock Horizontal	8,100	CY	$	395	$	3,200,000
				Rock Inclined	9,000	CY	$	553	$	4,980,000

					Rock Vertical	1,600	CY	$	536	$	860,000
				Tunnels/ Shafts- Access						$	-
					Rock Horizontal	10,400	CY	$	395	$	4,110,000
					Rock Inclined	1,600	CY	$	553	$	880,000
				Portals						$	-
					Overburden Rock	2,900	CY	$	17	$	50,000
					Rock	800	CY	$	49	$	40,000
		0.323		Surface Preparation						$	-
				Portals						$	-
					Horizontal	24	SF	$	2	$	-
					Inclined	160	SF	$	3	$	-
										$	-
		0.324		Concrete and Shotcrete						$	-
				Tunnels- Core Area						$	-
					Concrete Plugs	800	CY	$	428	$	340,000
					Concrete Slab	1,800	CY	$	945	$	1,700,000
					Concrete Overbreak 6"	920	CY	$	756	$	700,000
					Reinforcing Steel	64	TON	$	2,888	$	180,000
					2" Shotcrete	12,000	SF	$	5	$	60,000
				Tunnels-Access						$	-
					Concrete Slab	1,280	CY	$	945	$	1,210,000
					Concrete Overbreak 6"	640	CY	$	756	$	480,000
					Reinforcing Steel	48	TON	$	2,888	$	140,000
					2" Shotcrete	4,300	SF	$	5	$	20,000
				Shafts						$	-
					2" Shotcrete	4,000	SF	$	5	$	20,000
				Portals						$	-
					Concrete	16	CY	$	406	$	10,000
					Reinforcing Steel	2	TON	$	2,888	$	-
		0.325		Support and Anchors						$	-
				Tunnels- Core Area						$	-
					Rockbolts 3/4" @6'	1,400	EA	$	327	$	460,000
					Steel Mesh	2,400	SF	$	5	$	10,000
					Steel Support	16	TON	$	12,801	$	200,000
				Tunnels- Access						$	-
					Rockbolts 3/4" @6'	960	EA	$	327	$	310,000
					Steel Mesh	880	SF	$	5	$	-
					Steel Support	16	TON	$	12,801	$	200,000
				Shafts						$	-
					Rockbolts 3/4" @6'	280	EA	$	327	$	90,000
					Steel Mesh	800	SF	$	5	$	-
				Portals						$	-
					Rockbolts 1" @15'	24	EA	$	736	$	20,000
		0.329		Architectural Portal Doors						$	-
				Portal Doors		1	LS	$	33,900	$	30,000
	0.33			Instrumentation						$	-
		0.331		Instrumentation		1	LS	$	17,315,220	$	17,320,000
0.4				Relict Channel						$	-
	0.41			Shore Protection						$	-
		0.411		Excavation						$	-
				Overburden Stripping 2' thick		2,200	CY	$	12	$	30,000
		0.412		Fill						$	-
				Dump and Spread						$	-

					Filter Material - 2' layer	2,200	CY	$	32	$	70,000		
					Rock Spalls/ Rip Rap- 3' Ave	3,300	CY	$	10	$	30,000		
				Shore Protection						$	-		
					Rip Rap	24,000	CY	$	24	$	580,000		
					Waste Rock	24,000	CY	$	23	$	550,000		
	0.44		Channel Filter Blanket							$	-		
		0.442	Fill							$	-		
				Coarse Filter		#######	CY	$	34	$	98,170,000		
				Fine Filter		#######	CY	$	44	$	95,160,000		
				Rip Rap		182,000	CY	$	24	$	4,420,000		
		0.443	Surface preparation							$	-		
				Foundation Prep						$	-		
					Clearing and Grubbing	460	ACRE	$	3,963	$	1,820,000		
					Excavation	#######	CY	$	16	$	34,930,000		
												$	**1,718,000,000**
	0.5		Outlet Facilities										
		0.51	Outlet Facilities- (Intake Civil Work Include in Power Intake)			1	LS	$	73,000,000	$	73,000,000		
		0.52	Main (Chute) Spillway (Includes Civil Works for Outlet Facilities)			1	LS	$	182,000,000	$	182,000,000		
		0.53	Emergency Spillway			1	LS	$	164,000,000	$	164,000,000		
	0.6		Power Intake (Inc Inlet exec and Inlet Structure Civil Works for Outlet)			1	LS	$	145,000,000	$	145,000,000		
	0.7		Surge Chamber			1	LS	$	24,000,000	$	24,000,000		
		0.81	Head Race (Based on Penstock costs			1	LS	$	42,000,000	$	42,000,000		
		0.82	Penstocks			1	LS	$	25,000,000	$	25,000,000		
	0.9		Tailrace Works (1 Portal with Combined Tailrace/Diversion Tunnel)			1	LS	$	22,000,000	$	22,000,000		
												$	**677,000,000**
333			**Waterwheels, Turbines and Generators**							$	-		
		0.11	Turbines and Governors							$	-		
	0.3		Bid From Vendors (includes all equipment in this category)			4	EA	$	79,200,000.00	$	316,800,000	**$**	**317,000,000**
										$	-		
										$	-		
334			**Accessory Electrical Equipment**										
	0.1		Connections, Supports and Structures										
		0.11	Structures										
			0.111	Structures (included Below)									
		0.12	Conductors and Insulators										
			0.121	Generator Isolated Phase Bus		1	LS	$	3,792,000	$	3,790,000		
			0.122	HV Power Cables and Accessories		1	LS	$	1,540,500	$	1,540,000		
			0.123	LV Power Cables and Accessories		1	LS	$	711,000	$	710,000		
			0.124	Control Cables and Accessories		1	LS	$	1,303,500	$	1,300,000		
			0.125	Grounding System		1	LS	$	177,750	$	180,000		
		0.13	Conduits and Fittings					$	-	$	-		
			0.131	Conduits and Fittings		1	LS	$	474,000	$	470,000		
	0.2		Switchgear and Control Equipment					$	-	$	-		
		0.21	Auxiliary Transformers					$	-	$	-		
			0.211	Auxiliary Transformers		4	EA	$	83,811	$	340,000		
		0.22	Circuit Breakers Generators							$	-		
			0.221	Circuit Breakers Generators		4	EA	$	1,504,300	$	6,020,000		
		0.23	Surge Protectors and Generator Cubicles					$	-	$	-		
			0.231	Surge Protectors and Generator Cubicles		4	EA	$	50,000	$	200,000		
		0.24	Switch boards					$	-	$	-		
			0.241	Switch boards		1	LS	$	924,300	$	920,000		
		0.25	Auxiliary Power Equipment					$	-	$	-		
			0.251	Auxiliary Power Equipment		4	EA	$	100,000	$	400,000		

	0.3		Cubicles and Appurtenances				$	-		
		0.31	Control, relay and meter boards		$	-	$	-		
			0.311 Control, relay and meter boards	4 EA	$	200,000	$	800,000		
		0.32	Computer Control System		$	-	$	-		
			0.321 Computer Control System		$	-				
		0.33	Supervisor and Telemeter System		$	-				
			0.331 Supervisor and Telemeter System		$	-				
					$	-	$	-		
	0.4		Power Transformers		$	-	$	-		
		0.41	Power Transformers		$	-	$	-		
			0.411 Power Transformers	7 EA	$	3,600,000	$	25,200,000		
					$	-	$	-		
	0.5		Lighting System		$	-	$	-		
		0.51	Powerhouse and Transformer Gallery		$	-	$	-		
			0.511 Powerhouse and Transformer Gallery	1 LS	$	1,824,900	$	1,820,000		
		0.52	Access Tunnels and Roads				$	-		
			0.521 Access Tunnels and Roads	1 LS	$	402,900	$	400,000		
							$	-		
	0.6		Misc. Electrical Equipment				$	-		
		0.61	Misc. Electrical Equipment				$	-		
			0.611 Misc. Electrical Equipment	1 LS	$	782,100	$	780,000		
							$	-		
	0.7		Surface Accessory Equipment				$	-		
		0.71	34.5 kV and LV Equipment				$	-		
			0.711 Switchboard	1 LS	$	213,300	$	210,000		
			0.712 Cables	1 LS	$	450,300	$	450,000		
			0.713 Aux Transformers	1 LS	$	284,400	$	280,000		
		0.73	Diesel Generator- Standby				$	-		
			0.731 Diesel Generator- Standby	2 EA	$	347,550	$	700,000		
		0.74	Exterior Lighting				$	-		
			0.741 Exterior Lighting	1 LS	$	355,500	$	360,000		
		0.75	Mimic Board- Control Building				$	-		
			0.751 Mimic Board- Control Building	1 LS	$	1,185,000	$	1,190,000		
							$	-	**$**	**48,000,000**
335			**Misc Powerplant Equipment**				$	-		
	0.1		Auxiliary Systems- Underground				$	-		
		0.11	Station Water Systems				$	-		
			0.111 Station Water Systems	1 LS	$	4,977,000	$	4,980,000		
		0.12	Fire Protection Systems		$	-	$	-		
			0.121 Fire Protection Systems	1 LS	$	2,844,000	$	2,840,000		
		0.13	Compressed Air Systems		$	-	$	-		
			0.131 Compressed Air Systems	1 LS	$	3,555,000	$	3,560,000		
		0.14	Oil Handling Systems		$	-	$	-		
			0.141 Oil Handling Systems	1 LS	$	2,370,000	$	2,370,000		
		0.15	Drainage & Dewatering		$	-	$	-		
			0.151 Drainage & Dewatering	3 EA	$	1,738,000	$	5,210,000		
		0.16	Heating, Ventilation and Cooling System		$	-	$	-		
			0.161 Heating, Ventilation and Cooling System	1 LS	$	3,555,000	$	3,560,000		
		0.17	Miscellaneous				$	-		
			0.171 Miscellaneous	1 LS	$	2,370,000	$	2,370,000		
	0.2		Auxiliary Systems- Surface Facilities				$	-		
		0.21	Auxiliary Systems- Surface Facilities				$	-		
			0.211 Auxiliary Systems- Surface Facilities	1 LS	$	711,000	$	710,000		

	0.3		Auxiliary Equipment				$	-			
	0.31		Powerhouse Cranes			$	-	$	-		
		0.311	Powerhouse Cranes	2	EA	$	1,800,000	$	3,600,000		
	0.32		Elevators			$	-	$	-		
		0.321	Elevators	3	EA	$	181,700	$	550,000		
	0.33		Miscellaneous Cranes and Hoists			$	-	$	-		
		0.331	Miscellaneous Cranes and Hoists	1	LS	$	505,500	$	510,000		
	0.34		Machine Shop Equipment			$	-	$	-		
		0.341	Machine Shop Equipment	1	LS	$	2,022,000	$	2,020,000		
	0.4		General Station Equipment			$	-	$	-		
	0.5		Communications Equipment	1	LS	$	106,650	$	110,000		
						$	-	$	-	**$**	**32,000,000**
336			**Roads, Rails and Air Facilities**								
	0.1		Roads								
		0.11	Permanent Roads								
			Cost of road upgrades for 23 mi of Denali Highway	23	Mi	$	1,000,000.00	$	23,000,000.00		
			Cost of New road to 42 Mi of road to Watana	42	Mi	$	3,000,000.00	$	126,000,000.00		
			Cost of New road to 41 Mi of road to Devil Canyon	41	Mi	$	3,000,000.00	$	123,000,000.00		
		0.131	Site Roads								
			Construction Roads								
			Site Roads	20	Mile	$	750,000.00	$	15,000,000		
			Maintenance	141	MI/YRS	$	223,092.85	$	31,500,000		
		0.132	Permanent Roads								
			Permanent Roads	6	Mile	$	1,287,997.42	$	7,700,000		
	0.2		Rail								
		0.1	Railhead at Cantwell	1	LS	$	14,000,000.00	$	14,000,000		
	0.3		Airstrip								
		0.31	Airstrip								
			Permanent Airstrip	1	LS	$	13,000,000.00	$	13,000,000		
			Temporary Airstrip	1	LS	$	2,000,000.00	$	2,000,000		
			Permanent Roads	6	MILE	$	1,287,997.42	$	7,700,000		
										$	**363,000,000**
350-359			**Transmission Plant**								
			Transmission Line per mile	33	MILE	$	11,400,000.00	$	376,200,000.00		
			Substations (1 at Watana 1 at Gold Creek)	2	EA	$	35,000,000.00	$	70,000,000.00		
										$	**446,000,000.00**
			General Plant								
389			**Land and Land Rights**								
390			**Structures and Improvements**								
391			**Office Furniture and Equipment**								
392			**Transportation Equipment**								
393			**Stores Equipment**								
394			**Tools Shop and Garage Equipment**								

395		**Laboratory Equipment**							
396		**Power-Operated Equipment**							
397		**Communications Equipment**							
398		**Miscellaneous Equipment**							
399		**Other Tangible Property**							
		Other Tangible Property	1	LS	$ 16,000,000.00	$ 16,000,000			
								$	**16,000,000**
		Indirect Costs							
61		**Temporary Construction Facilities**							
62		**Construction Equipment**							
63		**Main Construction Camp**				$ -			
	0.1	Main Construction Camp	1	LS	$ 180,000,000	$ 180,000,000			
								$	**180,000,000**
64		**Labor Expense**							
65		**Superintendence**							
66		**Insurance**							
68		**Mitigation Fishery, Terrestrial and Recreational Not Included**							
69		**Fees**							
		Fees							
Subtotal								**$**	**4,525,000,000**
Subtotal									
71		**Engineering (4%), Environmental (2%), Regulatory(1%)**	1	LS	$ 285,000,000			**$**	**285,000,000**
71a		**Construction Management (4%)**	1	LS	$ 163,000,000			**$**	**163,000,000**
	Contingency		**20**	%				**$**	**905,000,000**
72		**Legal Expenses**	**0**	**%**					
75		**Taxes**	**0**	**%**					
76		**Administrative & Gen. Expenses**	**0**	**%**					
77		**Interest**	**0**	**%**					
80		**Earnings/Expenses During Construction**	**0**	**%**					
Watana I Cost								**$**	**4,973,000,000**

Devil Canyon II

FERC Lin	Sub Categories	Description	Quantity	Units	Unit Price	Line Price	Total
330		**Land and Land Rights**					
	0.1	Land	1	LS	$ 52,258,500.00	$ 52,260,000.00	
	0.2	Land Rights				$ -	
	0.3	Misc. Charges and Credits				$ -	
						$ -	**$ 52,000,000**
						$ -	
331		**Powerplant Structure Improvements**				$ -	
	0.1	Powerhouse				$ -	
	0.11	Powerhouse and Draft Tube				$ -	
	0.111	Excavation				$ -	
		Powerhouse Vault Rock	95800	CY	$ 90.12	$ 8,630,000.00	
		Draft Tube Rock	16800	CY	$ 90.12	$ 1,510,000.00	
	0.113	Surface Preparation/Grouting				$ -	
		Powerhouse				$ -	
		Surface Preparation	88700	SF	$ 3.56	$ 320,000.00	
		Draft Tube				$ -	
		Surface Preparation	51300	SF	$ 3.56	$ 180,000.00	
		Grout Curtain-(U/S of P-H)				$ -	
		Drill Holes	43800	LF	$ 28.59	$ 1,250,000.00	
		Cement	17500	CY	$ 86.68	$ 1,520,000.00	
	0.114	Concrete and Shotcrete				$ -	
		Powerhouse				$ -	
		Concrete	23800	CY	$ 740.65	$ 17,630,000.00	
		Concrete Overbreak 12"H/6"V	1800	CY	$ 478.06	$ 860,000.00	
		Reinforcing Steel	1200	TON	$ 3,086.65	$ 3,700,000.00	
		2" Shotcrete	1900	SF	$ 5.63	$ 10,000.00	
		3" Shotcrete	3400	SF	$ 8.21	$ 30,000.00	
		Draft Tube				$ -	
		Concrete	8000	CY	$ 740.65	$ 5,930,000.00	
		Concrete Overbreak 6"	1650	CY	$ 478.06	$ 790,000.00	
		Reinforcing Steel	660	TON	$ 3,086.65	$ 2,040,000.00	
		2" Shotcrete	800	SF	$ 5.63	$ -	
	0.115	Support and Anchors				$ -	
		Powerhouse				$ -	
		Rockbolts 1" @ 25'	780	EACH	$ 1,320.04	$ 1,030,000.00	
		Rockbolts 1" @ 15'	500	EACH	$ 786.58	$ 390,000.00	
		Steel Mesh	31000	SF	$ 6.26	$ 190,000.00	
		Steel Support	105	TON	$ 13,684.35	$ 1,440,000.00	
		Draft Tube				$ -	
		Rockbolts 1" @ 25'	100	EACH	$ 1,320.04	$ 130,000.00	
		Rockbolts 1" @ 12'	140	EACH	$ 564.79	$ 80,000.00	
		Rockbolts 1" @ 9'	70	EACH	$ 461.90	$ 30,000.00	
		Steel Mesh	12600	SF	$ 6.26	$ 80,000.00	
	0.117	Drainage				$ -	
		Holes (U/S of Powerhouse)	15000	LF	$ 54.88	$ 820,000.00	
		Holes (Powerhouse Crown)	21960	LF	$ 54.88	$ 1,210,000.00	
	0.118	Structural - Misc Steelwork				$ -	
		Powerhouse and Draft Tube				$ -	
		Structural Steel/Crane Rails	1	LS	$ 5,050,602.00	$ 5,050,000.00	
		Steel Comp. Water Pipe (8')	1	LS	$ 6,659,963.00	$ 6,660,000.00	

	0.119	Architectural						$	-
		Powerhouse						$	-
			Architectural	1	LS	$	1,777,974.00	$	1,780,000.00
	.11C	Mechanical						$	-
			Draft Tube Gates	2	Sets	$	608,040.00	$	1,220,000.00
			Draft Tube Gate Guides	4	Sets	$	247,720.00	$	990,000.00
			Draft Tube Crane	1	EACH	$	1,013,400.00	$	1,010,000.00
			Pump Intake Trashracks and Guides	1	LS	$	379,200.00	$	380,000.00
			Pump Outlet Stoplogs/Guides	1	LS	$	165,000.00	$	170,000.00
0.12		Access Tunnels and Portals						$	-
	0.121	Excavation						$	-
		Tunnels - Rock						$	-
			Main Tunnel	106000	CY	$	114.16	$	12,100,000.00
			Transformer Gallery Tunnel	17000	CY	$	96.30	$	1,640,000.00
			Grouting Gallery Tunnel	2300	CY	$	463.96	$	1,070,000.00
			Surge Chamber Access Tunnel	7800	CY	$	166.60	$	1,300,000.00
			Penstock Access Tunnel	50000	CY	$	170.11	$	8,510,000.00
			Penstock Elbow Access Tunnel	10000	CY	$	170.11	$	1,700,000.00
			Access shaft Tunnel	3300	CY	$	444.28	$	1,470,000.00
			Connector Tunnel	1600	CY	$	460.65	$	740,000.00
			Comp. Water Tunnel 10'D	2200	CY	$	460.65	$	1,010,000.00
			Comp. Water Tunnel 35'D	27000	CY	$	116.77	$	3,150,000.00
		Main Portal						$	-
			Rock	5000	CY	$	52.56	$	260,000.00
		Comp. Water Portal						$	-
			Rock	301	CY	$	52.55	$	20,000.00
								$	-
	0.123	Surface Preparation						$	-
		Tunnels						$	-
			Main Tunnel Slab	112000	SF	$	2.37	$	270,000.00
			Comp. Water Tunnel 35'D Slab	28400	SF	$	2.45	$	70,000.00
			Penstock ACC Tunnel Slab	52560	SF	$	2.37	$	120,000.00
		Main Portal						$	-
			Horizontal	200	SF	$	2.46	$	-
			Vertical	2100	SF	$	3.56	$	10,000.00
		Comp. Water Portal						$	-
			Horizontal	200	SF	$	2.46	$	-
			Vertical	2100	SF	$	3.56	$	10,000.00
	0.124	Concrete and Shotcrete						$	-
		Main Portal						$	-
			Concrete Slab	30	CY	$	434.30	$	10,000.00
			Concrete Walls	570	CY	$	434.29	$	250,000.00
			Concrete Overbreak 12"H/6"V	40	CY	$	393.90	$	20,000.00
			Reinforcing Steel	40	TON	$	3,086.65	$	120,000.00
		Comp. Water Portal						$	-
			Concrete Slab	30	CY	$	434.30	$	10,000.00
			Concrete Walls	570	CY	$	434.29	$	250,000.00
			Concrete Overbreak 12'H/6"V	40	CY	$	393.90	$	20,000.00
			Reinforcing Steel	40	TON	$	3,086.65	$	120,000.00
		Tunnels						$	-
			Concrete Slab Main Tunnel	4030	CY	$	538.66	$	2,170,000.00
			Concrete Plugs Pens Elbow Access	10000	CY	$	837.74	$	8,380,000.00
			Concrete Comp Water Slab 35'D	1030	CY	$	907.56	$	930,000.00

		Concrete Overbreak Main Tunnel 6"	2130	CY	$	383.97	$	820,000.00
		Concrete Comp Water Slab 6"O/B	540	CY	$	534.06	$	290,000.00
		Reinforcing Steel Main Tunnel	140	TON	$	3,090.99	$	430,000.00
		Reinforcing Steel Comp Water Slab	40	TON	$	3,091.00	$	120,000.00
		2" Shotcrete Main Tunnel	7950	SF	$	5.63	$	40,000.00
		2" Shotcrete Transformer Gal	1260	SF	$	5.63	$	10,000.00
		2" Shotcrete Surge Chamber Access	800	SF	$	5.63	$	-
		2" Shotcrete Penstock Access	3750	SF	$	5.63	$	20,000.00
		2" Shotcrete Penstock Elbow Acc	3750	SF	$	5.63	$	20,000.00
		2" Shotcrete Access Shaft	750	SF	$	5.63	$	-
		2" Shotcrete Grout Gallery	470	SF	$	5.63	$	-
		2" Shotcrete Connector Tunnel	330	SF	$	5.62	$	-
		2" Shotcrete Comp Water 35'D	2050	SF	$	5.63	$	10,000.00
		2" Shotcrete Comp Water 10'D	450	SF	$	5.62	$	-
0.125	Support and Anchors						$	-
		Main Tunnel					$	-
		Rockbolts 1" @ 12'	1440	EACH	$	564.79	$	810,000.00
		Rockbolts 1" @ 9'	190	EACH	$	461.91	$	90,000.00
		Steel Mesh	132500	SF	$	6.87	$	910,000.00
		Steel Support	120	TON	$	13,684.35	$	1,640,000.00
		Main Tunnel Portal					$	-
		Rockbolts 1" @ 15'	50	EACH	$	786.58	$	40,000.00
		Transformer Gallery Tunnel					$	-
		Rockbolts 1" @ 12'	230	EACH	$	564.79	$	130,000.00
		Rockbolts 1" @ 9'	30	EACH	$	461.90	$	10,000.00
		Steel Mesh	20940	SF	$	6.87	$	140,000.00
		Steel Support	20	TON	$	13,684.35	$	270,000.00
		Grouting Gallery Tunnel					$	-
		Rockbolts 3/4" @ 6'	220	EACH	$	349.70	$	80,000.00
		Steel Support	3	TON	$	13,684.33	$	40,000.00
		Steel Mesh	100	SF	$	6.87	$	-
		Surge Chamber Tunnel					$	-
		Rockbolts 1" @ 12'	150	EACH	$	564.79	$	80,000.00
		Rockbolts 1" @ 9'	30	EACH	$	461.90	$	10,000.00
		Steel Support	13	TON	$	13,684.38	$	180,000.00
		Steel Mesh	13200	SF	$	6.87	$	90,000.00
		Penstock Access Tunnel					$	-
		Rockbolts 1" @ 12'	680	EACH	$	564.79	$	380,000.00
		Rockbolts 1" @ 9'	90	EACH	$	461.90	$	40,000.00
		Steel Support	60	TON	$	13,684.35	$	820,000.00
		Steel Mesh	62150	SF	$	6.87	$	430,000.00
		Penstock Elbow Access Tunnel					$	-
		Rockbolts 1" @ 12'	280	EACH	$	564.79	$	160,000.00
		Rockbolts 1" @ 9'	80	EACH	$	461.90	$	40,000.00
		Steel Support	20	TON	$	13,684.35	$	270,000.00
		Steel Mesh	14760	SF	$	6.87	$	100,000.00
		Access Shaft Tunnel					$	-
		Rockbolts 1" @ 12'	50	EACH	$	564.80	$	30,000.00
		Rockbolts 1" @ 9'	50	EACH	$	461.90	$	20,000.00
		Steel Support	20	TON	$	13,684.35	$	270,000.00
		Steel Mesh	2500	SF	$	6.87	$	20,000.00
		Connector Tunnel					$	-
		Rockbolts 3/4" @ 6'	160	EACH	$	349.70	$	60,000.00

