

ROCK ISLAND POWERHOUSE 1

B1-B4 Modernization

Bid 16-60

Contract Award Recommendation

Special Commission Meeting

December 30, 2016



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Need for Special Commission Meeting

The lowest price bidder for B1-B4 Unit Modernization has provided an alternate bid that offers a \$1.24 million price reduction if Bid 16-60 is awarded in 2016.



Purpose of Presentation

Review Current State

- Present condition of B1-B4 generators and turbines
- Board approvals for modernization and solicitation of bids

Bid 16-60 Evaluation

- Bid Proposal Summary
- Alternatives Evaluated
- Project Budget
- Economic Analysis of Recommended Contract and Schedule
- Recommendation / Next Steps

Action Requested

- Approve Resolution to award B1-B4 contract for modernization and establish a project budget



Current State

Generators

- Stators replaced 2010 to 2016
- Rotors original 1931
 - Poles
 - Rim
 - Spider



Current State

Turbines

- Original 1931 equipment (85 yrs)
- Significant number of blade cracks discovered on B2 in 2015
- B2 Blade crack repairs unsuccessful
- B1, B3, B4 inspected in 2016 and similar cracks found
- Concluded cause was due to corrosion fatigue and not repairable
- B1-B4 out of service until new turbines installed

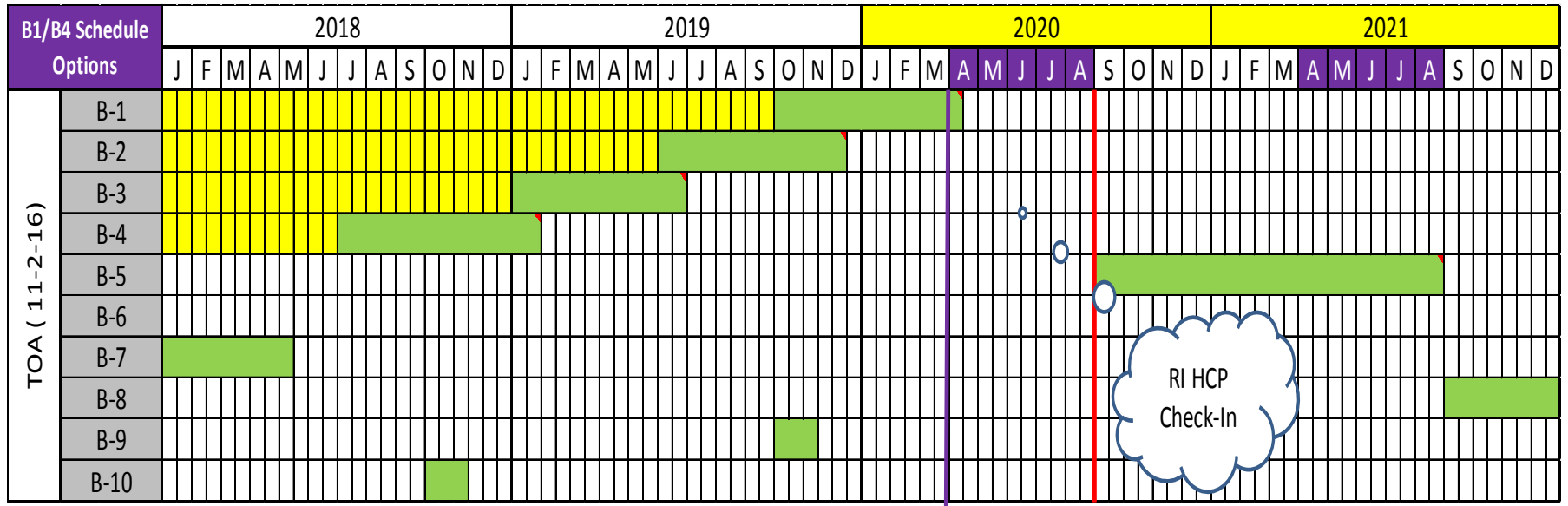


Spring 2016 Project Evaluation

- District performed extensive analysis of alternatives for the future state of B1-B4, including retirement, inactive reserve and rehabilitation.
 - Concluded that modernization provides the best economic and risk mitigation value for customer owners.
 - Schedule: Complete B6 and B7, then B1-B4, then B5 and B8



District Proposed Schedule 6/20/16



Assumptions for B1-B4 schedule:

Start as soon as equipment is available – fall 2018.

Contract construction work could be completed in 150 days per unit .

Project Budget based on 600 days of construction time and project completion by April 2020.

Blade cracks are not repairable for long term operation

B5 and B8 operate through 2021

PH2 Units operate through 2021

RI HCP check-in completed in 2020. RR check-in completed in 2021.



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Prior Board Approvals

- June 20, 2016 - Board approved a \$350K project for 2016 to prepare bid documents for a forecasted \$60M capital project for B1-B4 modernization.
- October 3, 2016 – Board approved a resolution to advertise bids to modernize B1-B4.



Bid 16-60 Details

- **Schedule:**
 - Contractor works on one unit at a time.
 - Contractor has 150 day duration per unit.
 - Contractor gets bid evaluation credit if completes early and penalty if completes late, \$3900 per day.
- **Scope:**
 - New fish friendly turbine
 - New rotor spider, rim and poles
 - New head covers and turbine shaft
 - Refurbished discharge liner, wicket gates, stay vanes, generator shaft and bearings
 - New governor hydraulic unit



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Items Learned During Bid Period

- 150 day duration not feasible
- Cost savings likely if contractor can work on more than one unit at a time.
- District staff re-evaluated schedule and determined 180 day duration would push 1 unit into HCP check-in, so schedule options were developed.
 - Option 1: 1 unit out at a time, 180 day. 3 units complete prior to HCP check-in.
 - Option 2: 2 units out at a time, 180 day. 4 units complete prior to HCP check-in.

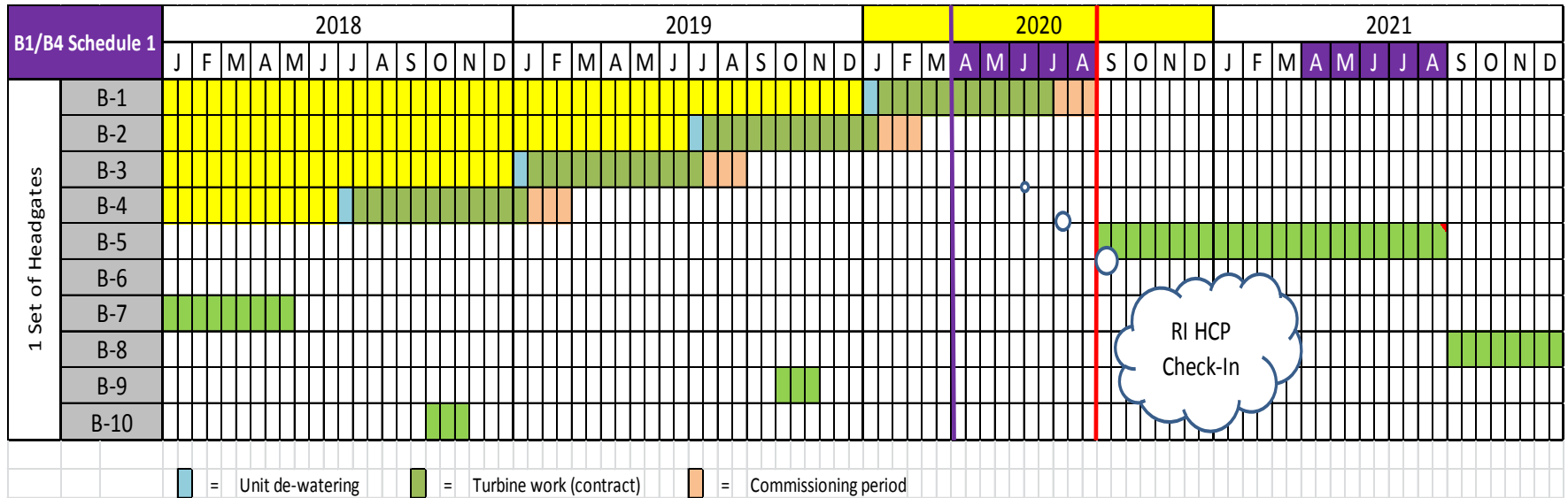
Addendums issued revising bid documents for the 2 schedule options.