			Steel Support	2	TON	$	13,684.50	$	30,000.00
			Steel Mesh	70	SF	$	6.87	$	-
			Comp. Water Tunnel 35' D					$	-
			Rockbolts 1" @ 12'	370	EACH	$	564.79	$	210,000.00
			Rockbolts 1" @ 9'	50	EACH	$	461.90	$	20,000.00
			Steel Support	30	TON	$	13,684.37	$	410,000.00
			Steel Mesh	33600	SF	$	6.87	$	230,000.00
			Comp. Water Tunnel Portal					$	-
			Rockbolts 1" @ 15'	40	EACH	$	786.58	$	30,000.00
			Comp. Water Tunnel 10' D					$	-
			Rockbolts 3/4" @ 6'	210	CY	$	195.49	$	40,000.00
			Steel Support	3	CY	$	206.00	$	-
			Steel Mesh	90	CY	$	1,278.98	$	120,000.00
	0.129		Architectural					$	-
			Main Portal Doors	2	SETS	$	194,294.00	$	390,000.00
			Comp. Water Portal Door	1	LS	$	58,776.00	$	60,000.00
	.12C		Mechanical					$	-
			Ventilating System					$	-
			(included In 63.71 and 63.72)					$	-
0.13			Access Shaft					$	-
	0.131		Excavation					$	-
			Rock	14500	CY	$	227.67	$	3,300,000.00
	0.133		Surface Preparation					$	-
			Shaft	70200	SF	$	3.56	$	250,000.00
	0.134		Concrete and Shotcrete					$	-
			Concrete Lining	3600	CY	$	1,009.98	$	3,640,000.00
			Concrete Overbreak 6"	1300	CY	$	589.16	$	770,000.00
	0.135		Support and Anchors					$	-
			Rockbolts 3/4" @ 6'	1120	EACH	$	349.70	$	390,000.00
	0.138		Structural - Misc Steelwork					$	-
			Miscellaneous Steelwork	50	TON	$	7,905.38	$	400,000.00
	0.139		Architectural					$	-
			(included in 331.2 Control Bldg)					$	-
	.13C		Mechanical					$	-
			Elevators	1	LS	$	2,370,000.00	$	2,370,000.00
0.14			Access Shaft					$	-
	0.141		Excavation					$	-
			Rock	1150	CY	$	592.92	$	680,000.00
	0.143		Surface Preparation					$	-
			Head Tank	2800	SF	$	2.36	$	10,000.00
	0.144		Concrete and Shotcrete					$	-
			Concrete Lining	250	CY	$	1,030.18	$	260,000.00
			Concrete Overbreak 6"	45	CY	$	434.29	$	20,000.00
			Reinforcing Steel	10	TON	$	3,055.40	$	30,000.00
	0.145		Support and Anchors					$	-
			Rockbolts 1" @ 12'	25	EACH	$	564.80	$	10,000.00
			Rockbolts 1" @ 9'	10	EACH	$	461.90	$	-
			Steel Mesh	1200	SF	$	6.80	$	10,000.00
			Steel Support	2	TON	$	13,546.00	$	30,000.00
	0.148		Structural - Misc Steelwork					$	-
			Miscellaneous Steelwork	1	LS	$	78,353.00	$	80,000.00
	.14C		Mechanical					$	-
			Piping/Valves					$	-

			(Included in 335.12)				$	-
0.15		Bus Tunnels					$	-
		(Totals for 4 Bus Tunnels)					$	-
	0.151	Excavation					$	-
			Rock Horizontal	3200	CY	$ 213.70	$	680,000.00
			Rock Inclined	2000	CY	$ 601.04	$	1,200,000.00
	0.153	Surface Preparation					$	-
			Tunnel	11300	SF	$ 2.45	$	30,000.00
	0.154	Concrete and Shotcrete					$	-
			Concrete Slab	800	CY	$ 875.32	$	700,000.00
			Concrete Overbreak 12"	360	CY	$ 504.99	$	180,000.00
			Reinforcing Steel	40	TON	$ 3,055.40	$	120,000.00
			2" Shotcrete	520	SF	$ 5.63	$	-
	0.155	Support and Anchors					$	-
			Rockbolts 1" @ 25'	80	EACH	$ 1,320.04	$	110,000.00
			Rockbolts 1" @ 12'	110	EACH	$ 564.79	$	60,000.00
			Rockbolts 1" @ 9'	30	EACH	$ 461.90	$	10,000.00
			Steel Mesh	8600	SF	$ 6.80	$	60,000.00
			Steel Support	14	TON	$ 13,545.86	$	190,000.00
0.16		Transformer Gallery					$	-
	0.161	Excavation					$	-
			Rock	28800	CY	$ 373.35	$	10,750,000.00
	0.163	Surface Preparation					$	-
			Transformer Gallery	26500	SF	$ 2.36	$	60,000.00
	0.164	Concrete and Shotcrete					$	-
			Concrete Slab	2810	CY	$ 1,312.97	$	3,690,000.00
			Concrete Overbreak 12"H/6"V	820	CY	$ 403.99	$	330,000.00
			Reinforcing Steel	140	TON	$ 3,055.41	$	430,000.00
			3" Shotcrete	1100	SF	$ 8.21	$	10,000.00
	0.165	Support and Anchors					$	-
			Rockbolts 1" @ 25'	170	EACH	$ 1,320.04	$	220,000.00
			Rockbolts 1" @ 15'	90	EACH	$ 786.58	$	70,000.00
			Steel Mesh	22200	SF	$ 6.20	$	140,000.00
			Steel Support	17	TON	$ 13,545.88	$	230,000.00
	0.161	Drainage					$	-
			Holes (In Gallery Crown)	8900	LF	$ 54.88	$	490,000.00
0.17		Cable Shafts					$	-
		(Totals for 2 Shafts)					$	-
	0.171	Excavation					$	-
			Rock	3000	CY	$ 642.47	$	1,930,000.00
	0.173	Surface Preparation					$	-
			Shafts	36000	SF	$ 3.56	$	130,000.00
	0.174	Concrete and Shotcrete					$	-
			Concrete Lining	920	CY	$ 1,885.30	$	1,730,000.00
			Concrete Overbreak 6"	670	CY	$ 942.65	$	630,000.00
	0.175	Support and Anchors					$	-
			Rockbolts 3/4" @ 6'	570	EACH	$ 349.70	$	200,000.00
	0.178	Structural - Misc Steelwork					$	-
			Miscellaneous Steelwork	13	TON	$ 16,678.00	$	220,000.00
	0.179	Architectural					$	-
			Enclosures	1	LS	$ 213,063.00	$	210,000.00
	.17C	Mechanical					$	-
			Man hoist	2	EACH	$ 517,960.00	$	1,040,000.00

	0.18		Dewatering (During Construct)					$ -		
		0.181	Dewatering (Power Facilities)					$ -		
			Dewatering	1	LS	$	1,653,075.00	$ 1,650,000.00		
	0.19		Cable Shafts					$ -		
		0.191	Excavation					$ -		
			Rock	1	LS	$	1,532,978.00	$ 1,530,000.00		
	0.2		Misc Buildings and Structures					$ -		
			Misc Buildings and Structures	1	LS	$	473,882.00	$ 470,000.00		
								$ -	**$**	**165,000,000**
332		**Reservoir, Dams and Waterways**						$ -		
	0.1		Reservoir					$ -		
		0.11	Clearing					$ -		
			Clearing	6350	Acre	$	3,072.12	$ 19,510,000.00		
	0.2		Diversion Tunnels/Cofferdams					$ -		
		0.21	Diversion Tunnels/Portals					$ -		
		0.211	Excavation					$ -		
			Tunnel					$ -		
			Rock	48300	CY	$	116.81	$ 5,640,000.00		
			Excavate Concrete for Plug	450	CY	$	122.62	$ 60,000.00		
			Upstream Portal					$ -		
			Overburden	1950	CY	$	18.33	$ 40,000.00		
			Rock	50200	CY	$	52.56	$ 2,640,000.00		
			Downstream Portal					$ -		
			Overburden	6600	CY	$	18.33	$ 120,000.00		
			Rock	54000	CY	$	52.56	$ 2,840,000.00		
		0.213	Surface Preparation/Grouting					$ -		
			Upstream Portal					$ -		
			Horizontal	4400	SF	$	2.45	$ 10,000.00		
			Inclined	15300	SF	$	3.56	$ 50,000.00		
			Downstream Portal					$ -		
			Horizontal	1300	SF	$	2.45	$ -		
			Inclined	2900	SF	$	3.56	$ 10,000.00		
			Grout Tunnel Plug					$ -		
			Drill Holes	2050	LF	$	12.73	$ 30,000.00		
			Cement	410	CF	$	72.48	$ 30,000.00		
		0.214	Concrete and Shotcrete					$ -		
			Tunnel					$ -		
			Concrete Lining	8100	CY	$	605.99	$ 4,910,000.00		
			Concrete Plug	3000	CY	$	457.86	$ 1,370,000.00		
			Concrete Overbreak 6"	3200	CY	$	336.66	$ 1,080,000.00		
			Reinforcing Steel	15	TON	$	3,086.67	$ 50,000.00		
			2" Shotcrete	4400	SF	$	5.63	$ 20,000.00		
			Upstream Portal					$ -		
			Concrete Headwall	2800	CY	$	696.89	$ 1,950,000.00		
			Concrete Lining	1550	CY	$	253.73	$ 390,000.00		
			Concrete Pier	400	CY	$	605.99	$ 240,000.00		
			Overbreak 12"H/6"V	500	CY	$	523.59	$ 260,000.00		
			Reinforcing Steel	310	TON	$	3,086.65	$ 960,000.00		
			Downstream Portal					$ -		
			Concrete Headwall	1000	CY	$	696.89	$ 700,000.00		
			Overbreak 12"H6"V	100	CY	$	523.59	$ 50,000.00		
			Reinforcing Steel	65	TON	$	3,086.65	$ 200,000.00		
		0.215	Support and Anchors					$ -		

					Tunnels					$	-
						Rockbolts 1" @ 12'	800	EACH	$ 564.79	$	450,000.00
						Rockbolts 1" @ 9'	90	EACH	$ 461.90	$	40,000.00
						Steel Mesh	76900	SF	$ 6.87	$	530,000.00
						Steel Support	90	TON	$ 13,684.36	$	1,230,000.00
					Upstream Portal					$	-
						Rockbolts 1" @ 15'	80	EACH	$ 786.58	$	60,000.00
						Rock Anchors 1" @ 25'	40	EACH	$ 1,320.03	$	50,000.00
						Rock Dowels	60	EACH	$ 503.02	$	30,000.00
					Downstream Portal					$	-
						Rockbolts 1" @ 15'	120	EACH	$ 786.58	$	90,000.00
						Rock Anchors 1" @ 25'	30	EACH	$ 1,320.03	$	40,000.00
		.21C		Mechanical						$	-
					Upstream Gate					$	-
						Gate Equipment	2	EACH	$ 2,775,040.00	$	5,550,000.00
					Downstream Outlet					$	-
						Stoplog Guides	1	SET	$ 78,820.00	$	80,000.00
						Stoplogs Including Followers	1	LS	$ -	$	-
	0.22			Upstream Cofferdam						$	-
		0.222		Fill						$	-
					Core		4600	CY	$ 11.64	$	50,000.00
					Fine/Filter		2800	CY	$ 39.37	$	110,000.00
					Course Filter		2700	CY	$ 32.13	$	90,000.00
					Rock Shell		19800	CY	$ 11.21	$	220,000.00
					Closure Dike		41900	CY	$ 11.64	$	490,000.00
					Rip Rap		7000	CY	$ 25.92	$	180,000.00
		0.223		Surface Preparation/Grouting						$	-
					Cutoff and Grout					$	-
						Holes	1600	LF	$ 30.60	$	50,000.00
						Grout	256000	CF	$ 86.68	$	22,190,000.00
		.22D		Dewatering						$	-
					Initial Dewatering		1	LS	$ 1,796,709.00	$	1,800,000.00
					Dewatering Maintenance		1	LS	$ 9,171,995.00	$	9,170,000.00
	0.23			Downstream Cofferdam						$	-
		0.231		Excavation						$	-
					Removal of Cofferdam		42000	CY	$ 14.37	$	600,000.00
		0.232		Fill						$	-
					Rip Rap		1650	CY	$ 25.92	$	40,000.00
					Closure Dike		47000	CY	$ 11.64	$	550,000.00
		0.233		Surface Prep/Grouting						$	-
					Cutoff and Grout					$	-
						Holes	2300	LF	$ 30.60	$	70,000.00
						Cement	368000	CF	$ 10.60	$	3,900,000.00
0.3			Main Dam							$	-
	0.31			Main Dam						$	-
		0.311		Excavation						$	-
						Overburden	35600	CY	$ 12.35	$	440,000.00
						Rock	320700	CY	$ 53.47	$	17,150,000.00
		0.313		Surface Preparation/Grouting						$	-
					Surface Preparation					$	-
						Under Dam/Thrust Blocks	171000	SF	$ 3.32	$	570,000.00
					Consolidation Grout					$	-
						Drill Holes	176900	LF	$ 12.73	$	2,250,000.00

			Cement	176900	CF	$	72.48	$	12,820,000.00
		Grout Curtain						$	-
			Drill Holes	259000	LF	$	28.59	$	7,410,000.00
			Cement	103600	CF	$	86.68	$	8,980,000.00
	0.314	Concrete and Shotcrete						$	-
		Dam						$	-
			Concrete	1281000	CY	$	437.66	$	560,640,000.00
			Concrete Overbreak	10400	CY	$	437.66	$	4,550,000.00
			Reinforcing steel	4500	TON	$	3,086.65	$	13,890,000.00
		Thrust blocks						$	-
			Concrete	105500	CY	$	437.66	$	46,170,000.00
			Concrete Overbreak	1100	CY	$	437.66	$	480,000.00
			Reinforcing steel	375	TON	$	3,086.65	$	1,160,000.00
		Joint Grouting						$	-
			Grouting	1	LS	$	6,024,540.00	$	6,020,000.00
	0.315	Support and Anchors						$	-
			Rockbolts 1" @ 25'	580	EACH	$	1,320.04	$	770,000.00
			Steel Mesh (on slopes)	275000	SF	$	5.28	$	1,450,000.00
	0.317	Drainage						$	-
			Holes	65800	LF	$	54.88	$	3,610,000.00
0.32		Grout Galleries/Portals						$	-
	0.321	Excavation						$	-
		Tunnels/Shafts - Core Area						$	-
			Rock Horizontal	13100	CY	$	422.05	$	5,530,000.00
			Rock inclined	5300	CY	$	591.06	$	3,130,000.00
			Rock Vertical	3400	CY	$	573.18	$	1,950,000.00
		Tunnels/Shafts Access						$	-
			Rock Horizontal	12400	CY	$	422.05	$	5,230,000.00
		Portals						$	-
			Overburden	28700	CY	$	18.33	$	530,000.00
			Rock	16500	CY	$	52.56	$	870,000.00
	0.323	Surface Preparation						$	-
		Portals						$	-
			Horizontal	50	SF	$	2.46	$	-
			Vertical	410	SF	$	3.56	$	-
	0.324	Concrete and Shotcrete						$	-
		Tunnels - Core Area						$	-
			Concrete Slab	1800	CY	$	6,565.54	$	11,820,000.00
			Concrete Overbreak 6"	900	CY	$	807.98	$	730,000.00
			Reinforcing Steel	62	TON	$	3,086.65	$	190,000.00
			2"Shotcrete	3300	SF	$	5.63	$	20,000.00
		Tunnels - Access						$	-
			Concrete Slab	1400	CY	$	1,009.98	$	1,410,000.00
			Concrete Overbreak 6"	700	CY	$	807.98	$	570,000.00
			Reinforcing Steel	50	TON	$	3,086.64	$	150,000.00
			2" Shotcrete	2500	SF	$	5.63	$	10,000.00
		Shafts - Core Area						$	-
			2" Shotcrete	6500	SF	$	5.63	$	40,000.00
		Portals (4 Portals)						$	-
			Concrete	40	CY	$	434.30	$	20,000.00
			Reinforcing Steel	3	TON	$	3,086.67	$	10,000.00
	0.325	Support and Anchors						$	-
		Tunnels - Core Area						$	-

						Rockbolts 1" @ 12'	150	EACH	$	564.79	$ 80,000.00
						Rockbolts 1" @ 9'	30	EACH	$	461.90	$ 10,000.00
						Rockbolts 3/4" @ 6'	1250	EACH	$	349.70	$ 440,000.00
						Steel Mesh	12200	SF	$	7.04	$ 90,000.00
						Steel support	27	TON	$	13,684.37	$ 370,000.00
					Tunnels - Access						$ -
						Rockbolts 3/4" @ 6'	1200	EACH	$	349.70	$ 420,000.00
						Steel Mesh	500	SF	$	7.04	$ -
						Steel support	12	TON	$	13,684.33	$ 160,000.00
					Shafts - Core Area						$ -
						Rockbolts 3/4" @ 6'	300	EACH	$	349.70	$ 100,000.00
						Steel Mesh	1300	SF	$	7.04	$ 10,000.00
					Portals						$ -
						Rockbolts 1" @ 15'	150	EACH	$	786.58	$ 120,000.00
		0.328			Structural Steel - Misc Steelwork						$ -
					Steel/Guides Shaft		50	TON	$	7,905.38	$ 400,000.00
					Steel Stairway		1	LS	$	316,022.00	$ 320,000.00
		0.329			Architectural						$ -
					Portal Doors		4	EACH	$	45,028.75	$ 180,000.00
					Headshaft Structure		1	LS	$	1,028,580.00	$ 1,030,000.00
		0.32C			Mechanical						$ -
					Elevator		1	LS	$	1,777,500.00	$ 1,780,000.00
					Overhead Crane		1	LS	$	1,449,100.00	$ 1,450,000.00
					Misc Mechanical Equipment		1	LS	$	284,400.00	$ 280,000.00
	0.33			Instrumentation							$ -
		0.331			Instrumentation (Dam)						$ -
					Instrumentation		1	LS	$	9,257,220.00	$ 9,260,000.00
0.4			Saddle Dam								$ -
	0.41			Main Saddle Dam							$ -
		0.411			Excavation						$ -
						Overburden	1145000	CY	$	11.16	$ 12,780,000.00
						Rock	301000	CY	$	38.37	$ 11,550,000.00
		0.412			Fill						$ -
						Impervious Core	313500	CY	$	19.05	$ 5,970,000.00
						Fine Filter	231000	CY	$	45.33	$ 10,470,000.00
						Course Filter	193000	CY	$	37.66	$ 7,270,000.00
						Rock Shell (Upstream)	534000	CY	$	9.52	$ 5,090,000.00
						Rip Rap	174500	CY	$	25.92	$ 4,520,000.00
						Rock Shell (Downstream)	345000	CY	$	9.52	$ 3,290,000.00
						Rockfill	127000	CY	$	9.52	$ 1,210,000.00
					Filter Fabric						$ -
						Filter Fabric	190000	SF	$	1.89	$ 360,000.00
		0.413			Surface Preparation/Grouting						$ -
					Surface Preparation						$ -
						Under Dam Core	191500	SF	$	3.32	$ 640,000.00
						Under Dam Shell	432500	SF	$	2.29	$ 990,000.00
					Dental Concrete						$ -
						Dental Concrete	7100	CY	$	390.53	$ 2,770,000.00
					Consolidation Grout						$ -
						Drill Holes	57500	LF	$	12.73	$ 730,000.00
						Cement	57500	CF	$	72.48	$ 4,170,000.00
					Grout Curtain (See 332.313						$ -
		0.417			Drainage (See 332.317)						$ -

0.5			Outlet Facility Valves (In Dam)							$ -	$ 900,000,000
	0.51		Outlet Facility Valves							$ -	
		.51C	Mechanical							$ -	
				Trashracks Guides	1	LS	$	4,384,500.00	$	4,380,000.00	
				Bulkhead Gate Guides	1	LS	$	2,891,400.00	$	2,890,000.00	
				Bulkhead Gates and Followers	2	EACH	$	495,440.00	$	990,000.00	
				Gantry Crane	1	LS	$	1,659,000.00	$	1,660,000.00	
				Fixed Cone Valves	1	LS	$	3,000,000.00	$	3,000,000.00	
				(7 Plus 2 Spare)	1	LS	$	7,584,000.00	$	7,580,000.00	
				Ring Follower Gates (7)	1	LS	$	14,931,000.00	$	14,930,000.00	
				Misc. Mechanical Equipment	1	LS	$	1,896,000.00	$	1,900,000.00	
				Misc. Electrical Systems	1	LS	$	237,000.00	$	240,000.00	
	0.52		Main (Chute) Spillway							$ -	
		0.521	Excavation							$ -	
				Approach						$ -	
				Overburden	44000	CY	$	15.92	$	700,000.00	
				Rock Useable	80000	CY	$	38.37	$	3,070,000.00	
				Rock Waste	17000	CY	$	38.37	$	650,000.00	
				Control Structure						$ -	
				(To end of Rollway)						$ -	
				Overburden	21500	CY	$	15.92	$	340,000.00	
				Rock Useable	87000	CY	$	39.60	$	3,440,000.00	
				Rock Waste	15000	CY	$	35.41	$	530,000.00	
				Chute and Flip						$ -	
				(End Rollway to End Flip)						$ -	
				Overburden	128500	CY	$	15.92	$	2,050,000.00	
				Rock Useable (Inclined)	38000	CY	$	49.00	$	1,860,000.00	
				Rock Useable (Vertical)	401000	CY	$	49.00	$	19,650,000.00	
				Rock Waste	93500	CY	$	38.37	$	3,590,000.00	
				Outfall						$ -	
				(From end of Basin)						$ -	
				Overburden	44500	CY	$	15.92	$	710,000.00	
				Rock Useable	141500	CY	$	42.22	$	5,970,000.00	
				Rock Waste	41500	CY	$	31.57	$	1,310,000.00	
				Drain Tunnel						$ -	
				Rock Horizontal	1500	CY	$	422.05	$	630,000.00	
				Rock Inclined	2300	CY	$	591.06	$	1,360,000.00	
				River Channel						$ -	
				Alluvium Excavation	67000	CY	$	13.44	$	900,000.00	
		0.523	Surface Preparation/Grouting							$ -	
				Surface Preparation						$ -	
				Spillway						$ -	
				Rock Horizontal	108000	SF	$	2.29	$	250,000.00	
				Rock Inclined	41500	SF	$	3.32	$	140,000.00	
				Consolidation Grout						$ -	
				Drill Holes	22000	LF	$	12.73	$	280,000.00	
				Cement	22000	CF	$	72.48	$	1,590,000.00	
				Grout Curtain (See 332.313)						$ -	
		0.524	Concrete & Shotcrete							$ -	
				Concrete Structure						$ -	
				(To end of Rollway)						$ -	
				(Including Storage Areas)						$ -	
				Concrete outer Walls	15500	CY	$	471.32	$	7,310,000.00	

			Concrete Piers (Full Length)	7700	CY	$	471.32	$	3,630,000.00
			Concrete Deck	1600	CY	$	471.32	$	750,000.00
			Concrete Rollway Slab	33000	CY	$	471.32	$	15,550,000.00
			Concrete Overbreak (12"H/6"V	1400	CY	$	370.33	$	520,000.00
			Reinforcing Steel	2300	TON	$	3,086.65	$	7,100,000.00
		Concrete Chute & Flip						$	-
		(End Rollway to End Flip)						$	-
		(Including Box Drain Galleries)						$	-
			Concrete Slabs	13000	CY	$	481.42	$	6,260,000.00
			Concrete Walls	20500	CY	$	511.72	$	10,490,000.00
			Concrete Overbreak 18"H/6"V	6300	CY	$	336.66	$	2,120,000.00
			Reinforcing Steel	1300	TON	$	3,086.65	$	4,010,000.00
		Concrete Drain Gallery						$	-
			Concrete Slab	400	CY	$	1,009.98	$	400,000.00
			Concrete Overbreak 6"	200	CY	$	605.99	$	120,000.00
			Reinforcing Steel	14	TON	$	3,086.64	$	40,000.00
			2" Shotcrete Dome	2500	SF	$	5.63	$	10,000.00
	0.525	Support and Anchors						$	-
		Drainage Tunnel						$	-
			Steel Support	4	TON	$	13,684.25	$	50,000.00
			Steel Mesh	500	SF	$	7.04	$	-
		Rockbolts Drainage Gallery						$	-
			3/4" @6'	400	EACH	$	352.95	$	140,000.00
		Rockbolts Approach						$	-
			1" @ 15'	140	EACH	$	792.43	$	110,000.00
		Rockbolts Chute & Structure						$	-
			1" @ 15'	85	EACH	$	792.42	$	70,000.00
		Slab/Wall Anchors						$	-
			1" @ 10'	3700	EACH	$	506.75	$	1,870,000.00
	0.527	Drainage						$	-
		Drill Holes						$	-
			Box Drains (To Drain Tunnel)	28000	LF	$	51.27	$	1,440,000.00
			3" relief	500	LF	$	52.93	$	30,000.00
	.52C	Mechanical						$	-
		Gate Equipment		3	EACH	$	4,010,800.00	$	12,030,000.00
		Stop Log Guides		3	SETS	$	101,340.00	$	300,000.00
		Stop Logs Including Followers		1	SET	$	1,080,960.00	$	1,080,000.00
		Miscellaneous Electrical		1	LS	$	237,000.00	$	240,000.00
0.53		Emergency spillway						$	-
	0.531	Excavation (Including -						$	-
		Bridge and Fuse Plug)						$	-
			Overburden	281500	CY	$	7.04	$	1,980,000.00
			Rock Useable	1019000	CY	$	39.81	$	40,570,000.00
			Rock Waste	215500	CY	$	39.04	$	8,410,000.00
	0.532	Fill						$	-
			Fuse Plug	26000	CY	$	22.27	$	580,000.00
								$	-
	0.533	Surface Preparation/Grouting						$	-
		Surface prep (under Fuse Plug)						$	-
			Horizontal	75500	SF	$	2.45	$	190,000.00
			Inclined	2500	SF	$	3.56	$	10,000.00
		Consolidation Grouting						$	-
			Drill Holes	23000	LF	$	12.73	$	290,000.00

					Cement	23000	CF	$	72.48	$	1,670,000.00
				Grout Curtain (See 332.313)						$	-
		0.534		Concrete						$	-
					Ground Slab	6000	CY	$	370.33	$	2,220,000.00
					Concrete Overbreak 12"H/12"V	3000	CY	$	370.33	$	1,110,000.00
					Reinforcing Steel	210	TON	$	3,086.64	$	650,000.00
		0.535		Support & Anchors						$	-
					Rockbolts 1" @ 15'	300	EACH	$	786.58	$	240,000.00
					Rock Anchors 1" @ 25'	760	EACH	$	1,320.04	$	1,000,000.00
		.53B		Bridge						$	-
					Bridge	1	LS	$	2,962,678.00	$	2,960,000.00
0.6			Power Intakes							$	-
	0.61			Power Intake Structures & App						$	-
		0.611		Excavation						$	-
					Overburden	99000	CY	$	15.92	$	1,580,000.00
					Rock	201600	CY	$	39.60	$	7,980,000.00
		0.613		Surface Preparation						$	-
					Horizontal	12100	SF	$	2.46	$	30,000.00
					Inclined	58000	SF	$	3.50	$	200,000.00
		0.614		Concrete and Shotcrete						$	-
				Structure						$	-
					Concrete Structure	14500	CY	$	582.42	$	8,450,000.00
					Concrete Overbreak 12"H/6"V	1530	CY	$	360.23	$	550,000.00
					Reinforcing Steel	940	TON	$	3,086.64	$	2,900,000.00
		0.615		Support & Anchors						$	-
				Approach						$	-
					Rockbolts 1" @ 15'	140	EACH	$	786.58	$	110,000.00
		.61C		Mechanical						$	-
					Trashracks/Guides	4	SETS	$	382,840.00	$	1,530,000.00
					Bulkhead Gate Guides	4	SETS	$	168,900.00	$	680,000.00
					Bulkhead Gates & Followers	1	SETS	$	619,300.00	$	620,000.00
					Intake Gantry Crane	1	EACH	$	2,815,000.00	$	2,820,000.00
					Intake Gate Equipment	4	EACH	$	2,049,320.00	$	8,200,000.00
					Miscellaneous Electrical	1	LS	$	237,000.00	$	240,000.00
		.61D		Intake Building						$	-
				Intake Building		1	LS	$	473,882.00	$	470,000.00
0.7			Surge Chambers							$	-
	0.71			Surge Chamber						$	-
		0.711		Excavation						$	-
					Chamber Rock	153800	CY	$	96.04	$	14,770,000.00
					Vent Shaft Rock	2300	CY	$	641.49	$	1,480,000.00
		0.713		Surface Preparations		6,100	SF	$	2.45	$	10,000.00
		0.714		Concrete and Shotcrete						$	-
				Chamber						$	-
					Concrete Chamber	1,300	CY	$	548.76	$	710,000.00
					Concrete Overbreak	140	CY	$	471.32	$	70,000.00
					Reinforcing Steel	65	TON	$	3,086.65	$	200,000.00
					3" Shotcrete	3,200	SF	$	8.21	$	30,000.00
					2" Shotcrete	2,300	SF	$	5.63	$	10,000.00
				Vent Shaft						$	-
					2" Shotcrete	6,300	SF	$	5.63	$	40,000.00
		0.715		Support and Anchors						$	-
				Chamber						$	-

					Rockbolts 1" @ 25'	725	EACH	$	1,320.04	$ 960,000.00
					Rockbolts 1" @ 15'	600	EACH	$	786.58	$ 470,000.00
					Steel Mesh	29,400	SF	$	6.26	$ 180,000.00
					Steel Support	70	TON	$	13,684.36	$ 960,000.00
				Vent Shaft						$ -
					Rockbolts 3/4" @ 6'	400	EACH	$	349.70	$ 140,000.00
					Steel Mesh	1,300	SF	$	6.80	$ 10,000.00
	0.717		Drainage Holes (In Chamber Crown)							$ -
0.8		Penstocks								$ -
	0.81		Penstocks							$ -
		0.811		Excavation Tunnels						$ -
				Rock Horizontal		10,500	CY	$	164.79	$ 1,730,000.00
				Rock Inclined		44,600	CY	$	325.72	$ 14,530,000.00
		0.813		Surface Preparations/Grouting						$ -
				Surface Preparation						$ -
					Tunnels	173,500	SF	$	2.45	$ 430,000.00
				Contact Grouting		1	LS	$	191,022.00	$ 190,000.00
				Consolidation Grouting		1	LS	$	525,311.00	$ 530,000.00
		0.814		Concrete and Shotcrete						$ -
				Concrete Liner		17,600	CY	$	1,036.91	$ 18,250,000.00
				Concrete Plug		10,000	CY	$	807.98	$ 8,080,000.00
				Concrete Overbreak 6"		4,700	CY	$	740.65	$ 3,480,000.00
				Concrete Overbreak Plug		860	CY	$	740.65	$ 640,000.00
				Reinforcing Steel		18	TON	$	3,055.39	$ 50,000.00
				2" Shotcrete		19,100	SF	$	5.63	$ 110,000.00
		0.815		Support and Anchors						$ -
				Rockbolts 1" @ 25'		100	EACH	$	1,320.04	$ 130,000.00
				Rockbolts 1" @ 6'		1,350	EACH	$	349.70	$ 470,000.00
				Steel Mesh		86,800	SF	$	6.80	$ 590,000.00
		0.818		Structural- Misc Steelwork						$ -
				Steel Liner		2,000	TON	$	10,340.36	$ 20,680,000.00
0.9		Tailrace Works								$ -
	0.91		Tailrace Tunnels/Portals							$ -
		0.911		Excavation						$ -
				Tunnels						$ -
					Rocks	329,300	CY	$	99.01	$ 32,600,000.00
				Portal						$ -
					Overburden	40,000	CY	$	18.33	$ 730,000.00
					Rock	21,000	CY	$	52.56	$ 1,100,000.00
		0.913		Surface Preparation						$ -
				Tunnels						$ -
					Tunnel	582,000	SF	$	3.56	$ 2,070,000.00
				Portal						$ -
					Horizontal	400	SF	$	2.46	$ -
					Inclined	2,700	SF	$	3.56	$ 10,000.00
		0.914		Concrete and Shotcrete						$ -
				Tunnels						$ -
					Concrete Lining	31,700	CY	$	471.32	$ 14,940,000.00
					Concrete Overbreak 6"	16,200	CY	$	349.06	$ 5,650,000.00
					Reinforcing Steel	13	TON	$	3,086.62	$ 40,000.00
					2" Shotcrete	17,500	SF	$	5.63	$ 100,000.00
				Portal						$ -
					Concrete Base Slab	100	CY	$	696.89	$ 70,000.00

				Concrete Walls	650	CY	$	696.89	$	450,000.00		
				Concrete Overbreak 12"H/6"V	50	CY	$	523.60	$	30,000.00		
				Reinforcing Steel	50	TON	$	3,086.64	$	150,000.00		
		0.915	Supports and Anchors						$	-		
			Tunnels						$	-		
				Rockbolts 1" @ 12'	3,160	EACH	$	564.79	$	1,780,000.00		
				Rockbolts 1" @ 9'	490	EACH	$	461.91	$	230,000.00		
				Steel Mesh	291,000	SF	$	6.87	$	2,000,000.00		
				Steel Support	232	TON	$	13,684.35	$	3,170,000.00		
			Portal						$	-		
				Rockbolts 1" @ 15'	100	EACH	$	786.58	$	80,000.00		
		0.916	Mechanical						$	-		
			Stoplog Guides		1	LS	$	97,170.00	$	100,000.00		
									$	-	$	**416,000,000**
333			**Waterwheels, Turbines, and Generators**						$	-		
	0.1		Turbines and Governors						$	-		
		0.11	Turbines and Governors						$	-		
		0.111	Supply		4	EACH			$	-		
		0.112	Install		4	EACH			$	-		
	0.2		Generators and Exciters						$	-		
		0.21	Generators and Exciters						$	-		
		0.211	Generators and Exciters		4	EACH			$	-		
	0.3		Total Bid From Vendor (includes all equipment in this category)		1	LS	$	295,000,000.00	$	295,000,000.00	$	**295,000,000**
									$	-		
									$	-		
334			**Accessory Electrical Equipment**						$	-		
	0.1		Connections, Supports, and Structures.						$	-		
		0.11	Structures						$	-		
		0.111	Structures (Incl. Below)						$	-		
		0.12	Conductors and Insulators						$	-		
		0.121	Generator Isolated Bus		1	LS	$	4,740,000.00	$	4,740,000.00		
		0.122	HV Power Cables and Access.		1	LS	$	2,844,000.00	$	2,840,000.00		
		0.123	LV Power Cables and Access.		1	LS	$	948,000.00	$	950,000.00		
		0.124	Control Cables and Accessories		1	LS	$	1,422,000.00	$	1,420,000.00		
		0.125	Grounding System		1	LS	$	355,500.00	$	360,000.00		
		0.13	Conduits and Fittings						$	-		
		0.131	Conduits and Fittings		1	LS	$	711,000.00	$	710,000.00		
	0.2		Switchgear and Control Equipment						$	-		
		0.21	Auxiliary Transformers						$	-		
		0.211	Auxiliary Transformers		4	EACH	$	65,040.00	$	260,000.00		
		0.22	Circuit Breakers						$	-		
		0.221	Circuit Breakers (not required)						$	-		
		0.23	Surge Protection and Generator Cubicles						$	-		
		0.231	Surge Protection and Generator Cubicles		1	LS	$	734,700.00	$	730,000.00		
		0.24	Switchboards						$	-		
		0.241	Switchboards		1	LS	$	1,706,400.00	$	1,710,000.00		
		0.25	Aux. Power Equipment Incl. Battery						$	-		
		0.251	Aux. Power Equipment		1	LS	$	521,400.00	$	520,000.00		
	0.3		Cubicles and Appurtenances						$	-		
		0.31	Control, Relay, and Meter Boards						$	-		
		0.311	Control, Relay, and Meter Boards		1	LS	$	1,659,000.00	$	1,660,000.00		
		0.32	Computer Control System						$	-		
		0.321	Computer Control System (incl. in 353)						$	-		

	0.33		Supervisory. And Telemeter System				$	-		
		0.331	Supervisory. And Telemeter System (included in 353)				$	-		
0.4			Power Transformers				$	-		
	0.41		Power Transformers				$	-		
		0.411	Power Transformers	13	EACH	$ 1,300,000.00	$	16,900,000.00		
0.5			Lighting System				$	-		
	0.51		Powerhouse and Transformer Gallery				$	-		
		0.511	Powerhouse and Transformer Gallery	1	LS	$ 1,564,200.00	$	1,560,000.00		
	0.52		Access Tunnels and Roads				$	-		
		0.521	Access Tunnels and Roads	1	LS	$ 402,900.00	$	400,000.00		
0.6			Misc. Electrical Equipment				$	-		
	0.61		Misc. Electrical Equipment				$	-		
		0.611	Misc. Electrical Equipment	1	LS	$ 521,400.00	$	520,000.00		
0.7			Surface Accessory Elec. Equipment				$	-		
	0.71		4.16 kV and LV Equipment				$	-		
		0.711	Switchboards	1	LS	$ 165,900.00	$	170,000.00		
		0.712	Cables	1	LS	$ 521,400.00	$	520,000.00		
		0.713	Aux. Transformers	1	LS	$ 284,400.00	$	280,000.00		
	0.73		Diesel Generators - Standby				$	-		
		0.731	Diesel Generators - Standby	2	EACH	$ 337,800.00	$	680,000.00		
	0.74		Exterior Lighting				$	-		
		0.741	Exterior Lighting	1	LS	$ 592,500.00	$	590,000.00		
							$	-	$	38,000,000
335			**Misc. Power Plant Equipment**				$	-		
0.1			Auxiliary Systems - Underground				$	-		
	0.11		Station Water Systems				$	-		
		0.111	Station Water Systems	1	LS	$ 3,081,000.00	$	3,080,000.00		
	0.12		Fire Protection Systems				$	-		
		0.121	Fire Protection Systems	1	LS	$ 2,370,000.00	$	2,370,000.00		
	0.13		Compressed Air Systems				$	-		
		0.131	Compressed Air Systems	1	LS	$ 3,318,000.00	$	3,320,000.00		
	0.14		Oil Handling Systems				$	-		
		0.141	Oil Handling Systems	1	LS	$ 2,370,000.00	$	2,370,000.00		
	0.15		Drainage And Dewatering				$	-		
		0.151	Drainage And Dewatering	1	LS	$ 3,555,000.00	$	3,560,000.00		
	0.16		Heat, Vent, and Cooling System				$	-		
		0.161	Heat, Vent, and Cooling System	1	LS	$ 2,844,000.00	$	2,840,000.00		
	0.17		Miscellaneous				$	-		
		0.171	Miscellaneous	1	LS	$ 2,133,000.00	$	2,130,000.00		
0.2			Auxiliary Systems - Surface Facilities				$	-		
	0.21		Auxiliary Systems - Surface Facilities				$	-		
		0.211	Auxiliary Systems - Surface Facilities	1	LS	$ 355,500.00	$	360,000.00		
0.3			Auxiliary Equipment				$	-		
	0.31		Powerhouse Cranes				$	-		
		0.311	Powerhouse Cranes	2	EACH	$ 1,936,800.00	$	3,870,000.00		
	0.32		Elevators				$	-		
		0.321	Elevators	1	LS	$ 545,100.00	$	550,000.00		
	0.33		Misc. Cranes and Hoist				$	-		
		0.331	Misc. Cranes and Hoist	1	LS	$ 505,500.00	$	510,000.00		
	0.34		Compensation Pumps				$	-		
		0.341	Pumps and Motors	2	EACH	$ 1,300,800.00	$	2,600,000.00		
		0.342	Valves	4	EACH	$ 151,760.00	$	610,000.00		
	0.35		Machine Shop Equipment				$	-		

		0.351	Machine Shop Equipment	1	LS	$	474,000.00	$	470,000.00		
	0.4		General Station Equipment (Included in Mechanical and Electrical Systems)					$	-		
	0.5		Communication Equipment	1	LS	$	213,300.00	$	210,000.00		
										$	29,000,000
336		**Roads**						$	-		
	0.1		Roads					$	-		
		0.12	Site Roads					$	-		
			Site Roads	7	MILE	$	750,000.00	$	5,250,000.00		
			Maintenance	60	MI/YRS	$	205,489.98	$	12,329,399.00		
		0.13	Trans Dam Crossing					$	-		
			Trans Dam Crossing (7.26 Miles)					$	-		
			Clearing	45	ACRE	$	10,953.82	$	492,922.00		
			Waste Excavation	132,300	CY	$	9.12	$	1,206,206.00		
			Common Excavation	114,500	CY	$	7.99	$	914,752.00		
			Rock Excavation	12,200	CY	$	28.21	$	344,153.00		
			Borrow	90,200	CY	$	12.14	$	1,095,035.00		
			NFS Sub base Material	27,960	CY	$	18.17	$	508,135.00		
			Grade "A" Base Material	15,260	CY	$	33.92	$	517,565.00		
			D-1 Base Material	6,370	TON	$	43.62	$	277,833.00		
			A.C. Surfacing	5,830	TON	$	195.78	$	1,141,374.00		
			Guardrail	2,640	LF	$	89.20	$	235,489.00		
			18" Culverts	1,785	LF	$	60.01	$	107,122.00		
			Thaw Pipes	1,785	LF	$	89.84	$	160,368.00		
			Topsoil and Seed	29	ACRE	$	7,266.03	$	210,715.00		
			Traffic Control Devices	3	MILE	$	37,438.33	$	112,315.00		
			Maintenance					$	-		
			Maintenance	7	MI/YRS	$	29,276.29	$	204,934.00		
								$	-	$	25,000,000
								$	-		
350-359		**Transmission Plant**									
		Substations(1 at Devil Canyon)		1	EA	$	35,000,000.00	$	35,000,000.00		
										$	35,000,000.00
General Plant								$	-		
389		**Land and Land Rights (Included in 330)**						$	-		
								$	-		
390		**Structures and Improvements (Included in 331.2)**						$	-		
								$	-		
391		**Office Furniture/Equipment (Included in 399)**						$	-		
								$	-		
392		**Transportation Equipment (Included in 399)**						$	-		
								$	-		
393		**Stores Equipment (Included in 399)**						$	-		
								$	-		
394		**Tools Shop and Garage Equipment (Included in 399)**						$	-		
								$	-		
395		**Laboratory Equipment (Included in 399)**						$	-		
								$	-		
396		**Power Operated Equipment (Included in 399)**						$	-		
								$	-		
397		**Communications Equipment (Included in 399)**						$	-		
								$	-		
398		**Miscellaneous Equipment (Included in 399)**						$	-		
								$	-		

399	**Other Tangible Property**	1 LS	$ 16,000,000.00	$ 16,000,000.00		
				$ -	**$**	**16,000,000**
Indirect Costs				$ -		
61	**Temporary Construction Facilities (Included in Direct Costs)**			$ -		
				$ -		
62	**Construction Equipment (Included in Direct Costs)**			$ -		
				$ -		
63	**Main Construction Camp**	1 LS	$ 180,000,000.00	$ 180,000,000.00		
				$ -	**$**	**180,000,000**
				$ -		
64	**Labor Expense (Included in Direct Costs)**			$ -		
				$ -		
65	**Superintendence (Included in Direct Costs)**			$ -		
				$ -		
66	**Insurance (Included in Direct Costs)**			$ -		
				$ -		
68	**Mitigation Fishery, Terrestrial and Recreational (Included in Watana I)**			$ -		
				$ -		
69	**Fees (Included in Direct Costs)**			$ -		
	Subtotal			$ -	$	2,388,000,000
	Contingency	**20%**		$ -	**$**	**478,000,000**
				$ -		
71	**Engineering (4%), Environmental (2%), Regulatory(1%)**	1 LS	$ 151,000,000		**$**	**151,000,000**
71a	**Construction Management (4%)**	1 LS	$ 86,000,000		**$**	**86,000,000**
72	**Legal Expenses (Included in 71)**			$ -		
75	**Taxes (Not Applicable)**			$ -		
76	**Administrative and Gen. Expenses (Included in 71)**			$ -		
77	**Interest (Not Included)**			$ -		
80	**Earnings/Expenses During Constr. (Not Included)**			$ -		
Devil Canyon Cost					**$**	**5,254,000,000**

Watana III

FERC Lin	Sub Categories				Description	Quantity	Units	Unit Price	Line Price	Total	
330			**Land and Land Rights**								
	0.1				Land (Included in Watana I)	1	LS	$ -	$ -		
									$ -		
331			**Powerplant Structure Improvements**						$ -		
	0.1				Powerhouse				$ -		
		0.19			Instrumentation				$ -		
			0.191		Instrumentation	1	LS	$1,000,000.00	$ 1,000,000.00		
									$ -	**$**	**1,000,000**
332			**Reservoir, Dams and Waterways**						$ -		
	0.1				Reservoir				$ -		
		0.11			Reservoir Clearing	16,500	ACRE	$ 3,005.85	$ 49,600,000.00		
	0.2				Diversion Tunnels /Cofferdams				$ -		
		0.21			Diversion Tunnels /Portals				$ -		
			0.211		Excavation				$ -		
			0.212		Fill- Temp for Coffer Dam to Construct Upstream Portals	23,000	CY	$ 11.66	$ 270,000.00		
			0.21c		Mechanical				$ -		
					Upstream Lower Gates				$ -		
					Gate Equipment	1	LS	$ 505,440.00	$ 510,000.00		
					Upstream Upper Gates				$ -		
					Gate Equipment	1	LS	$ 282,960.00	$ 280,000.00		
					Trashracks	1	LS	$ 204,750.00	$ 200,000.00		
					Downstream Lower Outlet				$ -		
					Stoplog Guides	1	LS	$ 14,220.00	$ 10,000.00		
					Stoplogs includes follower	1	LS	$ 1,967,100.00	$ 1,970,000.00		
					Downstream Upper Outlet				$ -		
					Stoplog Guides	1	LS	$ 82,950.00	$ 80,000.00		
					Low Level Release				$ -		
					Slide Gates Include Steel Liner		EA	$ 3,517,470.00	$ -		
									$ -		
		0.22			Upstream Cofferdam				$ -		
			0.221		Excavation				$ -		
					Overburden Removal	250	CY	$ 11.56	$ -		
			0.222		Fill				$ -		
					Rock Fill	38,400	CY	$ 10.90	$ 420,000.00		
					Fine Filter	16,600	CY	$ 36.84	$ 610,000.00		
					Coarse Filter	15,900	CY	$ 30.05	$ 480,000.00		
					Rock Shell	196,500	CY	$ 10.50	$ 2,060,000.00		
					Closure Dike	58,500	CY	$ 10.90	$ 640,000.00		
					Rip Rap	21,200	CY	$ 24.26	$ 510,000.00		
			0.223		Cutoff Slurry Wall				$ -		
					Excavation	4,850	CY	$ 4.88	$ 20,000.00		
					Slurry wall	43,600	SF	$ 72.44	$ 3,160,000.00		
			0.22d		Dewatering				$ -		
					Initial Dewatering	1	LS	$ 5,807,685.00	$ 5,810,000.00		
					Dewatering Maintenance	1	LS	$ 22,377,990.00	$ 22,380,000.00		
		0.23			Down Stream Cofferdam				$ -		
			0.231		Excavation				$ -		
					Overburden	1,250	CY	$ 11.56	$ 10,000.00		
					Rock	125	CY	$ 9.91	$ -		
									$ -		
					Removal of Cofferdam	14,500	CY	$ 13.48	$ 200,000.00		

		0.232	Fill							$	-
				Rip Rap	1,800	CY	$	24.26	$	40,000.00
				Closure Dike	15,200	CY	$	10.90	$	170,000.00
		0.233	Cutoff Slurry Wall						$	-
				Excavation	366	CY	$	4.60	$	-
				Slurry Wall	3,300	SF	$	72.44	$	240,000.00
0.3			Main Dam						$	-
	0.31		Main Dam						$	-
		0.311		Excavation					$	-
				Overburden above el. 1470	#######	CY	$	11.53	$	11,680,000.00
				Rock Usable above el. 1470	644,500	cy	$	43.03	$	27,730,000.00
				Rock Waste above el. 1470	975,000	cy	$	43.03	$	41,950,000.00
		0.312		Fill					$	-
				Rip Rap (upstream)	813,198	CY	$	23.30	$	18,950,000.00
				Gravel (upstream)	#######	CY	$	20.56	$	272,290,000.00
				Coarse Filter (upstream)	720,241	CY	$	28.86	$	20,790,000.00
				Fine Filter (upstream)	965,412	CY	$	37.91	$	36,600,000.00
				Core (impervious)	#######	CY	$	25.37	$	49,570,000.00
				Fine Filter (downstream)	#######	CY	$	37.91	$	41,000,000.00
				Coarse Filter (downstream)	835,759	CY	$	28.86	$	24,120,000.00
				Shell- Rock and Gravel	#######	CY	$	19.18	$	114,350,000.00
				Shell- Rock From Other Sources	#######	CY	$	10.09	$	28,740,000.00
				Cobbles (downstream Face)	#######	CY	$	16.35	$	17,210,000.00
				Road Base	12,000	CY	$	34.42	$	410,000.00
				Frost Protection						
				Process Protection	960,000	CY	$	10.31	$	9,900,000.00
				Place Protection	960,000	CY	$	3.29	$	3,160,000.00
				Remove 1' Protect and Waste	93,000	CY	$	7.21	$	670,000.00
				Scarify Core Surface	193	ACRE	$	858.77	$	170,000.00
				Filter Fabric					$	-
				Filter Fabric	118,400	SF	$	0.88	$	100,000.00
		0.313		Surface Prep/ Grouting					$	-
				Surface Preparation					$	-
				Under Core/Filters above el. 1500	502,500	SF	$	3.11	$	1,560,000.00
				Under Core/Filters below el. 1500	183,900	SF	$	3.11	$	570,000.00
				Under Shell above el. 1500	#######	SF	$	2.15	$	3,340,000.00
				Under Shell below el. 1500	775,200	SF	$	2.15	$	1,670,000.00
				Consolidation Grout					$	-
				Drill Holes	206,100	LF	$	11.91	$	2,450,000.00
				Cement	206,100	CF	$	67.81	$	13,980,000.00
				Grout Curtain					$	-
				Drill Holes	139,500	LF	$	26.76	$	3,730,000.00
				Cement	55,800	CF	$	81.10	$	4,530,000.00
				Dental Concrete					$	-
				Dental Concrete	25,500	CY	$	365.33	$	9,320,000.00
		0.317		Drainage					$	-
				Holes	40,800	LF	$	51.32	$	2,090,000.00
	0.32		Grout Galleries/Portals						$	-
		0.321		Excavation					$	-
				Tunnels/ Shafts- Core Area					$	-
				Rock Horizontal	3,000	CY	$	394.80	$	1,180,000.00
				Rock Inclined	3,400	CY	$	552.93	$	1,880,000.00
				Rock Vertical	600	CY	$	536.19	$	320,000.00

			Tunnels/ Shafts- Access						$	-	
			Rock Horizontal	3,900	CY	$	394.80	$	1,540,000.00		
			Rock Inclined	600	CY	$	552.93	$	330,000.00		
			Portals					$	-		
			Overburden Rock	1,100	CY	$	17.16	$	20,000.00		
			Rock	300	CY	$	49.16	$	10,000.00		
	0.323		Surface Preparation					$	-		
			Portals					$	-		
			Horizontal	9	SF	$	2.30	$	-		
			Inclined	60	SF	$	3.33	$	-		
								$	-		
	0.324		Concrete and Shotcrete					$	-		
			Tunnels- Core Area					$	-		
			Concrete Plugs	300	CY	$	428.32	$	130,000.00		
			Concrete Slab	690	CY	$	944.82	$	650,000.00		
			Concrete Overbreak 6"	345	CY	$	755.86	$	260,000.00		
			Reinforcing Steel	24	TON	$	2,887.51	$	70,000.00		
			2" Shotcrete	4,500	SF	$	5.26	$	20,000.00		
			Tunnels-Access					$	-		
			Concrete Slab	480	CY	$	944.82	$	450,000.00		
			Concrete Overbreak 6"	240	CY	$	755.86	$	180,000.00		
			Reinforcing Steel	18	TON	$	2,887.51	$	50,000.00		
			2" Shotcrete	1,600	SF	$	5.26	$	10,000.00		
			Shafts					$	-		
			2" Shotcrete	1,500	SF	$	5.26	$	10,000.00		
			Portals					$	-		
			Concrete	6	CY	$	406.36	$	-		
			Reinforcing Steel	1	TON	$	2,887.51	$	-		
	0.325		Support and Anchors					$	-		
			Tunnels- Core Area					$	-		
			Rockbolts 3/4" @6'	540	EA	$	327.15	$	180,000.00		
			Steel Mesh	900	SF	$	5.37	$	-		
			Steel Support	6	TON	$	12,801.49	$	80,000.00		
			Tunnels- Access					$	-		
			Rockbolts 3/4" @6'	360	EA	$	327.15	$	120,000.00		
			Steel Mesh	330	SF	$	5.37	$	-		
			Steel Support	6	TON	$	12,801.49	$	80,000.00		
			Shafts					$	-		
			Rockbolts 3/4" @6'	105	EA	$	327.15	$	30,000.00		
			Steel Mesh	300	SF	$	5.37	$	-		
			Portals					$	-		
			Rockbolts 1" @15'	9	EA	$	735.81	$	10,000.00		
	0.329		Architectural Portal Doors					$	-		
			Portal Doors	2	EA		12,386	$	20,000.00		
	0.33		Instrumentation					$	-		
	0.331		Instrumentation	1	LS		7,000,000	$	7,000,000.00		
0.4			Relict Channel- Included in Watana I							$	**867,000,000**
0.5			Outlet Facilities								
	0.52		Main (Chute) Spillway	1	LS	$	36,000,000	$	36,000,000		
	0.53		Emergency Spillway	1	LS	$	33,000,000	$	33,000,000		
0.6			Power Intake (Inc Inlet exec and Inlet Structure Civil Works for Outlet)	1	LS	$	29,000,000	$	29,000,000		

								$ -	$	**98,000,000**
333			**Waterwheels, Turbines and Generators**					$ -		
	0.1		Upgrade existing turbine generators	4	EA	$ 16,000,000.00	$ 64,000,000.00			
	0.2		Install 2 new turbines at 200 MW each	2	EA	$ 79,167,000.00	$ 158,330,000.00			
							$ -			
							$ -	$	**222,000,000**
334			**Accessory Electrical Equipment**				$ -			
	0.1		Connections, Supports and Structures							
		0.11	Structures							
			0.111 Structures (included Below)							
		0.12	Conductors and Insulators							
			0.121 Generator Isolated Phase Bus	1	LS	$ 7,584,000	$ 7,580,000			
			0.122 HV Power Cables and Accessories	1	LS	$ 3,081,000	$ 3,080,000			
			0.123 LV Power Cables and Accessories	1	LS	$ 1,422,000	$ 1,420,000			
			0.124 Control Cables and Accessories	1	LS	$ 2,607,000	$ 2,610,000			
			0.125 Grounding System	1	LS	$ 355,500	$ 360,000			
		0.13	Conduits and Fittings				$ -			
			0.131 Conduits and Fittings	1	LS	$ 948,000	$ 950,000			
	0.2		Switchgear and Control Equipment			$ -	$ -			
		0.21	Auxiliary Transformers			$ -	$ -			
			0.211 Auxiliary Transformers	2	EA	$ 83,811	$ 170,000			
		0.22	Circuit Breakers Generators				$ -			
			0.221 Circuit Breakers Generators	2	EA	$ 1,504,300	$ 3,010,000			
		0.23	Surge Protectors and Generator Cubicles			$ -	$ -			
			0.231 Surge Protectors and Generator Cubicles	2	EA	$ 50,000	$ 100,000			
		0.24	Switch boards			$ -	$ -			
			0.241 Switch boards	1	LS	$ 1,848,600	$ 1,850,000			
		0.25	Auxiliary Power Equipment			$ -	$ -			
			0.251 Auxiliary Power Equipment	2	EA	$ 100,000	$ 200,000			
	0.3		Cubicles and Appurtenances				$ -			
		0.31	Control, relay and meter boards			$ -	$ -			
			0.311 Control, relay and meter boards	2	EA	$ 200,000	$ 400,000			
		0.32	Computer Control System			$ -	$ -			
			0.321 Computer Control System			$ -				
		0.33	Supervisor and Telemeter System			$ -				
			0.331 Supervisor and Telemeter System			$ -				
						$ -	$ -			
	0.4		Power Transformers			$ -	$ -			
		0.41	Power Transformers			$ -	$ -			
			0.411 Power Transformers	3	EA	$ 3,600,000	$ 10,800,000			
							$ -	$	**33,000,000**
335			**Misc Powerplant Equipment**				$ -			
	0.1		Included in Watana I				$ -			
							$ -			
336			**Roads, Rails and Air Facilities**				$ -			
	0.1		Roads				$ -			
			Permanent Roads	2	MILE	$ 3,000,000.00	$ 6,000,000.00			
		0.14	Additional Maintenance for 5 additional years of wear and tear				$ -			
							$ -	$	**6,000,000**
350-359			**Transmission Plant**				$ -			
			Transmission included in Watana Stage 1				$ -			
			General Plant				$ -			

389	**Land and Land Rights**				$ -		
					$ -		
390	**Structures and Improvements**				$ -		
					$ -		
391	**Office Furniture and Equipment**				$ -		
					$ -		
392	**Transportation Equipment**				$ -		
					$ -		
393	**Stores Equipment**				$ -		
					$ -		
394	**Tools Shop and Garage Equipment**				$ -		
					$ -		
395	**Laboratory Equipment**				$ -		
					$ -		
396	**Power-Operated Equipment**				$ -		
					$ -		
397	**Communications Equipment**				$ -		
					$ -		
398	**Miscellaneous Equipment**				$ -		
					$ -		
399	**Other Tangible Property**				$ -		
	Other Tangible Property	1 LS	$ 10,000,000.00	$ 10,000,000.00			
	Indirect Costs					**$**	**10,000,000**
61	**Temporary Construction Facilities**						
62	**Construction Equipment**						
63	**Main Construction Camp**						
		1 less	$ 80,000,000.00	$ 80,000,000.00			
64	**Labor Expense**					**$**	**80,000,000**
	Labor Expense	(Included In Direct Costs)					
65	**Superintendence**						
	Superintendence	(Included In Direct Costs)					
66	**Insurance**						
	Insurance	(Included In Direct Costs)					
68	**Mitigation Fishery, Terrestrial and Recreational (Included in Watana I)**						
69	**Fees**						
	Fees	(Included In Direct Costs)					
	Subtotal					**$**	**1,462,000,000**
	Contingency	**20** %				**$**	**292,000,000**
Subtotal							
71	**Engineering (4%), Environmental (2%), Regulatory(1%)**	1 LS	$ 92,000,000			**$**	**92,000,000**
71a	**Construction Management (4%)**	1 LS	$ 53,000,000			**$**	**53,000,000**
72	**Legal Expenses**	**0** **%**					
75	**Taxes**	**0** **%**					
76	**Administrative & Gen. Expenses**	**0** **%**					
77	**Interest**	**0** **%**					
80	**Earnings/Expenses During Construction**	**0** **%**					
Full Watana Cost						**$**	**3,216,000,000**

HDR/AEA Susitna Hydroelectric Project
Cost Estimates for 1982 quantities- Alternatives
By: HDR
By: Leanne Andruszkiewicz, EIT
Reviewed By: David Elwood, EIT
Date: 10/14/2009
Alternatives- 2008 Dollars
Devil Canyon (4 Turbines)

FERC Line #	Sub Categories	Description	Quantity	Units	Unit Price	Line Price	Total
330		**Land and Land Rights**					
	0.1	Land	1	LS	$ 52,258,500.00	$ 52,258,500.00	
	0.2	Land Rights				$ -	
	0.3	Misc. Charges and Credits				$ -	
						$ -	**$ 52,000,000**
						$ -	
331		**Powerplant Structure Improvements**				$ -	
	0.1	Powerhouse				$ -	
	0.11	Powerhouse and Draft Tube				$ -	
	0.111	Excavation				$ -	
		Powerhouse Vault Rock	95800	CY	$ 90.12	$ 8,633,486.00	
		Draft Tube Rock	16800	CY	$ 90.12	$ 1,514,014.00	
	0.113	Surface Preparation/Grouting				$ -	
		Powerhouse				$ -	
		Surface Preparation	88700	SF	$ 3.56	$ 315,609.00	
		Draft Tube				$ -	
		Surface Preparation	51300	SF	$ 3.56	$ 182,534.00	
		Grout Curtain-(U/S of P-H)				$ -	
		Drill Holes	43800	LF	$ 28.59	$ 1,252,389.00	
		Cement	17500	CY	$ 86.68	$ 1,516,979.00	
	0.114	Concrete and Shotcrete				$ -	
		Powerhouse				$ -	
		Concrete	23800	CY	$ 740.65	$ 17,627,518.00	
		Concrete Overbreak 12"H/6"V	1800	CY	$ 478.06	$ 860,503.00	
		Reinforcing Steel	1200	TON	$ 3,086.65	$ 3,703,974.00	
		2" Shotcrete	1900	SF	$ 5.63	$ 10,688.00	
		3" Shotcrete	3400	SF	$ 8.21	$ 27,915.00	
		Draft Tube				$ -	
		Concrete	8000	CY	$ 740.65	$ 5,925,216.00	
		Concrete Overbreak 6"	1650	CY	$ 478.06	$ 788,794.00	
		Reinforcing Steel	660	TON	$ 3,086.65	$ 2,037,186.00	
		2" Shotcrete	800	SF	$ 5.63	$ 4,500.00	
	0.115	Support and Anchors				$ -	
		Powerhouse				$ -	
		Rockbolts 1" @ 25'	780	EACH	$ 1,320.04	$ 1,029,629.00	
		Rockbolts 1" @ 15'	500	EACH	$ 786.58	$ 393,289.00	
		Steel Mesh	31000	SF	$ 6.26	$ 194,095.00	
		Steel Support	105	TON	$ 13,684.35	$ 1,436,857.00	
		Draft Tube				$ -	
		Rockbolts 1" @ 25'	100	EACH	$ 1,320.04	$ 132,004.00	
		Rockbolts 1" @ 12'	140	EACH	$ 564.79	$ 79,071.00	
		Rockbolts 1" @ 9'	70	EACH	$ 461.90	$ 32,333.00	
		Steel Mesh	12600	SF	$ 6.26	$ 78,890.00	
	0.117	Drainage				$ -	
		Holes (U/S of Powerhouse)	15000	LF	$ 54.88	$ 823,219.00	
		Holes (Powerhouse Crown)	21960	LF	$ 54.88	$ 1,205,192.00	
	0.118	Structural - Misc Steelwork				$ -	
		Powerhouse and Draft Tube				$ -	
		Structural Steel/Crane Rails	1	LS	$ 5,050,602.00	$ 5,050,602.00	
		Steel Comp. Water Pipe (8')	1	LS	$ 6,659,963.00	$ 6,659,963.00	
	0.119	Architectural				$ -	

		Powerhouse					$	-
		Architectural	1	LS	$	1,777,974.00	$	1,777,974.00
	.11C	Mechanical					$	-
		Draft Tube Gates	2	Sets	$	608,040.00	$	1,216,080.00
		Draft Tube Gate Guides	4	Sets	$	247,720.00	$	990,880.00
		Draft Tube Crane	1	EACH	$	1,013,400.00	$	1,013,400.00
		Pump Intake Trashracks and Guides	1	LS	$	379,200.00	$	379,200.00
		Pump Outlet Stoplogs/Guides	1	LS	$	165,000.00	$	165,000.00
0.12		Access Tunnels and Portals					$	-
	0.121	Excavation					$	-
		Tunnels - Rock					$	-
		Main Tunnel	106000	CY	$	114.16	$	12,100,994.00
		Transformer Gallery Tunnel	17000	CY	$	96.30	$	1,637,144.00
		Grouting Gallery Tunnel	2300	CY	$	463.96	$	1,067,110.00
		Surge Chamber Access Tunnel	7800	CY	$	166.60	$	1,299,503.00
		Penstock Access Tunnel	50000	CY	$	170.11	$	8,505,552.00
		Penstock Elbow Access Tunnel	10000	CY	$	170.11	$	1,701,110.00
		Access shaft Tunnel	3300	CY	$	444.28	$	1,466,133.00
		Connector Tunnel	1600	CY	$	460.65	$	737,035.00
		Comp. Water Tunnel 10'D	2200	CY	$	460.65	$	1,013,423.00
		Comp. Water Tunnel 35'D	27000	CY	$	116.77	$	3,152,687.00
		Main Portal					$	-
		Rock	5000	CY	$	52.56	$	262,781.00
		Comp. Water Portal					$	-
		Rock	301	CY	$	52.55	$	15,819.00
							$	-
	0.123	Surface Preparation					$	-
		Tunnels					$	-
		Main Tunnel Slab	112000	SF	$	2.37	$	265,158.00
		Comp. Water Tunnel 35'D Slab	28400	SF	$	2.45	$	69,713.00
		Penstock ACC Tunnel Slab	52560	SF	$	2.37	$	124,435.00
		Main Portal					$	-
		Horizontal	200	SF	$	2.46	$	491.00
		Vertical	2100	SF	$	3.56	$	7,472.00
		Comp. Water Portal					$	-
		Horizontal	200	SF	$	2.46	$	491.00
		Vertical	2100	SF	$	3.56	$	7,472.00
	0.124	Concrete and Shotcrete					$	-
		Main Portal					$	-
		Concrete Slab	30	CY	$	434.30	$	13,029.00
		Concrete Walls	570	CY	$	434.29	$	247,546.00
		Concrete Overbreak 12"H/6"V	40	CY	$	393.90	$	15,756.00
		Reinforcing Steel	40	TON	$	3,086.65	$	123,466.00
		Comp. Water Portal					$	-
		Concrete Slab	30	CY	$	434.30	$	13,029.00
		Concrete Walls	570	CY	$	434.29	$	247,546.00
		Concrete Overbreak 12'H/6"V	40	CY	$	393.90	$	15,756.00
		Reinforcing Steel	40	TON	$	3,086.65	$	123,466.00
		Tunnels					$	-
		Concrete Slab Main Tunnel	4030	CY	$	538.66	$	2,170,784.00
		Conc Plugs Pens Elbow Access	10000	CY	$	837.74	$	8,377,440.00
		Conc Comp Water Slab 35'D	1030	CY	$	907.56	$	934,783.00
		Conc Overbreak Main Tunnel 6"	2130	CY	$	383.97	$	817,848.00
		Conc Comp Water Slab 6"O/B	540	CY	$	534.06	$	288,393.00
		Reinforcing Steel Main Tunnel	140	TON	$	3,090.99	$	432,739.00
		Reinforcing Steel Comp Water Slab	40	TON	$	3,091.00	$	123,640.00
		2" Shotcrete Main Tunnel	7950	SF	$	5.63	$	44,723.00
		2" Shotcrete Transformer Gal	1260	SF	$	5.63	$	7,088.00
		2" Shotcrete Surge Chamb Access	800	SF	$	5.63	$	4,500.00
		2" Shotcrete Penstock Access	3750	SF	$	5.63	$	21,096.00
		2" Shotcrete Penstock Elbow Acc	3750	SF	$	5.63	$	21,096.00

	2" Shotcrete Access Shaft	750	SF	$	5.63	$	4,219.00
	2" Shotcrete Grout Gallery	470	SF	$	5.63	$	2,644.00
	2" Shotcrete Connector Tunnel	330	SF	$	5.62	$	1,856.00
	2" Shotcrete Comp Water 35'D	2050	SF	$	5.63	$	11,532.00
	2" Shotcrete Comp Water 10'D	450	SF	$	5.62	$	2,531.00
0.125	Support and Anchors					$	-
	Main Tunnel					$	-
	Rockbolts 1" @ 12'	1440	EACH	$	564.79	$	813,301.00
	Rockbolts 1" @ 9'	190	EACH	$	461.91	$	87,762.00
	Steel Mesh	132500	SF	$	6.87	$	910,254.00
	Steel Support	120	TON	$	13,684.35	$	1,642,122.00
	Main Tunnel Portal					$	-
	Rockbolts 1" @ 15'	50	EACH	$	786.58	$	39,329.00
	Transformer Gallery Tunnel					$	-
	Rockbolts 1" @ 12'	230	EACH	$	564.79	$	129,902.00
	Rockbolts 1" @ 9'	30	EACH	$	461.90	$	13,857.00
	Steel Mesh	20940	SF	$	6.87	$	143,854.00
	Steel Support	20	TON	$	13,684.35	$	273,687.00
	Grouting Gallery Tunnel					$	-
	Rockbolts 3/4" @ 6'	220	EACH	$	349.70	$	76,934.00
	Steel Support	3	TON	$	13,684.33	$	41,053.00
	Steel Mesh	100	SF	$	6.87	$	687.00
	Surge Chamber Tunnel					$	-
	Rockbolts 1" @ 12'	150	EACH	$	564.79	$	84,719.00
	Rockbolts 1" @ 9'	30	EACH	$	461.90	$	13,857.00
	Steel Support	13	TON	$	13,684.38	$	177,897.00
	Steel Mesh	13200	SF	$	6.87	$	90,682.00
	Penstock Access Tunnel					$	-
	Rockbolts 1" @ 12'	680	EACH	$	564.79	$	384,059.00
	Rockbolts 1" @ 9'	90	EACH	$	461.90	$	41,571.00
	Steel Support	60	TON	$	13,684.35	$	821,061.00
	Steel Mesh	62150	SF	$	6.87	$	426,961.00
	Penstock Elbow Access Tunnel					$	-
	Rockbolts 1" @ 12'	280	EACH	$	564.79	$	158,142.00
	Rockbolts 1" @ 9'	80	EACH	$	461.90	$	36,952.00
	Steel Support	20	TON	$	13,684.35	$	273,687.00
	Steel Mesh	14760	SF	$	6.87	$	101,399.00
	Access Shaft Tunnel					$	-
	Rockbolts 1" @ 12'	50	EACH	$	564.80	$	28,240.00
	Rockbolts 1" @ 9'	50	EACH	$	461.90	$	23,095.00
	Steel Support	20	TON	$	13,684.35	$	273,687.00
	Steel Mesh	2500	SF	$	6.87	$	17,175.00
	Connector Tunnel					$	-
	Rockbolts 3/4" @ 6'	160	EACH	$	349.70	$	55,952.00
	Steel Support	2	TON	$	13,684.50	$	27,369.00
	Steel Mesh	70	SF	$	6.87	$	481.00
	Comp. Water Tunnel 35' D					$	-
	Rockbolts 1" @ 12'	370	EACH	$	564.79	$	208,973.00
	Rockbolts 1" @ 9'	50	EACH	$	461.90	$	23,095.00
	Steel Support	30	TON	$	13,684.37	$	410,531.00
	Steel Mesh	33600	SF	$	6.87	$	230,827.00
	Comp. Water Tunnel Portal					$	-
	Rockbolts 1" @ 15'	40	EACH	$	786.58	$	31,463.00
	Comp. Water Tunnel 10' D					$	-
	Rockbolts 3/4" @ 6'	210	CY	$	195.49	$	41,053.00
	Steel Support	3	CY	$	206.00	$	618.00
	Steel Mesh	90	CY	$	1,278.98	$	115,108.00
0.129	Architectural					$	-
	Main Portal Doors	2	SETS	$	194,294.00	$	388,588.00
	Comp. Water Portal Door	1	LS	$	58,776.00	$	58,776.00
.12C	Mechanical					$	-

		Ventilating System					$	-
		(incl In 63.71 and 63.72)					$	-
0.13		Access Shaft					$	-
	0.131	Excavation					$	-
		Rock	14500	CY	$	227.67	$	3,301,225.00
	0.133	Surface Preparation					$	-
		Shaft	70200	SF	$	3.56	$	249,783.00
	0.134	Concrete and Shotcrete					$	-
		Concrete Lining	3600	CY	$	1,009.98	$	3,635,928.00
		Concrete Overbreak 6"	1300	CY	$	589.16	$	765,902.00
	0.135	Support and Anchors					$	-
		Rockbolts 3/4" @ 6'	1120	EACH	$	349.70	$	391,664.00
	0.138	Structural - Misc Steelwork					$	-
		Miscellaneous Steelwork	50	TON	$	7,905.38	$	395,269.00
	0.139	Architectural					$	-
		(incl in 331.2 Cntrl Bldg)					$	-
	.13C	Mechanical					$	-
		Elevators	1	LS	$	2,370,000.00	$	2,370,000.00
0.14		Access Shaft					$	-
	0.141	Excavation					$	-
		Rock	1150	CY	$	592.92	$	681,853.00
	0.143	Surface Preparation					$	-
		Head Tank	2800	SF	$	2.36	$	6,617.00
	0.144	Concrete and Shotcrete					$	-
		Concrete Lining	250	CY	$	1,030.18	$	257,545.00
		Concrete Overbreak 6"	45	CY	$	434.29	$	19,543.00
		Reinforcing Steel	10	TON	$	3,055.40	$	30,554.00
	0.145	Support and Anchors					$	-
		Rockbolts 1" @ 12'	25	EACH	$	564.80	$	14,120.00
		Rockbolts 1" @ 9'	10	EACH	$	461.90	$	4,619.00
		Steel Mesh	1200	SF	$	6.80	$	8,160.00
		Steel Support	2	TON	$	13,546.00	$	27,092.00
	0.148	Structural - Misc Steelwork					$	-
		Miscellaneous Steelwork	1	LS	$	78,353.00	$	78,353.00
	.14C	Mechanical					$	-
		Piping/Valves					$	-
		(Included in 335.12)					$	-
0.15		Bus Tunnels					$	-
		(Totals for 4 Bus Tunnels)					$	-
	0.151	Excavation					$	-
		Rock Horizontal	3200	CY	$	213.70	$	683,832.00
		Rock Inclined	2000	CY	$	601.04	$	1,202,083.00
	0.153	Surface Preparation					$	-
		Tunnel	11300	SF	$	2.45	$	27,738.00
	0.154	Concrete and Shotcrete					$	-
		Concrete Slab	800	CY	$	875.32	$	700,253.00
		Concrete Overbreak 12"	360	CY	$	504.99	$	181,796.00
		Reinforcing Steel	40	TON	$	3,055.40	$	122,216.00
		2" Shotcrete	520	SF	$	5.63	$	2,925.00
	0.155	Support and Anchors					$	-
		Rockbolts 1" @ 25'	80	EACH	$	1,320.04	$	105,603.00
		Rockbolts 1" @ 12'	110	EACH	$	564.79	$	62,127.00
		Rockbolts 1" @ 9'	30	EACH	$	461.90	$	13,857.00
		Steel Mesh	8600	SF	$	6.80	$	58,483.00
		Steel Support	14	TON	$	13,545.86	$	189,642.00
0.16		Transformer Gallery					$	-
	0.161	Excavation					$	-
		Rock	28800	CY	$	373.35	$	10,752,414.00
	0.163	Surface Preparation					$	-
		Transformer Gallery	26500	SF	$	2.36	$	62,623.00
	0.164	Concrete and Shotcrete					$	-

				Concrete Slab	2810	CY	$	1,312.97	$	3,689,457.00	
				Concrete Overbreak 12"H/6"V	820	CY	$	403.99	$	331,273.00	
				Reinforcing Steel	140	TON	$	3,055.41	$	427,757.00	
				3" Shotcrete	1100	SF	$	8.21	$	9,031.00	
		0.165		Support and Anchors					$	-	
				Rockbolts 1" @ 25'	170	EACH	$	1,320.04	$	224,406.00	
				Rockbolts 1" @ 15'	90	EACH	$	786.58	$	70,792.00	
				Steel Mesh	22200	SF	$	6.20	$	137,590.00	
				Steel Support	17	TON	$	13,545.88	$	230,280.00	
		0.161		Drainage					$	-	
				Holes (In Gallery Crown)	8900	LF	$	54.88	$	488,443.00	
	0.17			Cable Shafts					$	-	
				(Totals for 2 Shafts)					$	-	
		0.171		Excavation					$	-	
				Rock	3000	CY	$	642.47	$	1,927,396.00	
		0.173		Surface Preparation					$	-	
				Shafts	36000	SF	$	3.56	$	128,094.00	
		0.174		Concrete and Shotcrete					$	-	
				Concrete Lining	920	CY	$	1,885.30	$	1,734,472.00	
				Concrete Overbreak 6"	670	CY	$	942.65	$	631,574.00	
		0.175		Support and Anchors					$	-	
				Rockbolts 3/4" @ 6'	570	EACH	$	349.70	$	199,329.00	
		0.178		Structural - Misc Steelwork					$	-	
				Miscellaneous Steelwork	13	TON	$	16,678.00	$	216,814.00	
		0.179		Architectural					$	-	
				Enclosures	1	LS	$	213,063.00	$	213,063.00	
		.17C		Mechanical					$	-	
				Man hoist	2	EACH	$	517,960.00	$	1,035,920.00	
	0.18			Dewatering (During Construct)					$	-	
		0.181		Dewatering (Power Facs)					$	-	
				Dewatering	1	LS	$	1,653,075.00	$	1,653,075.00	
	0.19			Cable Shafts					$	-	
		0.191		Excavation					$	-	
				Rock	1	LS	$	1,532,978.00	$	1,532,978.00	
	0.2			Misc Buildings and Structures					$	-	
				Misc Buildings and Structures	1	LS	$	473,882.00	$	473,882.00	
									$	-	**$ 165,000,000**
332			**Reservoir, Dams and Waterways**						$	-	
	0.1			Reservoir					$	-	
		0.11		Clearing					$	-	
				Clearing	6350	Acre	$	3,072.12	$	19,507,935.00	
	0.2			Diversion Tunnels/Cofferdams					$	-	
		0.21		Diversion Tunnels/Portals					$	-	
			0.211	Excavation					$	-	
				Tunnel					$	-	
				Rock	48300	CY	$	116.81	$	5,641,889.00	
				Excavate Concrete for Plug	450	CY	$	122.62	$	55,177.00	
				Upstream Portal					$	-	
				Overburden	1950	CY	$	18.33	$	35,750.00	
				Rock	50200	CY	$	52.56	$	2,638,325.00	
				Downstream Portal					$	-	
				Overburden	6600	CY	$	18.33	$	121,001.00	
				Rock	54000	CY	$	52.56	$	2,838,039.00	
			0.213	Surface Preparation/Grouting					$	-	
				Upstream Portal					$	-	
				Horizontal	4400	SF	$	2.45	$	10,801.00	
				Inclined	15300	SF	$	3.56	$	54,440.00	
				Downstream Portal					$	-	
				Horizontal	1300	SF	$	2.45	$	3,191.00	
				Inclined	2900	SF	$	3.56	$	10,319.00	
				Grout Tunnel Plug					$	-	

		Drill Holes	2050	LF	$	12.73	$	26,095.00
		Cement	410	CF	$	72.48	$	29,717.00
	0.214	Concrete and Shotcrete					$	-
		Tunnel					$	-
		Concrete Lining	8100	CY	$	605.99	$	4,908,503.00
		Concrete Plug	3000	CY	$	457.86	$	1,373,573.00
		Concrete Overbreak 6"	3200	CY	$	336.66	$	1,077,312.00
		Reinforcing Steel	15	TON	$	3,086.67	$	46,300.00
		2" Shotcrete	4400	SF	$	5.63	$	24,752.00
		Upstream Portal					$	-
		Concrete Headwall	2800	CY	$	696.89	$	1,951,281.00
		Concrete Lining	1550	CY	$	253.73	$	393,281.00
		Concrete Pier	400	CY	$	605.99	$	242,395.00
		Overbreak 12"H/6"V	500	CY	$	523.59	$	261,795.00
		Reinforcing Steel	310	TON	$	3,086.65	$	956,860.00
		Downstream Portal					$	-
		Concrete Headwall	1000	CY	$	696.89	$	696,886.00
		Overbreak 12"H6"V	100	CY	$	523.59	$	52,359.00
		Reinforcing Steel	65	TON	$	3,086.65	$	200,632.00
	0.215	Support and Anchors					$	-
		Tunnels					$	-
		Rockbolts 1" @ 12'	800	EACH	$	564.79	$	451,834.00
		Rockbolts 1" @ 9'	90	EACH	$	461.90	$	41,571.00
		Steel Mesh	76900	SF	$	6.87	$	528,291.00
		Steel Support	90	TON	$	13,684.36	$	1,231,592.00
		Upstream Portal					$	-
		Rockbolts 1" @ 15'	80	EACH	$	786.58	$	62,926.00
		Rock Anchors 1" @ 25'	40	EACH	$	1,320.03	$	52,801.00
		Rock Dowels	60	EACH	$	503.02	$	30,181.00
		Downstream Portal					$	-
		Rockbolts 1" @ 15'	120	EACH	$	786.58	$	94,389.00
		Rock Anchors 1" @ 25'	30	EACH	$	1,320.03	$	39,601.00
	.21C	Mechanical					$	-
		Upstream Gate					$	-
		Gate Equipment	2	EACH	$	2,775,040.00	$	5,550,080.00
		Downstream Outlet					$	-
		Stoplog Guides	1	SET	$	78,820.00	$	78,820.00
		Stoplogs Incl Followers	1	LS	$	-	$	-
0.22		Upstream Cofferdam					$	-
	0.222	Fill					$	-
		Core	4600	CY	$	11.64	$	53,522.00
		Fine/Filter	2800	CY	$	39.37	$	110,222.00
		Course Filter	2700	CY	$	32.13	$	86,746.00
		Rock Shell	19800	CY	$	11.21	$	222,044.00
		Closure Dike	41900	CY	$	11.64	$	487,512.00
		Rip Rap	7000	CY	$	25.92	$	181,449.00
	0.223	Surface Preparation/Grouting					$	-
		Cutoff and Grout					$	-
		Holes	1600	LF	$	30.60	$	48,967.00
		Grout	256000	CF	$	86.68	$	22,191,237.00
	.22D	Dewatering					$	-
		Initial Dewatering	1	LS	$	1,796,709.00	$	1,796,709.00
		Dewatering Maintenance	1	LS	$	9,171,995.00	$	9,171,995.00
0.23		Downstream Cofferdam					$	-
	0.231	Excavation					$	-
		Removal of Cofferdam	42000	CY	$	14.37	$	603,519.00
	0.232	Fill					$	-
		Rip Rap	1650	CY	$	25.92	$	42,770.00
		Closure Dike	47000	CY	$	11.64	$	546,851.00
	0.233	Surface Prep/Grouting					$	-
		Cutoff and Grout					$	-

			Holes	2300	LF	$	30.60	$	70,391.00
			Cement	368000	CF	$	10.60	$	3,899,903.00
0.3		Main Dam						$	-
	0.31	Main Dam						$	-
		0.311	Excavation					$	-
			Overburden	35600	CY	$	12.35	$	439,642.00
			Rock	320700	CY	$	53.47	$	17,146,273.00
		0.313	Surface Preparation/Grouting					$	-
			Surface Preparation					$	-
			Under Dam/Thrust Blocks	171000	SF	$	3.32	$	568,459.00
			Consolidation Grout					$	-
			Drill Holes	176900	LF	$	12.73	$	2,251,795.00
			Cement	176900	CF	$	72.48	$	12,821,648.00
			Grout Curtain					$	-
			Drill Holes	259000	LF	$	28.59	$	7,405,680.00
			Cement	103600	CF	$	86.68	$	8,980,516.00
		0.314	Concrete and Shotcrete					$	-
			Dam					$	-
			Concrete	1281000	CY	$	437.66	$	560,639,898.00
			Concrete Overbreak	10400	CY	$	437.66	$	4,551,643.00
			Reinforcing steel	4500	TON	$	3,086.65	$	13,889,903.00
			Thrust blocks					$	-
			Concrete	105500	CY	$	437.66	$	46,172,919.00
			Concrete Overbreak	1100	CY	$	437.66	$	481,424.00
			Reinforcing steel	375	TON	$	3,086.65	$	1,157,492.00
			Joint Grouting					$	-
			Grouting	1	LS	$	6,024,540.00	$	6,024,540.00
		0.315	Support and Anchors					$	-
			Rockbolts 1" @ 25'	580	EACH	$	1,320.04	$	765,621.00
			Steel Mesh (on slopes)	275000	SF	$	5.28	$	1,452,776.00
		0.317	Drainage					$	-
			Holes	65800	LF	$	54.88	$	3,611,186.00
	0.32	Grout Galleries/Portals						$	-
		0.321	Excavation					$	-
			Tunnels/Shafts - Core Area					$	-
			Rock Horizontal	13100	CY	$	422.05	$	5,528,863.00
			Rock inclined	5300	CY	$	591.06	$	3,132,621.00
			Rock Vertical	3400	CY	$	573.18	$	1,948,811.00
			Tunnels/Shafts Access					$	-
			Rock Horizontal	12400	CY	$	422.05	$	5,233,428.00
			Portals					$	-
			Overburden	28700	CY	$	18.33	$	526,171.00
			Rock	16500	CY	$	52.56	$	867,179.00
		0.323	Surface Preparation					$	-
			Portals					$	-
			Horizontal	50	SF	$	2.46	$	123.00
			Vertical	410	SF	$	3.56	$	1,459.00
		0.324	Concrete and Shotcrete					$	-
			Tunnels - Core Area					$	-
			Concrete Slab	1800	CY	$	6,565.54	$	11,817,964.00
			Concrete Overbreak 6"	900	CY	$	807.98	$	727,186.00
			Reinforcing Steel	62	TON	$	3,086.65	$	191,372.00
			2"Shotcrete	3300	SF	$	5.63	$	18,564.00
			Tunnels - Access					$	-
			Concrete Slab	1400	CY	$	1,009.98	$	1,413,972.00
			Concrete Overbreak 6"	700	CY	$	807.98	$	565,589.00
			Reinforcing Steel	50	TON	$	3,086.64	$	154,332.00
			2" Shotcrete	2500	SF	$	5.63	$	14,064.00
			Shafts - Core Area					$	-
			2" Shotcrete	6500	SF	$	5.63	$	36,566.00
			Portals (4 Portals)					$	-

			Concrete	40	CY	$	434.30	$	17,372.00		
			Reinforcing Steel	3	TON	$	3,086.67	$	9,260.00		
		0.325	Support and Anchors					$	-		
			Tunnels - Core Area					$	-		
			Rockbolts 1" @ 12'	150	EACH	$	564.79	$	84,719.00		
			Rockbolts 1" @ 9'	30	EACH	$	461.90	$	13,857.00		
			Rockbolts 3/4" @ 6'	1250	EACH	$	349.70	$	437,125.00		
			Steel Mesh	12200	SF	$	7.04	$	85,934.00		
			Steel support	27	TON	$	13,684.37	$	369,478.00		
			Tunnels - Access					$	-		
			Rockbolts 3/4" @ 6'	1200	EACH	$	349.70	$	419,640.00		
			Steel Mesh	500	SF	$	7.04	$	3,522.00		
			Steel support	12	TON	$	13,684.33	$	164,212.00		
			Shafts - Core Area					$	-		
			Rockbolts 3/4" @ 6'	300	EACH	$	349.70	$	104,910.00		
			Steel Mesh	1300	SF	$	7.04	$	9,157.00		
			Portals					$	-		
			Rockbolts 1" @ 15'	150	EACH	$	786.58	$	117,987.00		
		0.328	Structural Steel - Misc Steelwork					$	-		
			Steel/Guides Shaft	50	TON	$	7,905.38	$	395,269.00		
			Steel Stairway	1	LS	$	316,022.00	$	316,022.00		
		0.329	Architectural					$	-		
			Portal Doors	4	EACH	$	45,028.75	$	180,115.00		
			Headshaft Structure	1	LS	$	1,028,580.00	$	1,028,580.00		
		0.32C	Mechanical					$	-		
			Elevator	1	LS	$	1,777,500.00	$	1,777,500.00		
			Overhead Crane	1	LS	$	1,449,100.00	$	1,449,100.00		
			Misc Mechanical Equipment	1	LS	$	284,400.00	$	284,400.00		
	0.33		Instrumentation					$	-		
		0.331	Instrumentation (Dam)					$	-		
			Instrumentation	1	LS	$	9,257,220.00	$	9,257,220.00		
0.4			Saddle Dam					$	-		
	0.41		Main Saddle Dam					$	-		
		0.411	Excavation					$	-		
			Overburden	1145000	CY	$	11.16	$	12,778,554.00		
			Rock	301000	CY	$	38.37	$	11,549,381.00		
		0.412	Fill					$	-		
			Impervious Core	313500	CY	$	19.05	$	5,970,802.00		
			Fine Filter	231000	CY	$	45.33	$	10,471,868.00		
			Course Filter	193000	CY	$	37.66	$	7,268,689.00		
			Rock Shell (Upstream)	534000	CY	$	9.52	$	5,085,472.00		
			Rip Rap	174500	CY	$	25.92	$	4,523,263.00		
			Rock Shell (Downstream)	345000	CY	$	9.52	$	3,285,558.00		
			Rockfill	127000	CY	$	9.52	$	1,209,466.00		
			Filter Fabric					$	-		
			Filter Fabric	190000	SF	$	1.89	$	359,419.00		
		0.413	Surface Preparation/Grouting					$	-		
			Surface Preparation					$	-		
			Under Dam Core	191500	SF	$	3.32	$	636,607.00		
			Under Dam Shell	432500	SF	$	2.29	$	991,878.00		
			Dental Concrete					$	-		
			Dental Concrete	7100	CY	$	390.53	$	2,772,732.00		
			Consolidation Grout					$	-		
			Drill Holes	57500	LF	$	12.73	$	731,929.00		
			Cement	57500	CF	$	72.48	$	4,167,579.00		
			Grout Curtain (See 332.313					$	-		
		0.417	Drainage (See 332.317)					$	-	**$**	**900,000,000**
0.5			Outlet Facility Valves (In Dam)					$	-		
	0.51		Outlet Facility Valves					$	-		
		.51C	Mechanical					$	-		
			Trashracks Guides	1	LS	$	4,384,500.00	$	4,384,500.00		

			Bulkhead Gate Guides	1	LS	$	2,891,400.00	$ 2,891,400.00
			Bulhead Gates and Followers	2	EACH	$	495,440.00	$ 990,880.00
			Gantry Crane	1	LS	$	1,659,000.00	$ 1,659,000.00
			Fixed Cone Valves	1	LS	$	3,000,000.00	$ 3,000,000.00
			(7 Plus 2 Spare)	1	LS	$	7,584,000.00	$ 7,584,000.00
			Ring Follower Gates (7)	1	LS	$	14,931,000.00	$ 14,931,000.00
			Misc. Mechanical Equipment	1	LS	$	1,896,000.00	$ 1,896,000.00
			Misc. Electrical Systems	1	LS	$	237,000.00	$ 237,000.00
0.52		Main (Chute) Spillway						$ -
	0.521	Excavation						$ -
		Approach						$ -
			Overburden	44000	CY	$	15.92	$ 700,352.00
			Rock Useable	80000	CY	$	38.37	$ 3,069,603.00
			Rock Waste	17000	CY	$	38.37	$ 652,291.00
		Control Structure						$ -
		(To end of Rollway)						$ -
			Overburden	21500	CY	$	15.92	$ 342,218.00
			Rock Useable	87000	CY	$	39.60	$ 3,444,768.00
			Rock Waste	15000	CY	$	35.41	$ 531,095.00
		Chute and Flip						$ -
		(End Rollway to End Flip)						$ -
			Overburden	128500	CY	$	15.92	$ 2,045,347.00
			Rock Useable (Inclined)	38000	CY	$	49.00	$ 1,861,994.00
			Rock Useable (Vertical)	401000	CY	$	49.00	$ 19,648,936.00
			Rock Waste	93500	CY	$	38.37	$ 3,587,598.00
		Outfall						$ -
		(From end of Basin)						$ -
			Overburden	44500	CY	$	15.92	$ 708,311.00
			Rock Useable	141500	CY	$	42.22	$ 5,974,533.00
			Rock Waste	41500	CY	$	31.57	$ 1,310,291.00
		Drain Tunnel						$ -
			Rock Horizontal	1500	CY	$	422.05	$ 633,076.00
			Rock Inclined	2300	CY	$	591.06	$ 1,359,439.00
		River Channel						$ -
			Alluvium Excavation	67000	CY	$	13.44	$ 900,448.00
	0.523	Surface Preparation/Grouting						$ -
		Surface Preparation						$ -
		Spillway						$ -
			Rock Horizontal	108000	SF	$	2.29	$ 247,683.00
			Rock Inclined	41500	SF	$	3.32	$ 137,959.00
		Consolidation Grout						$ -
			Drill Holes	22000	LF	$	12.73	$ 280,042.00
			Cement	22000	CF	$	72.48	$ 1,594,552.00
		Grout Curtain (See 332.313)						$ -
	0.524	Concrete & Shotcrete						$ -
		Concrete Structure						$ -
		(To end of Rollway)						$ -
		(Including Storage Areas)						$ -
			Concrete outer Walls	15500	CY	$	471.32	$ 7,305,522.00
			Concrete Piers (Full Length)	7700	CY	$	471.32	$ 3,629,195.00
			Concrete Deck	1600	CY	$	471.32	$ 754,118.00
			Concrete Rollway Slab	33000	CY	$	471.32	$ 15,553,692.00
			Concrete Overbreak (12"H/6"V	1400	CY	$	370.33	$ 518,456.00
			Reinforcing Steel	2300	TON	$	3,086.65	$ 7,099,284.00
		Concrete Chute & Flip						$ -
		(End Rollway to End Flip)						$ -
		(Incl Box Drain Galleries)						$ -
			Concrete Slabs	13000	CY	$	481.42	$ 6,258,509.00
			Concrete Walls	20500	CY	$	511.72	$ 10,490,326.00
			Concrete Overbreak 18"H/6"V	6300	CY	$	336.66	$ 2,120,958.00
			Reinforcing Steel	1300	TON	$	3,086.65	$ 4,012,639.00

			Concrete Drain Gallery					$	-
			Concrete Slab	400	CY	$	1,009.98	$	403,992.00
			Concrete Overbreak 6"	200	CY	$	605.99	$	121,198.00
			Reinforcing Steel	14	TON	$	3,086.64	$	43,213.00
			2" Shotcrete Dome	2500	SF	$	5.63	$	14,064.00
	0.525		Support and Anchors					$	-
			Drainage Tunnel					$	-
			Steel Support	4	TON	$	13,684.25	$	54,737.00
			Steel Mesh	500	SF	$	7.04	$	3,522.00
			Rockbolts Drainage Gallery					$	-
			3/4" @6'	400	EACH	$	352.95	$	141,180.00
			Rockbolts Approach					$	-
			1" @ 15'	140	EACH	$	792.43	$	110,940.00
			Rockbolts Chute & Structure					$	-
			1" @ 15'	85	EACH	$	792.42	$	67,356.00
			Slab/Wall Anchors					$	-
			1" @ 10'	3700	EACH	$	506.75	$	1,874,969.00
	0.527		Drainage					$	-
			Drill Holes					$	-
			Box Drains (To Drain Tunnel)	28000	LF	$	51.27	$	1,435,685.00
			3" relief	500	LF	$	52.93	$	26,466.00
	.52C		Mechanical					$	-
			Gate Equipment	3	EACH	$	4,010,800.00	$	12,032,400.00
			Stop Log Guides	3	SETS	$	101,340.00	$	304,020.00
			StopLogs Including Followers	1	SET	$	1,080,960.00	$	1,080,960.00
			Miscellaneous Electrical	1	LS	$	237,000.00	$	237,000.00
	0.53		Emergency spillway					$	-
	0.531		Excavation (Including -					$	-
			Bridge and Fuse Plug)					$	-
			Overburden	281500	CY	$	7.04	$	1,980,662.00
			Rock Useable	1019000	CY	$	39.81	$	40,568,805.00
			Rock Waste	215500	CY	$	39.04	$	8,413,510.00
	0.532		Fill					$	-
			Fuse Plug	26000	CY	$	22.27	$	579,079.00
								$	-
	0.533		Surface Preparation/Grouting					$	-
			Surface prep (under Fuse Plug)					$	-
			Horizontal	75500	SF	$	2.45	$	185,328.00
			Inclined	2500	SF	$	3.56	$	8,895.00
			Consolidation Grouting					$	-
			Drill Holes	23000	LF	$	12.73	$	292,772.00
			Cement	23000	CF	$	72.48	$	1,667,032.00
			Grout Curtain (See 332.313)					$	-
	0.534		Concrete					$	-
			Ground Slab	6000	CY	$	370.33	$	2,221,956.00
			Concrete Overbreak 12"H/12"V	3000	CY	$	370.33	$	1,110,978.00
			Reinforcing Steel	210	TON	$	3,086.64	$	648,195.00
	0.535		Support & Anchors					$	-
			Rockbolts 1" @ 15'	300	EACH	$	786.58	$	235,973.00
			Rock Anchors 1" @ 25'	760	EACH	$	1,320.04	$	1,003,228.00
	.53B		Bridge					$	-
			Bridge	1	LS	$	2,962,678.00	$	2,962,678.00
0.6		Power Intakes						$	-
	0.61		Power Intake Struct & App					$	-
	0.611		Excavation					$	-
			Overburden	99000	CY	$	15.92	$	1,575,793.00
			Rock	201600	CY	$	39.60	$	7,982,358.00
	0.613		Surface Preparation					$	-
			Horizontal	12100	SF	$	2.46	$	29,766.00
			Inclined	58000	SF	$	3.56	$	206,480.00
	0.614		Concrete and Shotcrete					$	-

			Structure					$	-
			Concrete Structure	14500	CY	$	582.42	$	8,445,116.00
			Concrete Overbreak 12"H/6"V	1530	CY	$	360.23	$	551,146.00
			Reinforcing Steel	940	TON	$	3,086.64	$	2,901,446.00
		0.615	Support & Anchors					$	-
			Approach					$	-
			Rockbolts 1" @ 15'	140	EACH	$	786.58	$	110,121.00
		.61C	Mechanical					$	-
			Trashracks/Guides	4	SETS	$	382,840.00	$	1,531,360.00
			Bulkhead Gate Guides	4	SETS	$	168,900.00	$	675,600.00
			Bulkhead Gates & Followers	1	SETS	$	1,040,424.00	$	1,040,424.00
			Intake Gantry Crane	1	EACH	$	4,729,200.00	$	4,729,200.00
			Intake Gate Equipment	4	EACH	$	2,049,320.00	$	8,197,280.00
			Miscellaneous Electrical	1	LS	$	237,000.00	$	237,000.00
		.61D	Intake Building					$	-
			Intake Building	1	LS	$	473,882.00	$	473,882.00
0.7			Surge Chambers					$	-
	0.71		Surge Chamber					$	-
		0.711	Excavation					$	-
			Chamber Rock	153800	CY	$	96.04	$	14,771,512.00
			Vent Shaft Rock	2300	CY	$	641.49	$	1,475,434.00
		0.713	Surface Preparations	6,100	SF	$	2.45	$	14,974.00
		0.714	Concrete and Shotcrete					$	-
			Chamber					$	-
			Concrete Chamber	1,755	CY	$	548.76	$	963,067.05
			Concrete Overbreak	140	CY	$	471.32	$	65,985.00
			Reinforcing Steel	65	TON	$	3,086.65	$	200,632.00
			3" Shotcrete	3,200	SF	$	8.21	$	26,273.00
			2" Shotcrete	2,300	SF	$	5.63	$	12,939.00
			Vent Shaft					$	-
			2" Shotcrete	6,300	SF	$	5.63	$	35,441.00
		0.715	Support and Anchors					$	-
			Chamber					$	-
			Rockbolts 1" @ 25'	725	EACH	$	1,320.04	$	957,027.00
			Rockbolts 1" @ 15'	600	EACH	$	786.58	$	471,947.00
			Steel Mesh	29,400	SF	$	6.26	$	184,077.00
			Steel Support	70	TON	$	13,684.36	$	957,905.00
			Vent Shaft					$	-
			Rockbolts 3/4" @ 6'	400	EACH	$	349.70	$	139,880.00
			Steel Mesh	1,300	SF	$	6.80	$	8,846.00
		0.717	Drainage Holes (In Chamber Crown)	18,428	LF	$	54.88	$	1,011,301.20
0.8			Penstocks					$	-
	0.81		Penstocks					$	-
		0.811	Excavation Tunnels					$	-
			Rock Horizontal	10,500	CY	$	164.79	$	1,730,245.00
			Rock Inclined	44,600	CY	$	325.72	$	14,527,123.00
		0.813	Surface Preparations/Grouting					$	-
			Surface Preparation					$	-
			Tunnels	173,500	SF	$	2.45	$	425,887.00
			Contact Grouting	1	LS	$	191,022.00	$	191,022.00
			Consolidation Grouting	1	LS	$	525,311.00	$	525,311.00
		0.814	Concrete and Shotcrete					$	-
			Concrete Liner	17,600	CY	$	1,036.91	$	18,249,665.00
			Concrete Plug	10,000	CY	$	807.98	$	8,079,840.00
			Concrete Overbreak 6"	4,700	CY	$	740.65	$	3,481,064.00
			Concrete Overbreak Plug	860	CY	$	740.65	$	636,961.00
			Reinforcing Steel	18	TON	$	3,055.39	$	54,997.00
			2" Shotcrete	19,100	SF	$	5.63	$	107,447.00
		0.815	Support and Anchors					$	-
			Rockbolts 1" @ 25'	100	EACH	$	1,320.04	$	132,004.00
			Rockbolts 1" @ 6'	1,350	EACH	$	349.70	$	472,095.00

			Steel Mesh	86,800	SF	$	6.80	$	590,268.00		
		0.818	Structural- Misc Steelwork					$	-		
			Steel Liner	2,000	TON	$	10,340.36	$	20,680,720.00		
	0.9		Tailrace Works					$	-		
		0.91	Tailrace Tunnels/Portals					$	-		
		0.911	Excavation					$	-		
			Tunnels					$	-		
			Rocks	329,300	CY	$	99.01	$	32,603,116.00		
			Portal					$	-		
			Overburden	40,000	CY	$	18.33	$	733,340.00		
			Rock	21,000	CY	$	52.56	$	1,103,682.00		
		0.913	Surface Preparation					$	-		
			Tunnels					$	-		
			Tunnel	582,000	SF	$	3.56	$	2,070,849.00		
			Portal					$	-		
			Horizontal	400	SF	$	2.46	$	982.00		
			Inclined	2,700	SF	$	3.56	$	9,607.00		
		0.914	Concrete and Shotcrete					$	-		
			Tunnels					$	-		
			Concrete Lining	31,700	CY	$	471.32	$	14,940,971.00		
			Conc Overbreak 6"	16,200	CY	$	349.06	$	5,654,772.00		
			Reinforcing Steel	13	TON	$	3,086.62	$	40,126.00		
			2" Shotcrete	17,500	SF	$	5.63	$	98,446.00		
			Portal					$	-		
			Concrete Base Slab	100	CY	$	696.89	$	69,689.00		
			Concrete Walls	650	CY	$	696.89	$	452,976.00		
			Conc Overbreak 12"H/6"V	50	CY	$	523.60	$	26,180.00		
			Reinforcing Steel	50	TON	$	3,086.64	$	154,332.00		
		0.915	Supports and Anchors					$	-		
			Tunnels					$	-		
			Rockbolts 1" @ 12'	3,160	EACH	$	564.79	$	1,784,744.00		
			Rockbolts 1" @ 9'	490	EACH	$	461.91	$	226,334.00		
			Steel Mesh	291,000	SF	$	6.87	$	1,999,123.00		
			Steel Support	232	TON	$	13,684.35	$	3,174,770.00		
			Portal					$	-		
			Rockbolts 1" @ 15'	100	EACH	$	786.58	$	78,658.00		
		0.916	Mechanical					$	-		
			Stoplog Guides	1	LS	$	97,170.00	$	97,170.00		
								$	-	**$**	**415,000,000**
333			**Waterwheels, Turbines, and Generators**					$	-		
	0.1		Turbines and Governors					$	-		
		0.11	Turbines and Governors					$	-		
		0.111	Supply	4	EACH	$	73,750,000.00	$	295,000,000.00		
		0.112	Install	4	EACH			$	-		
	0.2		Generators and Exciters					$	-		
		0.21	Generators and Exciters					$	-		
		0.211	Generators and Exciters	4	EACH			$	-		
	0.3		Total Bid From Vendor (includes all equipment in this category)			$	295,000,000.00	$	-	**$**	**295,000,000**
			Price from Voith Seimens Bid					$	-		
								$	-		
334			**Accessory Electrical Equipment**					$	-		
	0.1		Connections, Supports, and Struct.					$	-		
		0.11	Structures					$	-		
		0.111	Structures (Incl. Below)					$	-		
		0.12	Conductors and Insulators					$	-		
		0.121	Generator Isolated Bus	1	LS	$	4,740,000.00	$	4,740,000.00		
		0.122	HV Power Cables and Access.	1	LS	$	2,844,000.00	$	2,844,000.00		
		0.123	LV Power Cables and Access.	1	LS	$	948,000.00	$	948,000.00		
		0.124	Control Cables and Accessories	1	LS	$	1,422,000.00	$	1,422,000.00		
		0.125	Grounding System	1	LS	$	355,500.00	$	355,500.00		
		0.13	Conduits and Fittings					$	-		

		0.131	Conduits and Fittings	1	LS	$ 711,000.00	$ 711,000.00		
	0.2		Switchgear and Control Equipment				$ -		
		0.21	Auxiliary Transformers				$ -		
		0.211	Auxiliary Transformers	4	EACH	$ 65,040.00	$ 260,160.00		
		0.22	Circuit Breakers				$ -		
		0.221	Circuit Breakers (not required)				$ -		
		0.23	Surge Protection and Generator Cubicles				$ -		
		0.231	Surge Protection and Generator Cubicles	1	LS	$ 734,700.00	$ 734,700.00		
		0.24	Switchboards				$ -		
		0.241	Switchboards	1	LS	$ 1,706,400.00	$ 1,706,400.00		
		0.25	Aux. Power Equipment Incl. Battery				$ -		
		0.251	Aux. Power Equipment	1	LS	$ 521,400.00	$ 521,400.00		
	0.3		Cubicles and Appurtenances				$ -		
		0.31	Control, Relay, and Meter Boards				$ -		
		0.311	Control, Relay, and Meter Boards	1	LS	$ 1,659,000.00	$ 1,659,000.00		
		0.32	Computer Control System				$ -		
		0.321	Computer Control System (incl. in 353)				$ -		
		0.33	Supervis. And Telemeter System				$ -		
		0.331	Supervis. And Telemeter System (incl in 353)				$ -		
	0.4		Power Transformers				$ -		
		0.41	Power Transformers				$ -		
		0.411	Power Transformers	13	EACH	$ 1,300,000.00	$ 16,900,000.00		
	0.5		Lighting System				$ -		
		0.51	Powerhouse and Transformer Gallery				$ -		
		0.511	Powerhouse and Transformer Gallery	1	LS	$ 1,564,200.00	$ 1,564,200.00		
		0.52	Access Tunnels and Roads				$ -		
		0.521	Access Tunnels and Roads	1	LS	$ 402,900.00	$ 402,900.00		
	0.6		Misc. Electrical Equipment				$ -		
		0.61	Misc. Electrical Equipment				$ -		
		0.611	Misc. Electrical Equipment	1	LS	$ 521,400.00	$ 521,400.00		
	0.7		Surface Accessory Elec. Equipment				$ -		
		0.71	4.16 kV and LV Equipment				$ -		
		0.711	Switchboards	1	LS	$ 165,900.00	$ 165,900.00		
		0.712	Cables	1	LS	$ 521,400.00	$ 521,400.00		
		0.713	Aux. Transformers	1	LS	$ 284,400.00	$ 284,400.00		
		0.73	Diesel Generators - Standby				$ -		
		0.731	Diesel Generators - Standby	2	EACH	$ 337,800.00	$ 675,600.00		
		0.74	Exterior Lighting				$ -		
		0.741	Exterior Lighting	1	LS	$ 592,500.00	$ 592,500.00		
							$ -	$	38,000,000
335			**Misc. Power Plant Equipment**				$ -		
	0.1		Auxiliary Systems - Underground				$ -		
		0.11	Station Water Systems				$ -		
		0.111	Station Water Systems	1	LS	$ 3,081,000.00	$ 3,081,000.00		
		0.12	Fire Protection Systems				$ -		
		0.121	Fire Protection Systems	1	LS	$ 2,370,000.00	$ 2,370,000.00		
		0.13	Compressed Air Systems				$ -		
		0.131	Compressed Air Systems	1	LS	$ 3,318,000.00	$ 3,318,000.00		
		0.14	Oil Handling Systems				$ -		
		0.141	Oil Handling Systems	1	LS	$ 2,370,000.00	$ 2,370,000.00		
		0.15	Drainage And Dewatering				$ -		
		0.151	Drainage And Dewatering	1	LS	$ 3,555,000.00	$ 3,555,000.00		
		0.16	Heat, Vent, and Cooling System				$ -		
		0.161	Heat, Vent, and Cooling System	1	LS	$ 2,844,000.00	$ 2,844,000.00		
		0.17	Miscellaneous				$ -		
		0.171	Miscellaneous	1	LS	$ 2,133,000.00	$ 2,133,000.00		
	0.2		Auxiliary Systems - Surface Facs				$ -		
		0.21	Auxiliary Systems - Surface Facs				$ -		
		0.211	Auxiliary Systems - Surface Facs	1	LS	$ 355,500.00	$ 355,500.00		
	0.3		Auxiliary Equipment				$ -		
		0.31	Powerhouse Cranes				$ -		

		0.311	Powerhouse Cranes	2	EACH	$	1,936,800.00	$	3,873,600.00		
	0.32		Elevators					$	-		
		0.321	Elevators	1	LS	$	545,100.00	$	545,100.00		
	0.33		Misc. Cranes and Hoist					$	-		
		0.331	Misc. Cranes and Hoist	1	LS	$	505,500.00	$	505,500.00		
	0.34		Compensation Pumps					$	-		
		0.341	Pumps and Motors	2	EACH	$	1,300,800.00	$	2,601,600.00		
		0.342	Valves	4	EACH	$	151,760.00	$	607,040.00		
	0.35		Machine Shop Equipment					$	-		
		0.351	Machine Shop Equipment	1	LS	$	474,000.00	$	474,000.00		
0.4			General Station Equipment (Included in Mechanical and Electrical Systems)					$	-		
0.5			Communication Equipment	1	LS	$	213,300.00	$	213,300.00		
								$	-	**$**	**29,000,000**
336		**Roads**						$	-		
0.1			Roads								
	0.11		Pioneer Roads and Bridges								
		0.111	Gold Creek- Devil Canyon								
			Road (12.31 mi)								
			Clearing	113	ACRE	$	11,416.62	$	1,300,000		
			Waste Excavation	324,998	CY	$	9.51	$	3,100,000		
			Common Excavation	291,163	CY	$	8.32	$	2,400,000		
			18" Culverts	3,460	LF	$	62.55	$	200,000		
			36" Culverts	1	LS	$	32,760.98	$	-		
			D-1 Base Material	66,444	TON	$	45.47	$	3,000,000		
			Fabric	3,192	SY	$	6.73	$	-		
			Maintenance	25	MI/YR	$	9,008.99	$	200,000		
		0.113	Devil Canyon Low Level Crossing								
			Crossing (7.88 Miles)								
			Clearing	170	ACRE	$	11,416.62	$	1,900,000		
			Waste Excavation	498,845	CY	$	9.51	$	4,700,000		
			Common Excavation	549,417	CY	$	8.32	$	4,600,000		
			Rock Excavation	749,641	CY	$	28.45	$	21,300,000		
			18" Culverts	5,100	LF	$	62.55	$	300,000		
			D-1 Base Material	36,966	TON	$	45.47	$	1,700,000		
			Maintenance	118	MI/YR	$	11,258.74	$	1,300,000		
	0.12		Permanent Roads and Bridges								
		0.121	Parks Hwy - Gold Creek (13.26 mile)								
			Main Road								
			Clearing	210	Acre	$	11,416.62	$	2,400,000		
			Waste Excavation	575,480	CY	$	10.00	$	5,800,000		
			Common Excavation	570,180	CY	$	8.32	$	4,700,000		
			Rock Excavation	35,850	CY	$	28.45	$	1,000,000		
			Borrow	126,600	CY	$	12.11	$	1,500,000		
			NFS Subbase Material	136,500	CY	$	18.94	$	2,600,000		
			Grade "A" Base Material	74,480	CY	$	34.83	$	2,600,000		
			D-1 Base Material	31,080	Ton	$	45.47	$	1,400,000		
			A. C. Surfacing	28,462	Ton	$	204.04	$	5,800,000		
			Guardrail	9,800	LF	$	92.97	$	900,000		
			18" Culverts	7,055	LF	$	62.55	$	400,000		
			36" Culverts	1	LS	$	119,258.40	$	100,000		
			Fabric	18,844	SY	$	6.73	$	100,000		
			Thaw Pipes	7,555	LF	$	93.64	$	700,000		
			Topsoil and Seed	130	Acre	$	7,573.05	$	1,000,000		
			Traffic Control Devices	13	Mile	$	39,020.27	$	500,000		
			Bridge	1	LS	$	300,000,000.00	$	300,000,000		
			Maintenance	13	MI/YRS	$	22,520.81	$	300,000		
		0.122	Gold Creek - Devil Canyon (12.31 mile)								
			Main Road								
			Clearing	28	Acre	$	11,416.62	$	300,000		
			Waste Excavation	97,892	CY	$	9.51	$	900,000		

			Common Excavation	44,772	CY	$	8.32	$	400,000	
			Rock Excavation	23,625	CY	$	28.45	$	700,000	
			Borrow	416,311	CY	$	12.11	$	5,000,000	
			NFS Subbase Material	126,750	CY	$	18.94	$	2,400,000	
			Grade "A" Base Material	69,160	CY	$	34.83	$	2,400,000	
			D-1 Base Material	28,860	Ton	$	45.47	$	1,300,000	
			A.C. Surfacing	26,429	Ton	$	204.04	$	5,400,000	
			Guardrail	6,700	LF	$	92.97	$	600,000	
			18" Culverts	4,950	LF	$	62.55	$	300,000	
			36" Culverts	1	LS	$	79,451.65	$	100,000	
			Fabric	5,585	SY	$	6.73	$	-	
			Thaw Pipes	8,845	LF	$	93.64	$	800,000	
			Topsoil and Seed	86	Acre	$	7,573.05	$	700,000	
			Traffic Control Devices	12	Mile	$	39,020.27	$	500,000	
			Maintenance	160	MI/YRS	$	27,023.64	$	4,300,000	
	0.2		Rail Facilities							
		0.21	Railhead - Gold Creek							
			Railhead							
			Clearing	25	Acre	$	11,416.62	$	300,000	
			Waste Excavation	78,000	CY	$	10.12	$	800,000	
			Common Excavation	505,000	CY	$	8.84	$	4,500,000	
			Grade "A" Base Material	4,900	CY	$	35.35	$	200,000	
			D-1 Base Material	2,400	Ton	$	45.47	$	100,000	
			A.C. Surfacing	2,200	Ton	$	204.04	$	400,000	
			Topsoil and Seed	15	Acre	$	7,573.05	$	100,000	
			Railyard Control Devices	1	LS	$	1,706.42	$	-	
			Subballast	25,800	CY	$	18.09	$	500,000	
			Trackage	19,700	LF	$	315.24	$	6,200,000	
			Dock Lumber	16	MBP	$	1,306.18	$	-	
			Maintenance	15	Years	$	64,604.12	$	1,000,000	
	0.3		Airstrip							
		0.31	Airstrip							
			Permanent Airstrip	1	LS	$	12,798,000.00	$	12,800,000	
			Temporary Airstrip	1	LS	$	2,133,000.00	$	2,100,000	
		0.14	Site Roads							
			Site Roads	7	MILE	$	11,743,475.57	$	82,204,329.00	
			Maintenance	60	MI/YRS	$	205,489.98	$	12,329,399.00	
		0.16	Trans Dam Crossing							
			Trans Dam Crossing (7.26 Miles)							
			Clearing	45	ACRE	$	10,953.82	$	492,922.00	
			Waste Excavation	132,300	CY	$	9.12	$	1,206,206.00	
			Common Excavation	114,500	CY	$	7.99	$	914,752.00	
			Rock Excavation	12,200	CY	$	28.21	$	344,153.00	
			Borrow	90,200	CY	$	12.14	$	1,095,035.00	
			NFS Subbase Material	27,960	CY	$	18.17	$	508,135.00	
			Grade "A" Base Material	15,260	CY	$	33.92	$	517,565.00	
			D-1 Base Material	6,370	TON	$	43.62	$	277,833.00	
			A.C. Surfacing	5,830	TON	$	195.78	$	1,141,374.00	
			Guardrail	2,640	LF	$	89.20	$	235,489.00	
			18" Culverts	1,785	LF	$	60.01	$	107,122.00	
			Thaw Pipes	1,785	LF	$	89.84	$	160,368.00	
			Topsoil and Seed	29	ACRE	$	7,266.03	$	210,715.00	
			Traffic Control Devices	3	MILE	$	37,438.33	$	112,315.00	
			Maintenance							
			Maintenance	7	MI/YRS	$	29,276.29	$	204,934.00	
										$ 535,000,000
350-350		**Transmission Plant**								
		Transmission Line per mile		11	MILE	$	5,700,000.00	$	62,700,000.00	

		Substations per EPS Cost Estimate (1 at Devil Canyon and 1 at Gold Creek)	2	EA	$	18,000,000.00	$	36,000,000.00		
									$	99,000,000.00
General Plant										
389		**Land and Land Rights (Included in 330)**					$	-		
							$	-		
390		**Structures and Improvements (Included in 331.2)**					$	-		
							$	-		
391		**Office Furniture/Equipment (Included in 399)**					$	-		
							$	-		
392		**Transportation Equipment (Included in 399)**					$	-		
							$	-		
393		**Stores Equipment (Included in 399)**					$	-		
							$	-		
394		**Tools Shop and Garage Equipment (Included in 399)**					$	-		
							$	-		
395		**Laboratory Equipment (Included in 399)**					$	-		
							$	-		
396		**Power Operated Equipment (Included in 399)**					$	-		
							$	-		
397		**Communications Equipment (Included in 399)**					$	-		
							$	-		
398		**Miscellaneous Equipment (Included in 399)**					$	-		
							$	-		
399		**Other Tangible Property**	1	LS	$	16,000,000.00	$	16,000,000.00		
			1	LS	$	(231,219.51)	$	(231,219.51)		
							$	-	$	16,000,000
Indirect Costs							$	-		
61		**Temporary Construction Facilities (Included in Direct Costs)**					$	-		
62		**Construction Equipment (Included in Direct Costs)**					$	-		
63		**Main Construction Camp**					$	-		
	0.1	Main Construction Camp Saved Maintence	1	LS	$	180,000,000.00	$	180,000,000.00		
64		**Labor Expense (Included in Direct Costs)**					$	-	$	180,000,000
65		**Superintendence (Included in Direct Costs)**					$	-		
66		**Insurance (Included in Direct Costs)**					$	-		
68		**Mitigation Fishery, Terrestrial and Recrational)- Not Included**	1	LS	$	200,000,000.00			$	-
69		**Fees (Included in Direct Costs)**					$	-		
		Contingency	**20%**				$	-	$	545,000,000
71		**Engineering (4%), Enviornmental (2%), Regulatory(1%)**	1	LS	$	229,000,000			$	229,000,000
71a		**Construction Management (4%)**	1	LS	$	131,000,000			$	131,000,000
72		**Legal Expenses (Included in 71)**					$	-		
75		**Taxes (Not Applicable)**					$	-		
76		**Administrative and Gen. Expenses (Included in 71)**					$	-		
77		**Interest (Not Included)**					$	-		
80		**Earnings/Expenses During Constr. (Not Included)**					$	-		
Total Project Cost									$	3,629,000,000

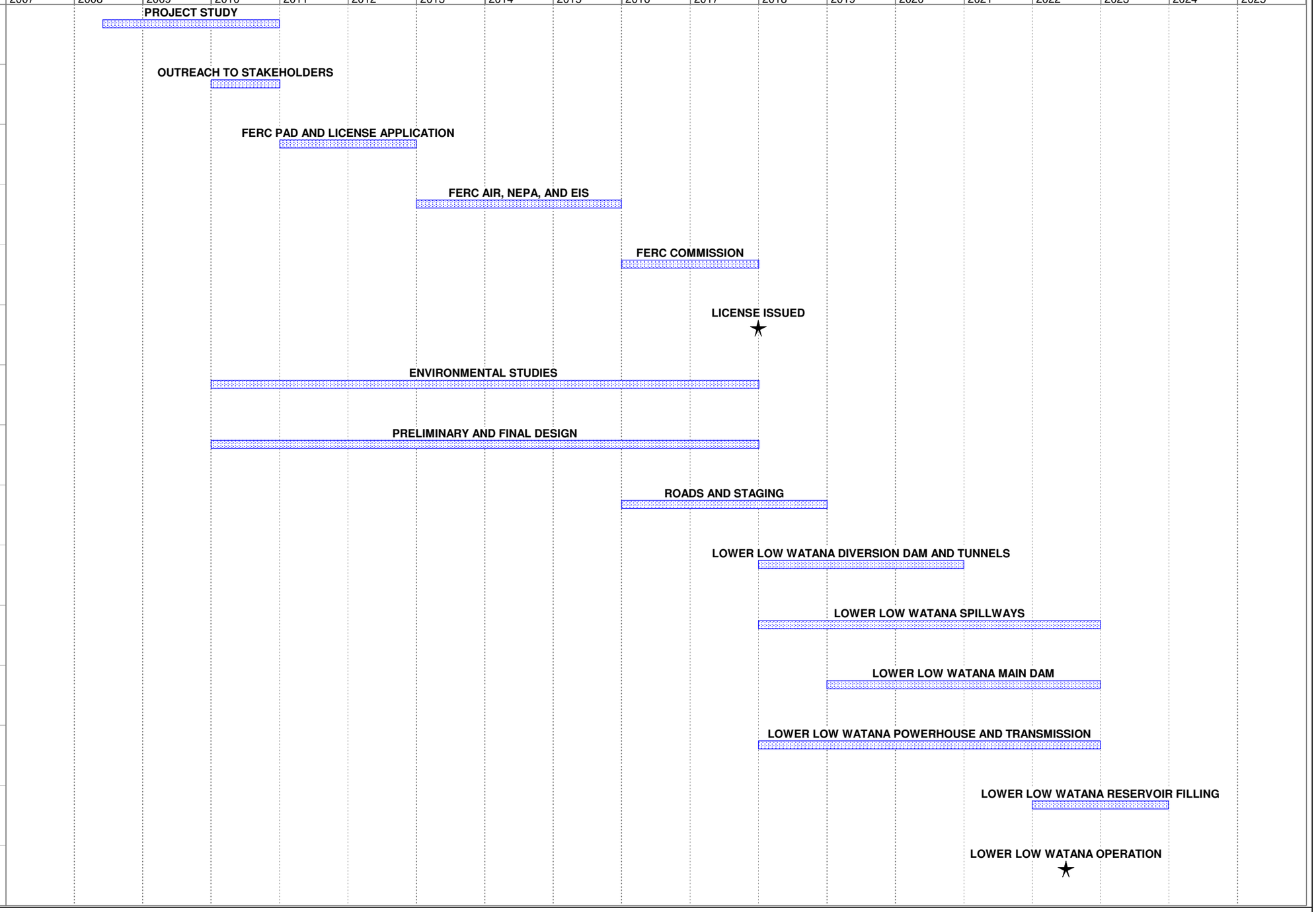
Number of Years for Base Case 12.5 years
Number of Years for Devil Canyon 6.5 years
Max Plant Capacity 1200

Appendix C:
Detailed Schedules

For the purposes of this submittal, the appendices have been attached as PDFs.

SUSITNA PROJECT: LOWER LOW WATANA DEVELOPMENT

ID	Task Name
1	PROJECT STUDY
2	OUTREACH TO STAKEHOLDERS
3	FERC PAD AND LICENSE APPLICATION
4	FERC AIR, NEPA, AND EIS
5	FERC COMMISSION
6	LICENSE ISSUED
7	ENVIRONMENTAL STUDIES
8	PRELIMINARY AND FINAL DESIGN
9	ROADS AND STAGING
10	LOWER LOW WATANA DIVERSION DAM AND TUNNELS
11	LOWER LOW WATANA SPILLWAYS
12	LOWER LOW WATANA MAIN DAM
13	LOWER LOW WATANA POWERHOUSE AND TRANSMISSION
14	LOWER LOW WATANA RESERVOIR FILLING
15	LOWER LOW WATANA OPERATION



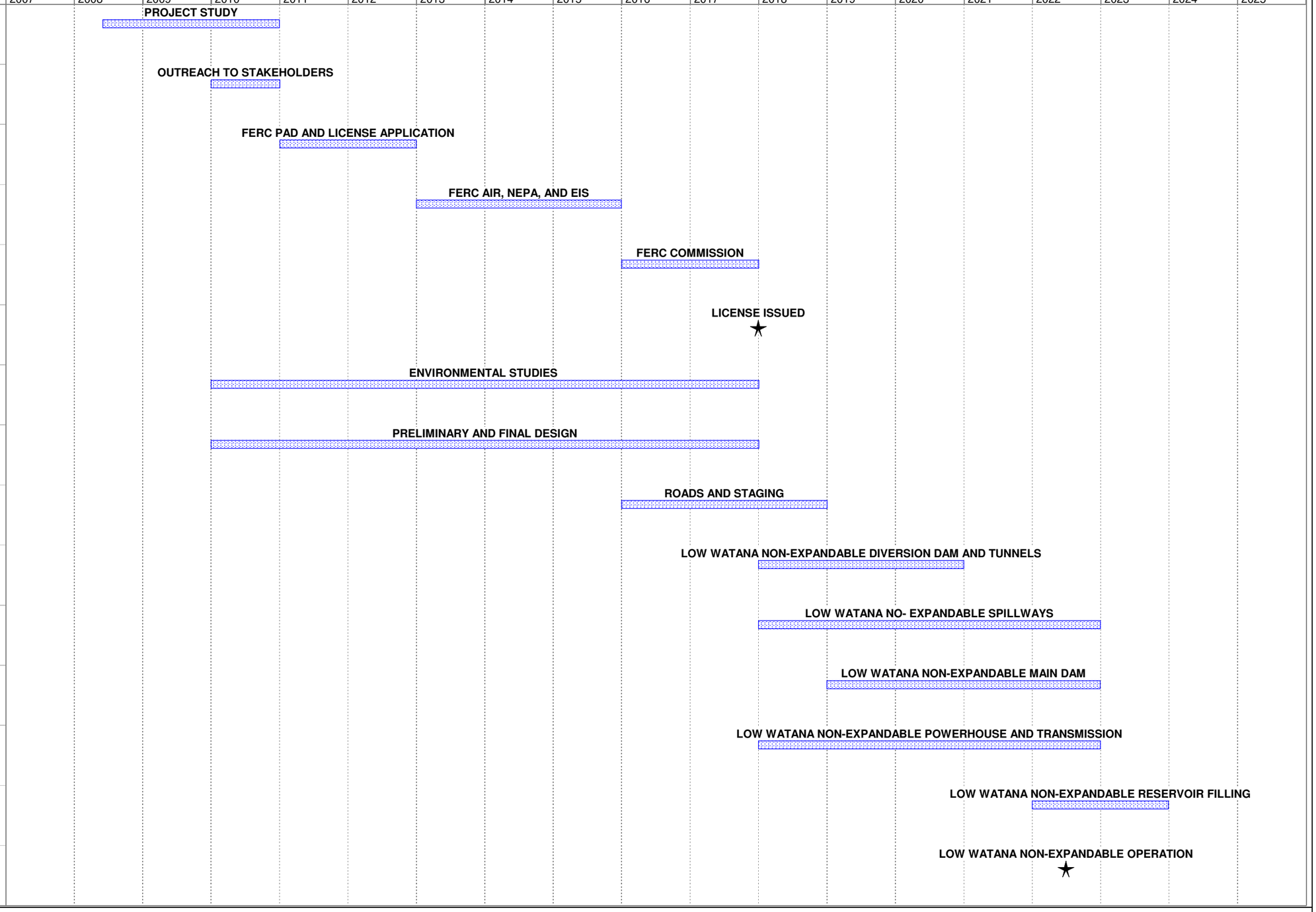
HDR

HDR/AEA SUSITNA HYDROELECTRIC PROJECT

11/18/09 Created NBA Checked PB

SUSITNA PROJECT: LOW WATANA NON-EXPANDABLE DEVELOPMENT

ID	Task Name
1	PROJECT STUDY
2	OUTREACH TO STAKEHOLDERS
3	FERC PAD AND LICENSE APPLICATION
4	FERC AIR, NEPA, AND EIS
5	FERC COMMISSION
6	LICENSE ISSUED
7	ENVIRONMENTAL STUDIES
8	PRELIMINARY AND FINAL DESIGN
9	ROADS AND STAGING
10	LOW WATANA NON-EXPANDABLE DIVERSION DAM AND TUNNELS
11	LOW WATANA NO- EXPANDABLE SPILLWAYS
12	LOW WATANA NON-EXPANDABLE MAIN DAM
13	LOW WATANA NON-EXPANDABLE POWERHOUSE AND TRANSMISSION
14	LOW WATANA NON-EXPANDABLE RESERVOIR FILLING
15	LOW WATANA NON-EXPANDABLE OPERATION



HDR/AEA SUSITNA HYDROELECTRIC PROJECT

11/18/09 Created NBA Checked PB

SUSITNA PROJECT: LOW WATANA DEVELOPMENT

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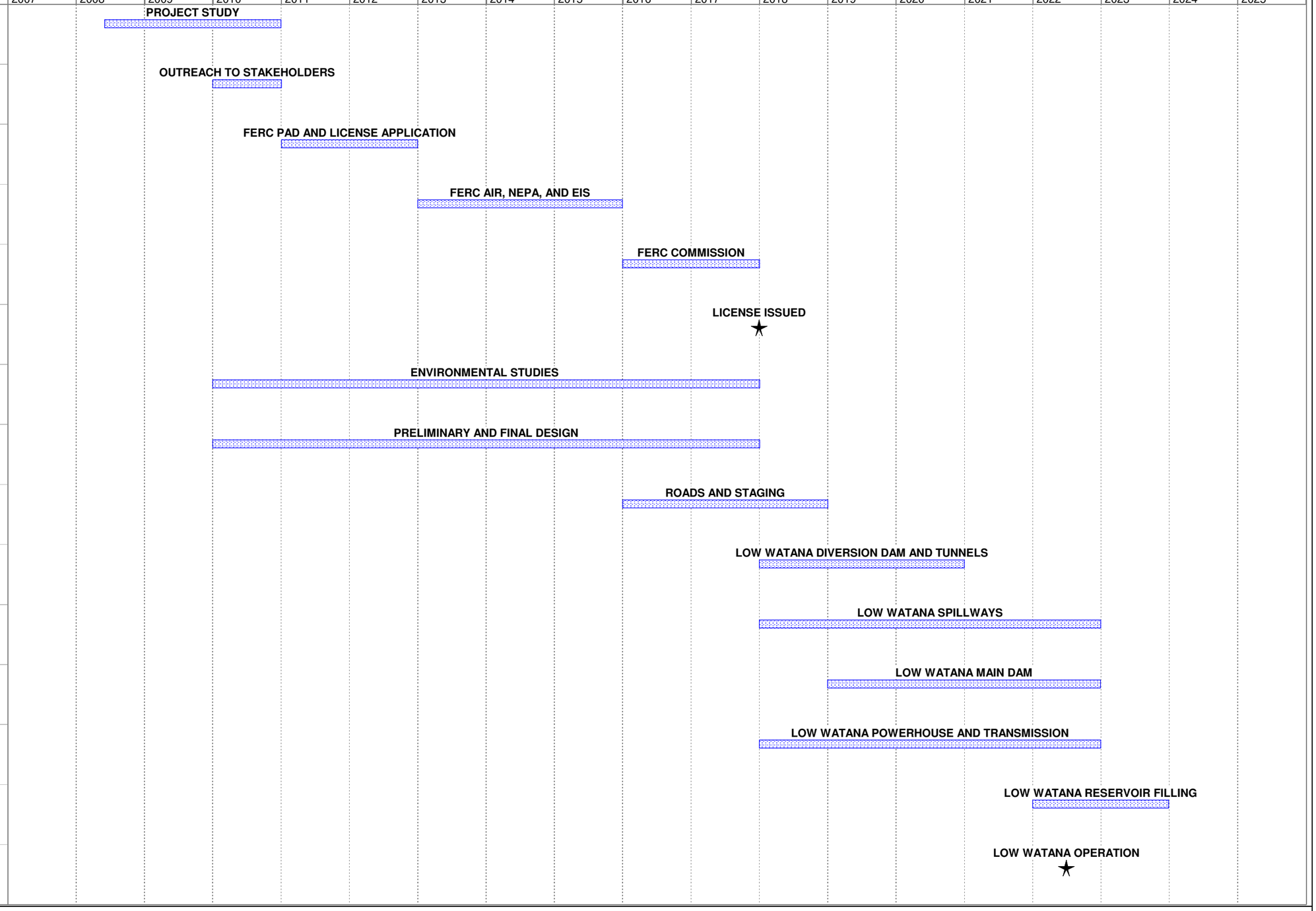
11	LOW WATANA SPILLWAYS
12	LOW WATANA MAIN DAM
13	LOW WATANA POWERHOUSE AND TRANSMISSION
14	LOW WATANA RESERVOIR FILLING
15	LOW WATANA OPERATION



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11/18/09 Created NBA Checked PB

SUSITNA PROJECT: WATANA DEVELOPMENT

ID	Task Name
1	PROJECT STUDY
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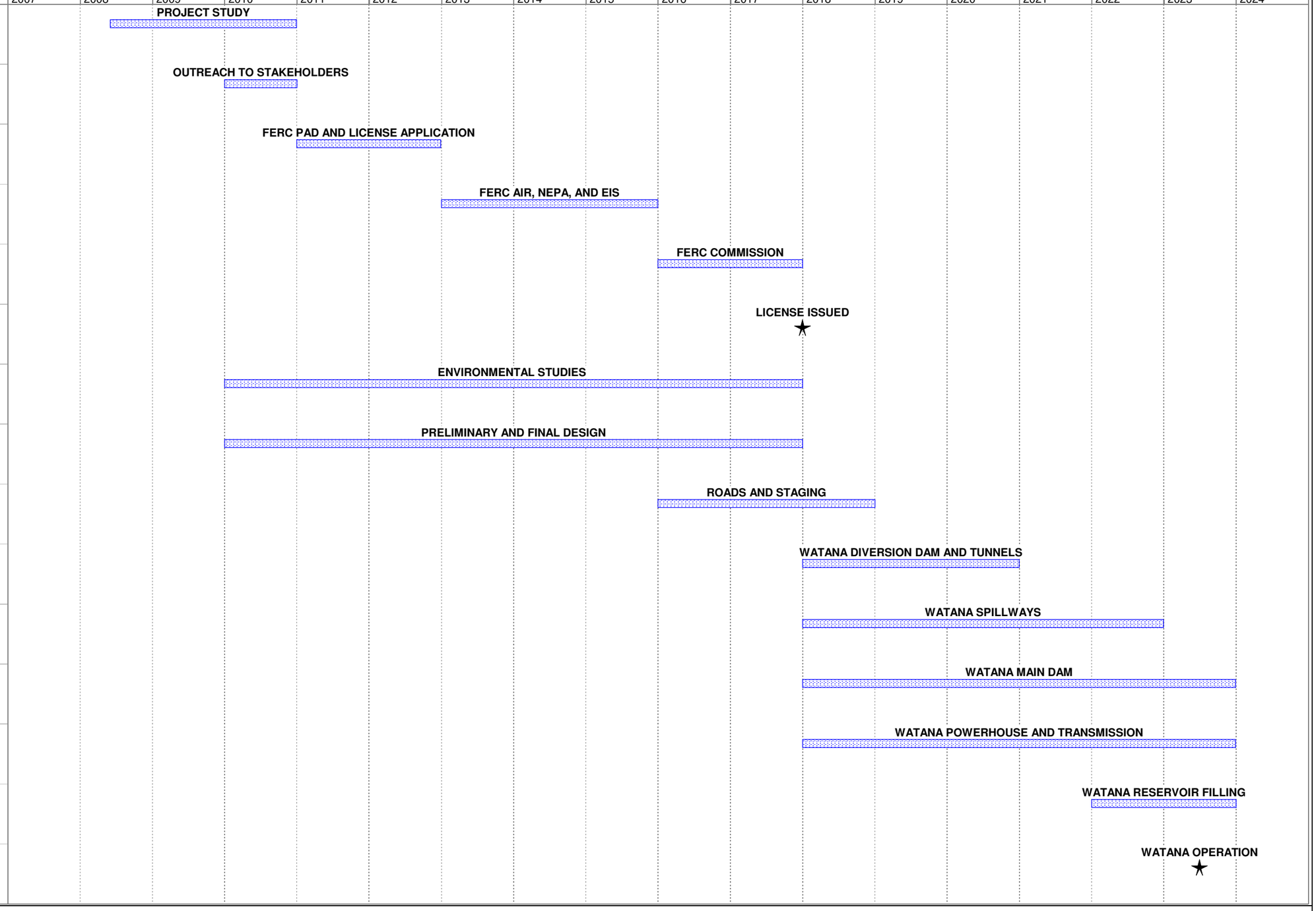
12	WATANA MAIN DAM
13	WATANA POWERHOUSE AND TRANSMISSION
14	WATANA RESERVOIR FILLING
15	WATANA OPERATION



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11/18/09 Created NBA Checked PB

SUSITNA PROJECT: WATANA AND DEVIL CANYON DEVELOPMENT

ID	Task Name
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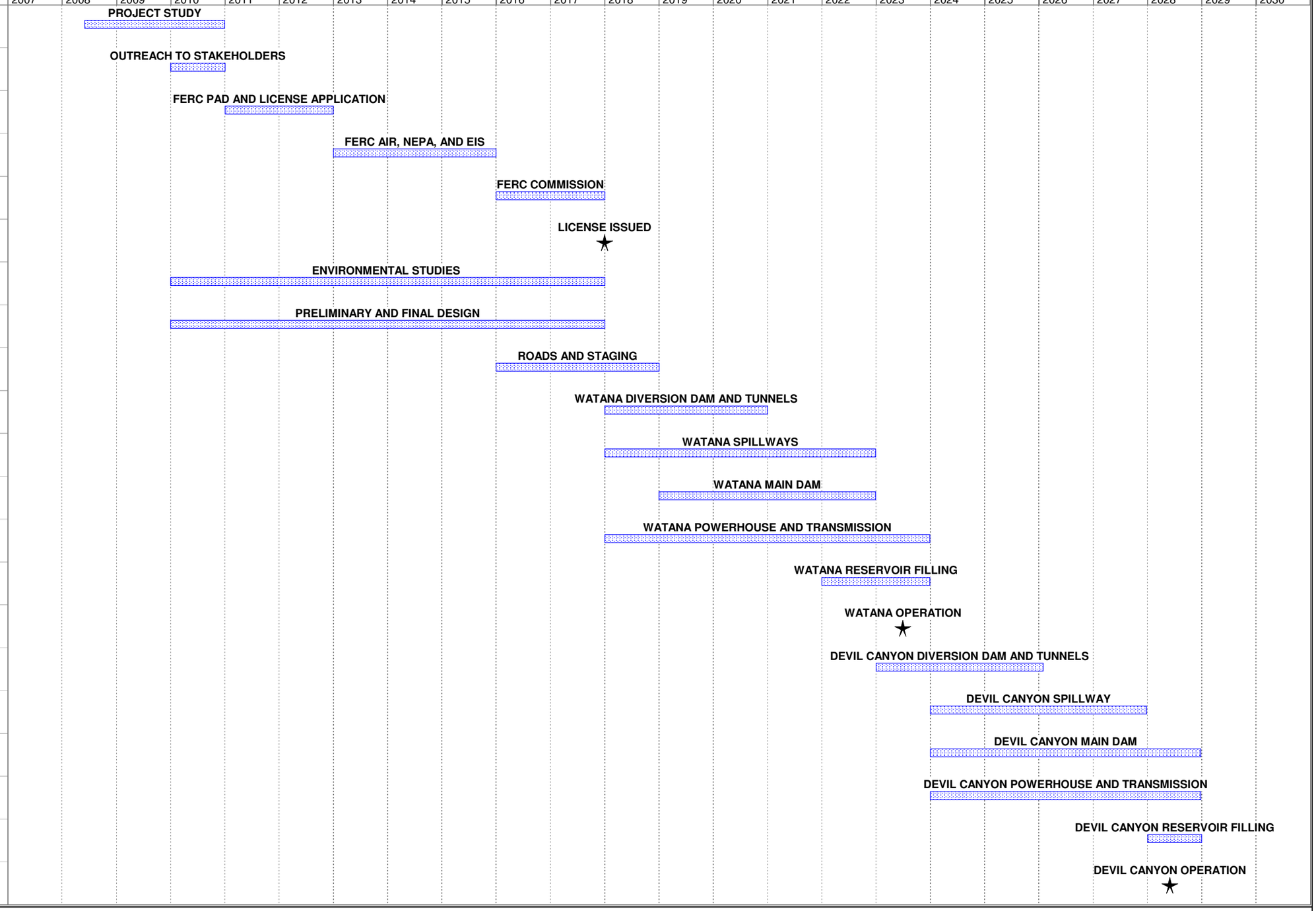
2	OUTREACH TO STAKEHOLDERS
3	FERC PAD AND LICENSE APPLICATION
4	FERC AIR, NEPA, AND EIS
5	FERC COMMISSION
6	LICENSE ISSUED
7	ENVIRONMENTAL STUDIES
8	PRELIMINARY AND FINAL DESIGN
9	ROADS AND STAGING
10	WATANA DIVERSION DAM AND TUNNELS
11	WATANA SPILLWAYS
12	WATANA MAIN DAM
13	WATANA POWERHOUSE AND TRANSMISSION
14	WATANA RESERVOIR FILLING
15	WATANA OPERATION
16	DEVIL CANYON DIVERSION DAM AND TUNNELS
17	DEVIL CANYON SPILLWAY
18	DEVIL CANYON MAIN DAM
19	DEVIL CANYON POWERHOUSE AND TRANSMISSION
20	DEVIL CANYON RESERVOIR FILLING
21	DEVIL CANYON OPERATION

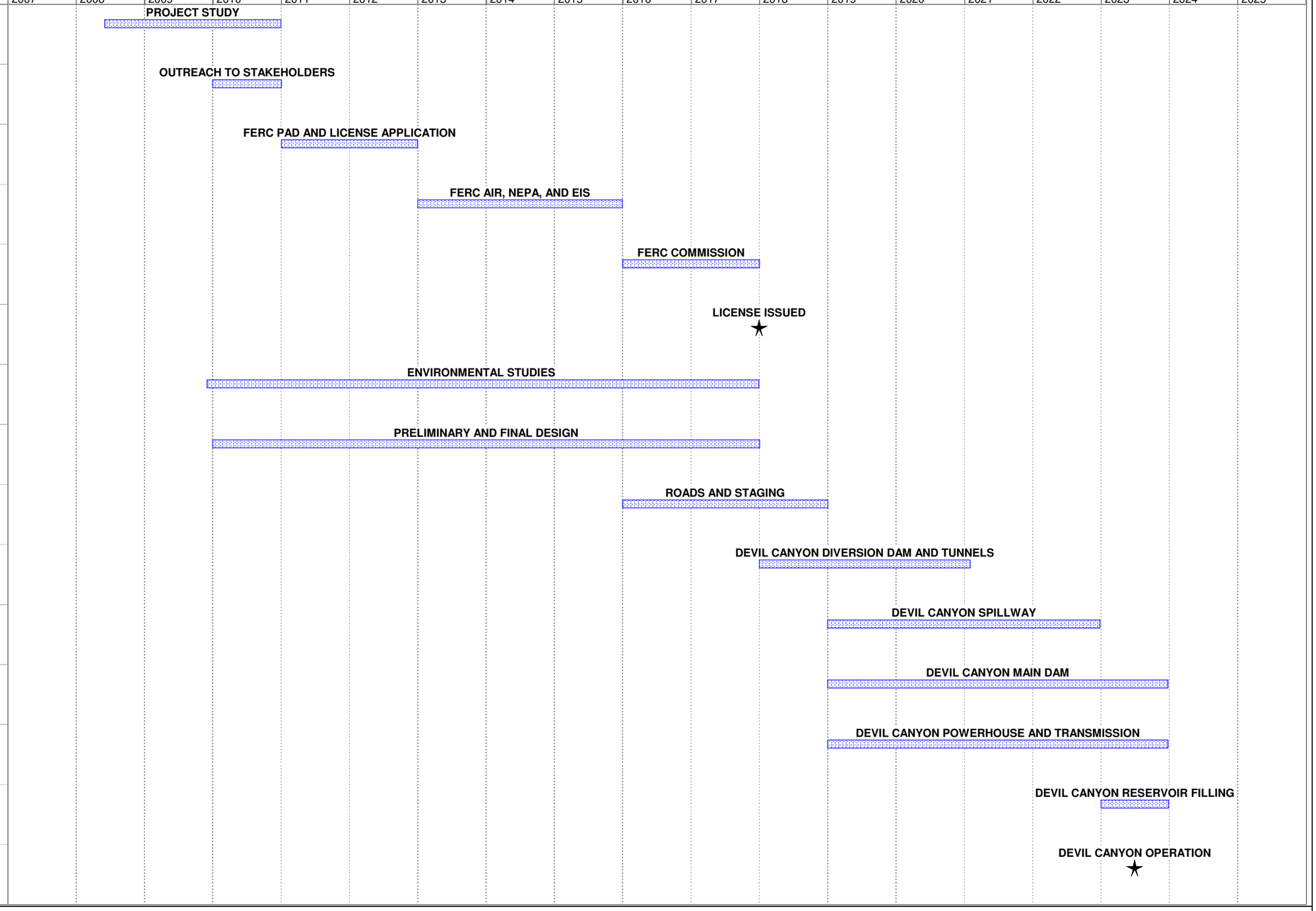


HDR/AEA SUSITNA HYDROELECTRIC PROJECT

11/18/09 Created NBA Checked PB

SUSITNA PROJECT: DEVIL CANYON DEVELOPMENT

ID	Task Name
1	PROJECT STUDY
2	OUTREACH TO STAKEHOLDERS
3	FERC PAD AND LICENSE APPLICATION
4	FERC AIR, NEPA, AND EIS
5	FERC COMMISSION
6	LICENSE ISSUED
7	ENVIRONMENTAL STUDIES
8	PRELIMINARY AND FINAL DESIGN
9	ROADS AND STAGING
10	DEVIL CANYON DIVERSION DAM AND TUNNELS
11	DEVIL CANYON SPILLWAY
12	DEVIL CANYON MAIN DAM
13	DEVIL CANYON POWERHOUSE AND TRANSMISSION
14	DEVIL CANYON RESERVOIR FILLING
15	DEVIL CANYON OPERATION



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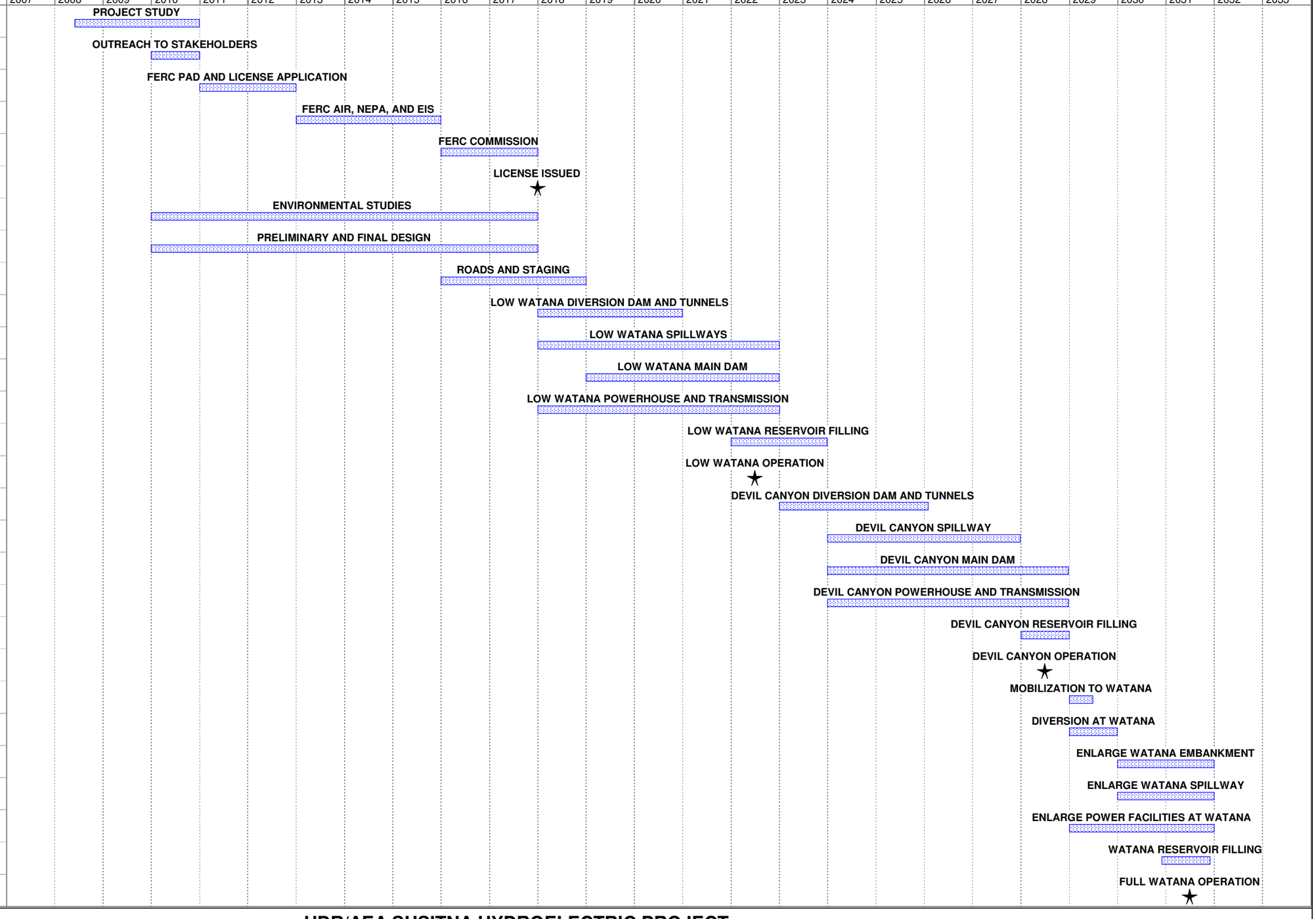
SUSITNA PROJECT: STAGED WATANA AND DEVIL CANYON DEVELOPMENT

ID	Task Name
1	PROJECT STUDY
2	OUTREACH TO STAKEHOLDERS
3	FERC PAD AND LICENSE APPLICATION
4	FERC AIR, NEPA, AND EIS
5	FERC COMMISSION
6	LICENSE ISSUED
7	ENVIRONMENTAL STUDIES
8	PRELIMINARY AND FINAL DESIGN
9	ROADS AND STAGING
10	LOW WATANA DIVERSION DAM AND TUNNELS
11	LOW WATANA SPILLWAYS
12	LOW WATANA MAIN DAM
13	LOW WATANA POWERHOUSE AND TRANSMISSION
14	LOW WATANA RESERVOIR FILLING
15	LOW WATANA OPERATION
16	DEVIL CANYON DIVERSION DAM AND TUNNELS
17	DEVIL CANYON SPILLWAY
18	DEVIL CANYON MAIN DAM
19	DEVIL CANYON POWERHOUSE AND TRANSMISSION
20	DEVIL CANYON RESERVOIR FILLING
21	DEVIL CANYON OPERATION
22	MOBILIZATION TO WATANA
23	DIVERSION AT WATANA
24	ENLARGE WATANA EMBANKMENT
25	ENLARGE WATANA SPILLWAY
26	ENLARGE POWER FACILITIES AT WATANA
27	WATANA RESERVOIR FILLING
28	FULL WATANA OPERATION



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Appendix D:
Climate Change Analyses

For the purposes of this submittal, the appendices have been attached as PDFs.

Climate Change, Natural and Potentially Man-made, and the Susitna River Basin

Concern over the impacts of climate change on Alaska have been voiced and evaluated since 2000 in a series of updated reports entitled: "Climate Change Impacts on the United States - *The Potential Consequences of Climate Variability and Change* Overview: Alaska". These assessments have been updated in 2004 and 2007 by the National Assessment Synthesis Team, US Global Change Research Program. A summary of the concerns are listed below:

> *Alaska has warmed substantially over the 20th century, particularly over the past few decades. Average warming since the 1950s has been 4F (2C). The largest warming, about 7F (4C), has occurred in the interior in winter. The growing season has lengthened by more than 14 days since the 1950s. Some records suggest that much of the recent warming occurred suddenly around 1977. Alaska has also grown wetter recently, with precipitation over most of the state increasing 30% between 1968 and 1990. The observed warming is part of a larger trend through most of the Arctic corroborated by many independent measurements of sea ice, glaciers, permafrost, vegetation, and snow cover. In contrast to other regions, the most severe environmental stresses in Alaska at present are climate-related.*

The figures below show the observed warming and the variation in precipitation that we reported in this series of reports. It is interesting to note that the temperature of Alaska has experienced warming trends from 1920-1940 and again from about 1975 to 2000. In between these two "warming periods", cooler periods were noted from 1900-1920 and again from 1950-1974. Thus it is very important to note that cyclical changes in Alaskan temperature have been documented though the causes have not. The figure on the right shows that Alaskan precipitation experiences considerable year-to-year variability but has been relatively consistent on a decadal and cyclical basis.

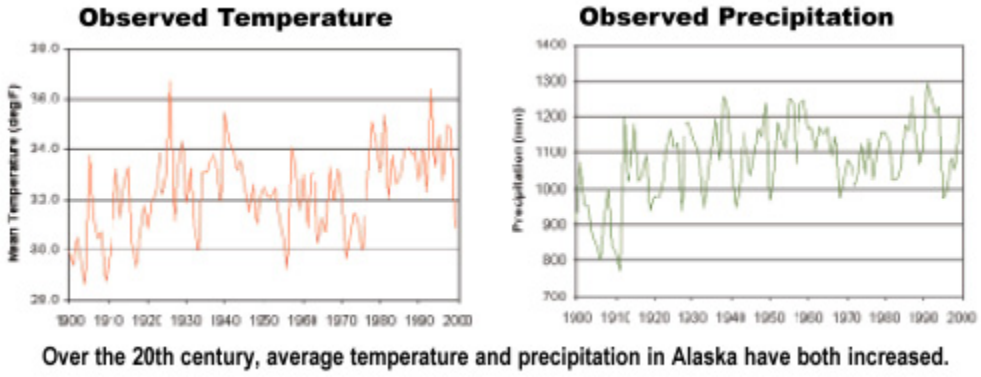


Figure 1: Observed temperature and predicpitaiton trends in Alaska from 1900-2000. ***Courtesy National Assessment Synthesis Team, US Global Change Research Program***

Global Circulation Models project that rapid Arctic warming will continue. For Alaska, the Hadley and Canadian models project 1.5-5F (1-3C) more warming by 2030, and 5-12F (3-6.5C) (Hadley) or 7-18F (4-10C) (Canadian) by 2100. The warming is projected to be strongest in the north and in winter. Both models also project continued precipitation increases in most of the state reaching 20-25% in the north and northwest, with areas of up to 10% decrease along the

south coast. Projections indicate that increased evaporation from warming will more than offset increased precipitation, however, making soils drier throughout most of the state.

As a means of comparison, the Alaskan warming observed from 1950 to 2000 was from 29F to 37F or about 8F. This warming is comparable to the anticipated warming predicted by the Global Climate Models by ~2050 so in effect, Alaskans may already have seen a glimpse of the future. . Climate change describes the variation in Earth's global and regional atmosphere over time. These changes are likely caused by a combination of natural processes and possible man-made activities. The rise in the Earth's average surface temperature is known as global warming. Some scientists attribute the accelerating rate of global warming to manmade greenhouse gas emissions while others suggest that natural variability of the climate plays an equal role to man-made activities.

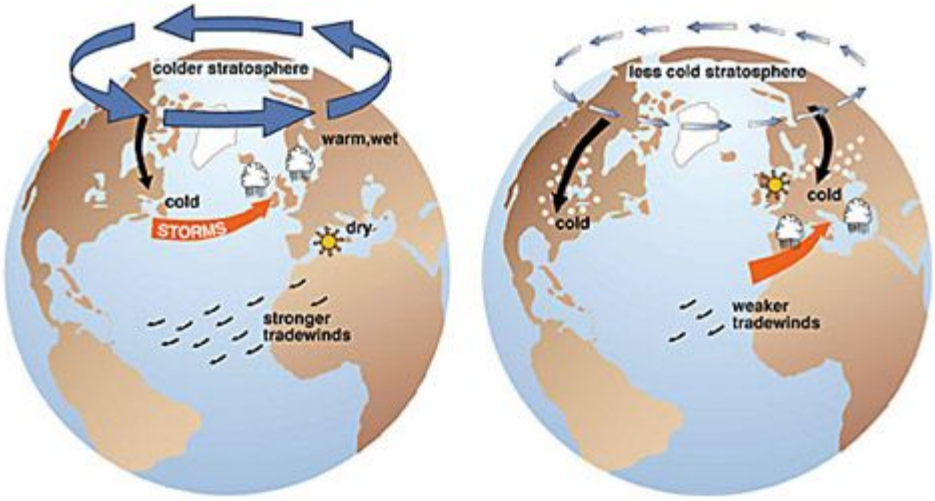
Global warming, regardless of its cause, is currently impacting Alaska and will continue to impact it in a number of ways. These impacts include melting polar ice, the retreat of glaciers, increasing storm intensity, wildfires, coastal flooding, droughts, crop failures, loss of habitat and threatened plant and animal species. Globally, 2005 was the warmest year on record (using records dating back to 1880) with a sustained period of warming in the Arctic during 2000-2005. Evidence includes NASA satellite data that shows Arctic perennial sea ice decreasing by 9% per decade since 1979. Less ice means more open water-which means greater absorption of solar energy-which leads to increased warming in the ocean, and in turn accelerates more ice loss.

Three major climate regimes contribute to the Alaska's climate variability: the Arctic Oscillation (AO), the Pacific Decadal Oscillation (PDO) and the ENSO or El Nino/La Nina. In looking at the impacts of climate on the Susitna River hydro-power generation potential, an appreciation of these naturally occurring climate regimes is important. A brief discussion of each regime and its relationship to both the mean annual discharge and total runoff follows.

The Arctic Oscillation

The Arctic Oscillation refers to opposing atmospheric pressure patterns in northern middle and high latitudes. The oscillation exhibits a "negative phase" with relatively high pressure over the polar region and low pressure at mid-latitudes (about 45 degrees North), and a "positive phase" in which the pattern is reversed. In the positive phase, higher pressure at mid-latitudes drives ocean storms farther north, and changes in the circulation pattern bring ***wetter weather to Alaska***, Scotland and Scandinavia, as well as drier conditions to the western United States and the Mediterranean. In the positive phase, frigid winter air does not extend as far into the middle of North America as it would during the negative phase of the oscillation. Weather patterns in the negative phase are in general "opposite" to those of the positive phase, as illustrated below.

Effects of the Positive Phase of the Arctic Oscillation | Effects of the Negative Phase of the Arctic Oscillation



(Figures courtesy of J. Wallace, University of Washington)

Over most of the past century, the Arctic Oscillation alternated between its positive and negative phases. Starting in the 1970s, however, the oscillation has tended to stay in the positive phase, causing lower than normal arctic air pressure and higher than normal temperatures in much of the United States, including Alaska, and northern Eurasia. Please note that this positive phase AO is not caused by global warming but a function of the natural variability and cycles in the atmosphere. http://nsidc.org/arcticmet/quickfacts/climate_change_lesson.htmlChanges beginning in the 1970s and 1980s due to the persistent positive phase AO include:

- warmer winters and springs over North America, Alaska and Eurasia, partially compensated by cooling over the northern North Atlantic,
- warmer air over the central Arctic Ocean,
- warming in the Arctic Ocean at 200 to 900 meters depth,
- reductions in sea ice and snow extent,
- increases in terrestrial precipitation,
- warming permafrost in Alaska and Russia, and cooling permafrost in Canada,
- increased plant growth and northward migration of the tree line.

Most of these trends derive from relatively short environmental records, and the magnitude of the high-latitude temperature increase is no larger than the inter-decadal temperature range for the last century. Since climate is naturally variable, the occurrence of an exceptionally warm period may not be abnormal because it may fall well within the expected range of temperature variability for a specific area. The Arctic Oscillation (AO), shown below, is an important Arctic climate index with positive and negative phases, which represents the state of atmospheric circulation over the Arctic.

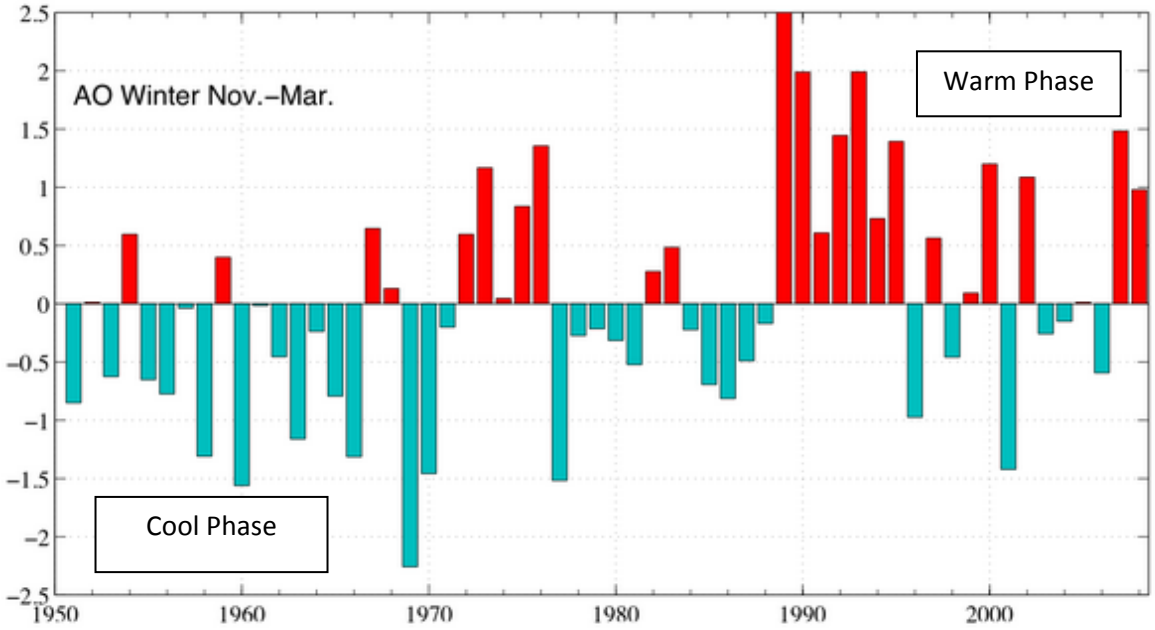


Figure 2: Arctic Oscillation Phases 1950-2004 (National Center for Environmental Prediction).

The positive phase (red) brings lower-than-normal pressure over the polar region, steering ocean storms northward, bringing wetter weather and the warmer conditions to Alaska as discussed earlier. While the value of the AO index was strongly positive in the early 1990's compared to the previous forty years, the value of the AO has been low and variable for the last nine years. The year to year persistence of positive or negative values and the rapid transition from one to the other is often referred to as "regime-like".

A detailed comparison of the AO phase and the Susitna River's total annual runoff is shown in the figure below. It indicates that no correlation in either the positive or negative phases of the AO could be found. This result was surprising since the AO is considered by many climatologists to have the most profound impact on precipitation in Alaska. The chart below is presented to substantiate this result. The yellow box indicates a +/-10 percent of the average total runoff for the river. As is easy to see, the total runoff appears to be relatively "climate regime" free from AO influences. This result bodes well for the consistent ability of the river to provide needed flow to sustain hydro-power generation.

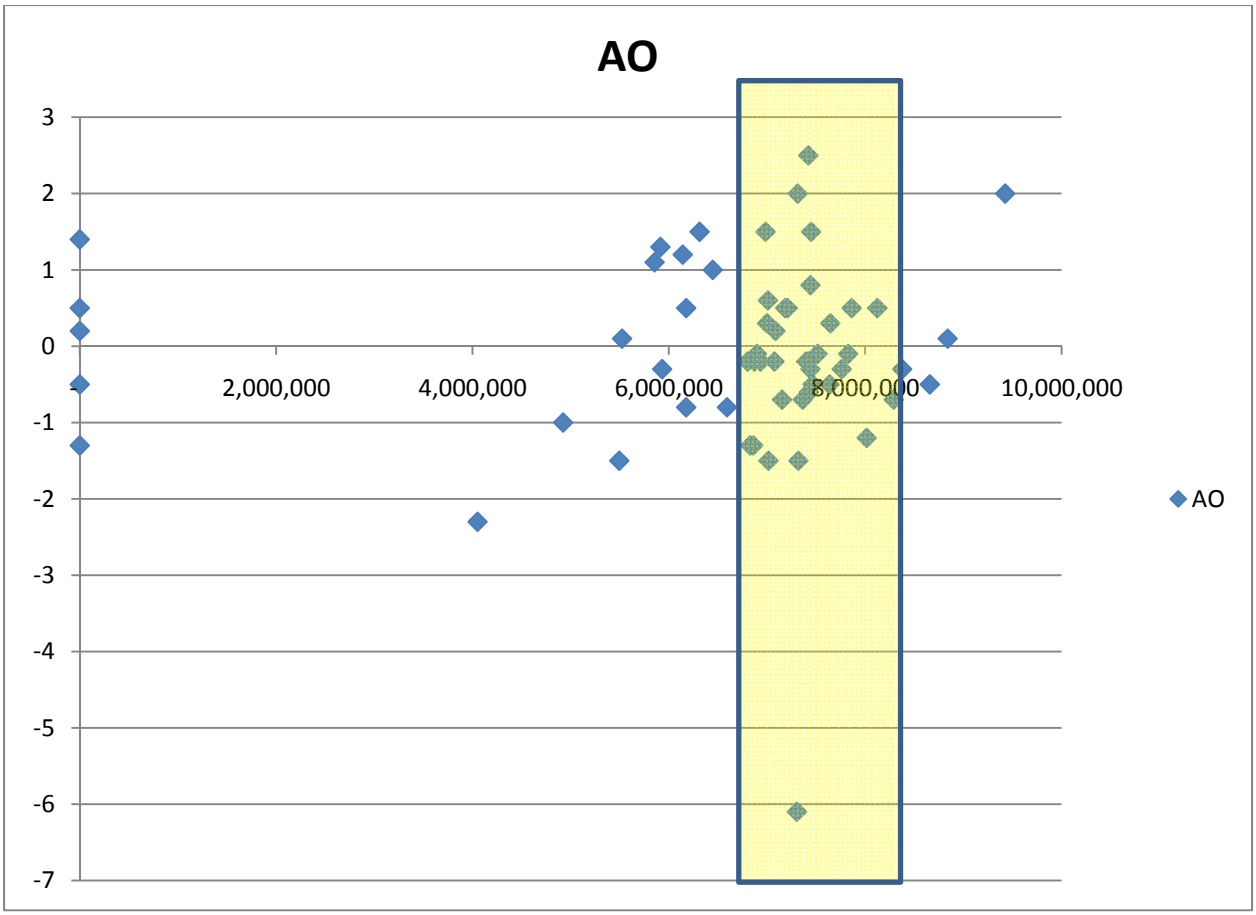


Figure 3 Comparison of the total annual runoff of the Susitna River and the Nov-Mar phase of the Pacific Decadal Oscillation

Similar results were derived for both the ENSO (El Nino/La Nina) cycles and the Pacific Decadal Oscillation (PDO) shown in the two following figures. Again, these results were not expected as the PDO is known to have a marked impact on precipitation in mountain ranges along the Canadian and California coasts and in the Rocky Mountains from Montana to New Mexico. The PDO comparison shown in Figure 4 demonstrates a remarkably balanced distribution. The greatest runoff years are balanced between positive, neutral and negative phases. While it is not understood why this balanced distribution exists, it is significant because it supports consistent runoff for hydro-power generation and water supply. Note in Figure 5 that the PDO goes through warm and cold phases like the AO.

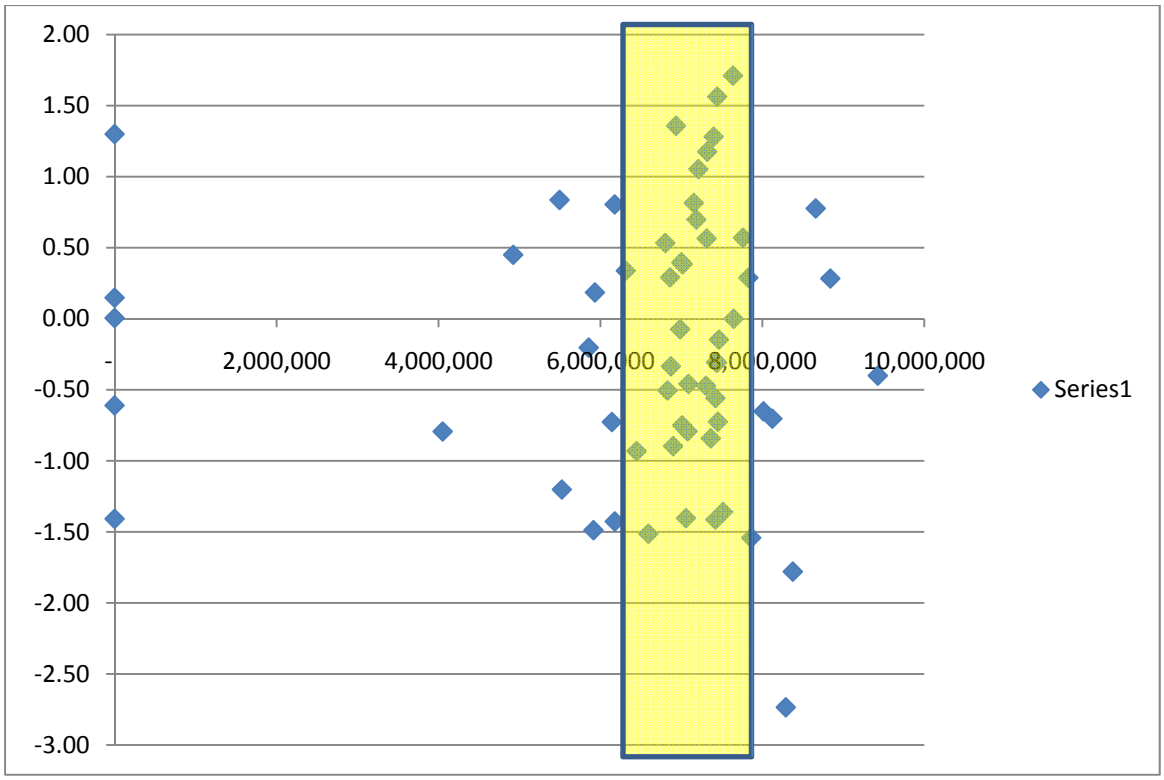


Figure 4 Comparison of the total runoff (acre ft) of the Susitna River and the Pacific Decadal Oscillation

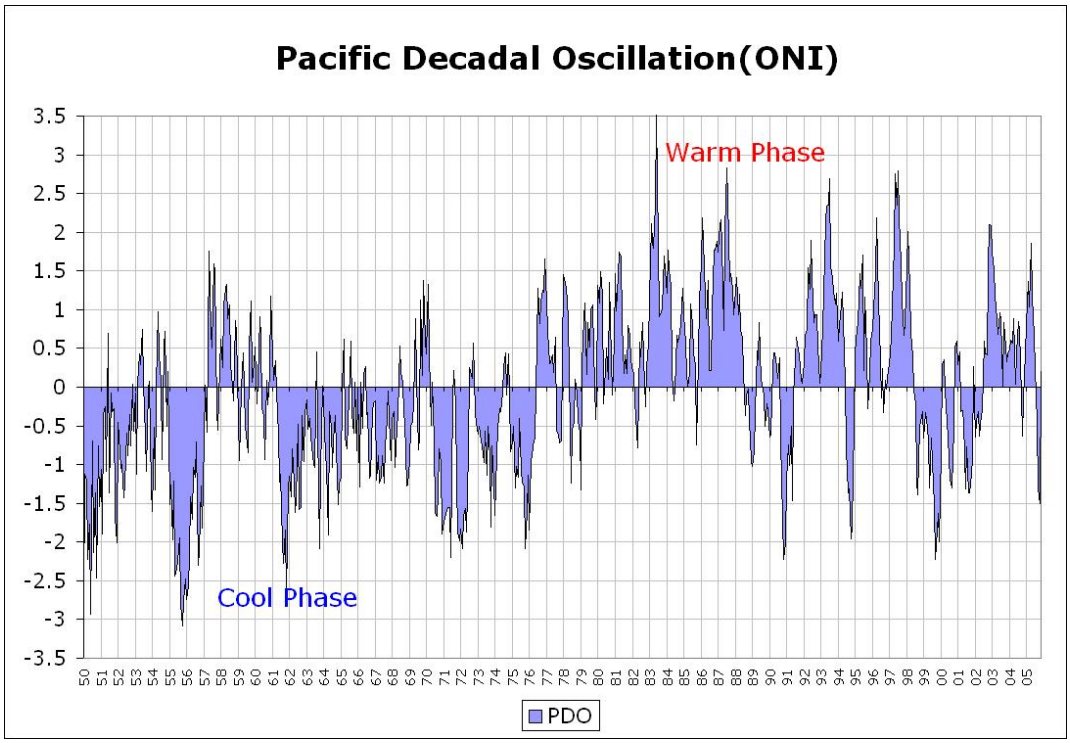


Figure 6 Warm and cool phases of the Pacific Decadal Oscillation 1950-2006

While this evaluation sounds redundant, the figure below shows the Multivariate ENSO Index or MEI plotted against the total annual runoff. Values of the MEI above 0.5 represent the presence of a El Nino while values less than -0.5 represent a La Nina is present. Once again a balanced distribution is present. Figure 8 shows the MEI plotted from 1950 to 2009. It shows a cool phase from 1950-1975 and a warm phase from 1976-2006 and possibly the start of another cool phase in 2007.

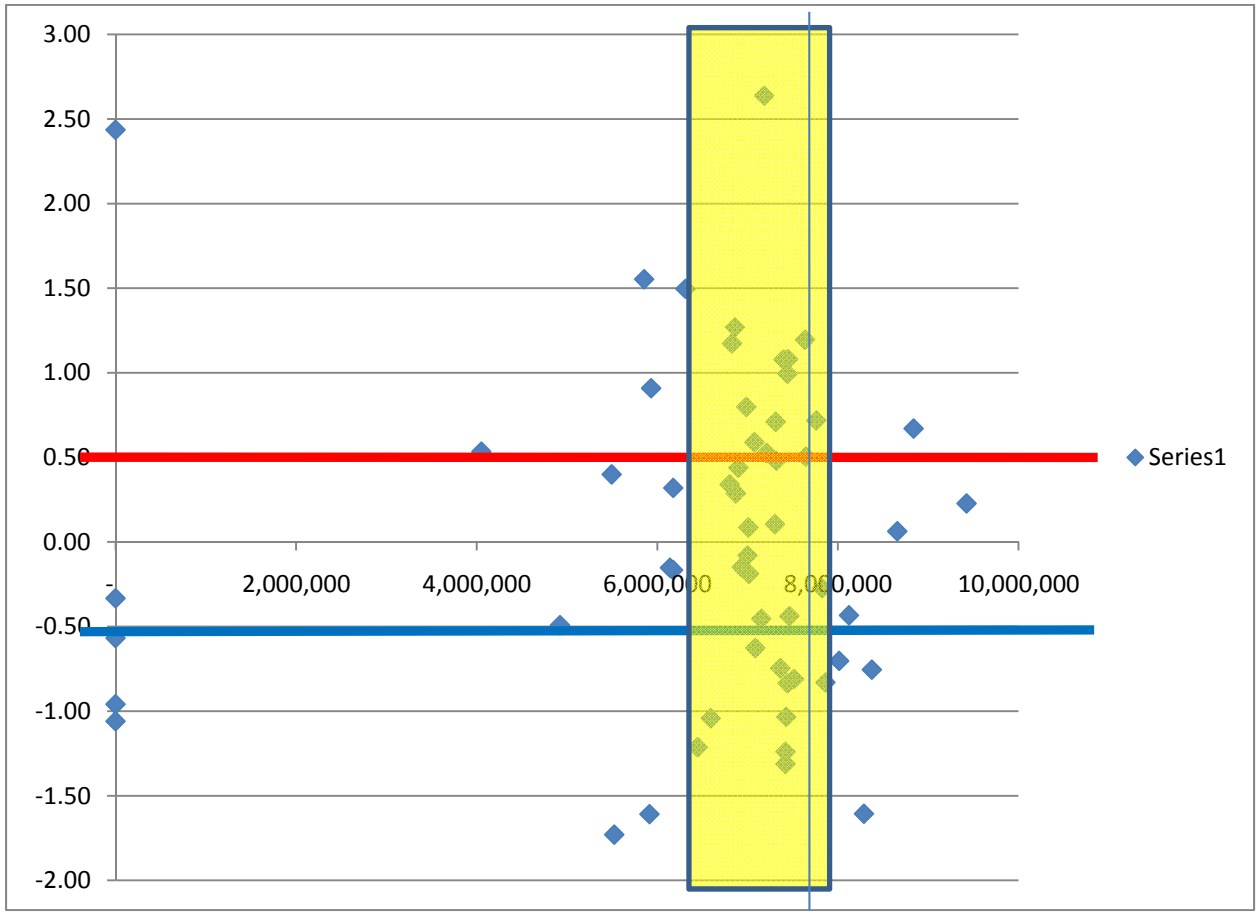


Figure 7 Comparison of the total runoff (acre ft) of the Susitna River and the Multi-Variate ENSO Index (MEI)

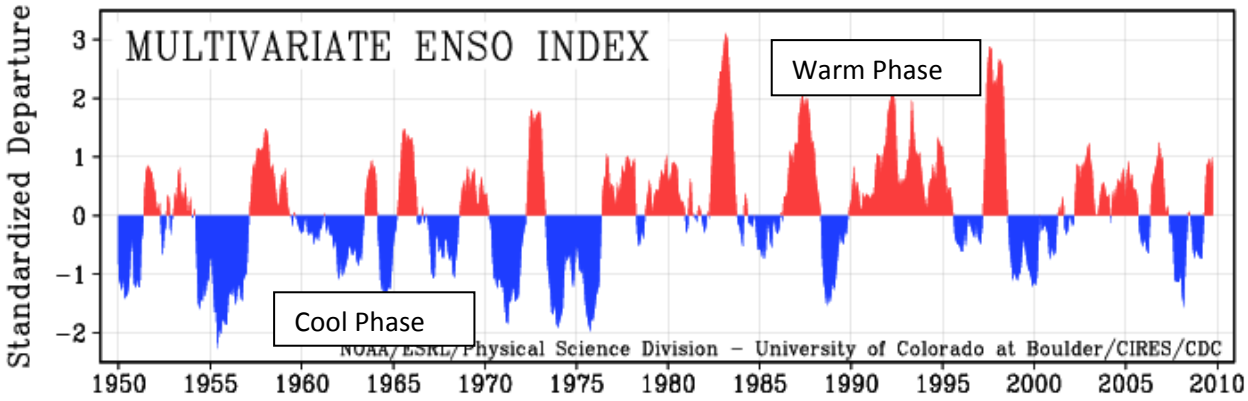


Figure 8 The Multi-Variate ENSO Index (MEI) plotted from 1950-2009 and multi-decadal phases.

While it is beyond the goals of this evaluation to attribute cause, it is interesting to note that the PDO and MEI experienced cool phases in sync from 1950-1975 and changed to warm phases from 1975-1978. The AO experienced a cool phase until about 1982 and then entered into a warm phase that continues into 2009. The lag between the AO and the PDO and MEI suggests either gradual influence exists or that a totally different phasing is being experienced. It is interesting to note that the AO, PDO and MEI were all in their warm phase from 1985 until 2005 when the greatest atmospheric and global warming were recorded. It is during this period that Alaska experienced its greatest surface warming which is consistent with the atmospheric warming noted during extended El Nino periods. Perhaps the syncronicity of these cliamte regimes contributed to the observed warmer Alaskan climate.

The key point is that the total runoff of the Susitna River basin shows remarkable balance during very disparate climate regimes. The analyses support the consistent supply of water from the basin precipitation to support hydro-power generation regrardless of the climate fluctuations. While global climate models suggests additional warming may impact the Arctic and Alaska, it seems very unlikely that these impacts will cause an unbalance in the runoff production of the basin.