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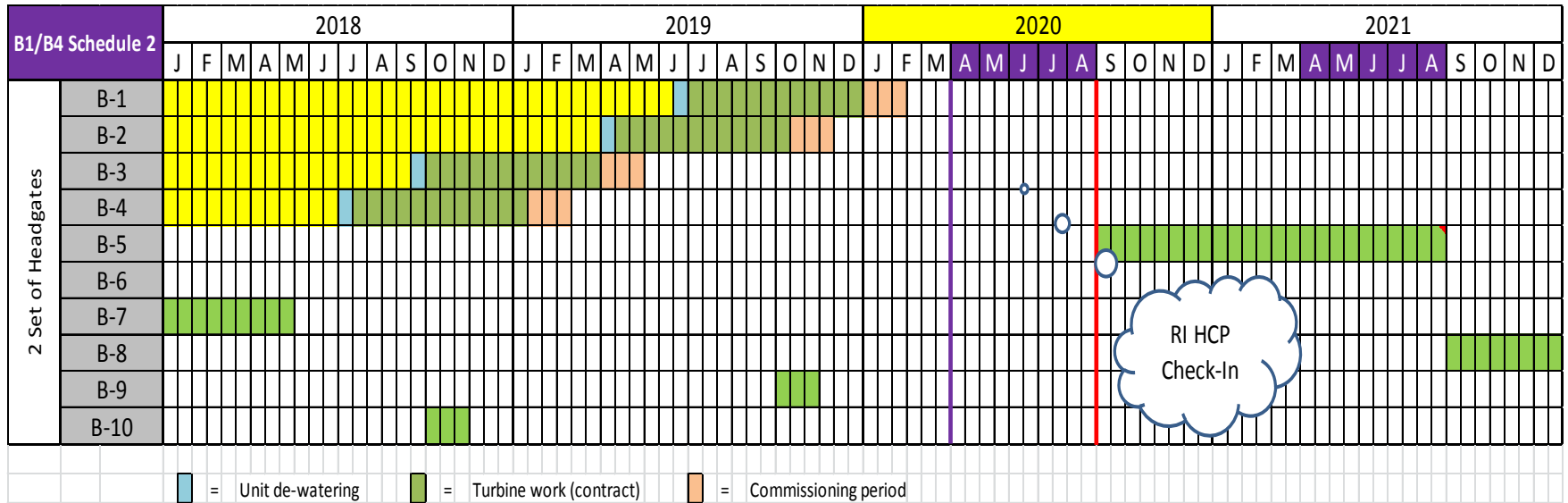
Bid Option 1



- The result was that only 3 units would be online in time for the HCP check-in, not meeting the District’s objective presented to the Board in June.
- Risk of additional unit outages not mitigated (B5, B8).
- Utilizes existing dewatering equipment.



Bid Option 2



- Provided an alternative to complete all 4 units prior to the HCP check-in.
- Provided an opportunity to evaluate if overlapping outages could be more cost effective for construction and create benefits from earlier unit completions.
- Requires procurement of additional dewatering equipment (head gates, stoplogs, dewatering pumps).

Bid Proposal Summary

	Option 1	Option 2	Alternate Schedule
	One Unit Out	2 Units Out	3 Units Out
BIDDER	3 units by Mar 2020	4 Units by Feb 2020	3 units by June 2019, 4th Unit by Dec 2019
Andritz Hydro Corp	\$45,074,521	\$42,909,840	\$42,203,843
Alstom Renewable LLC	\$49,056,962	\$46,970,255	
Voith Hydro	\$59,841,356	\$60,840,102	
Mitsubishi Hitachi Power	\$84,638,000	\$89,335,000	
Engineer Estimate	\$50,200,000	\$48,900,000	
Andritz 3rd Unit Dewatering System			\$850,000
Andritz 2016 award discount price			-\$1,240,615

Andritz provided the lowest price bids for Option 1 and Option 2.

Andritz provided highest turbine efficiency and additional capacity at low heads.

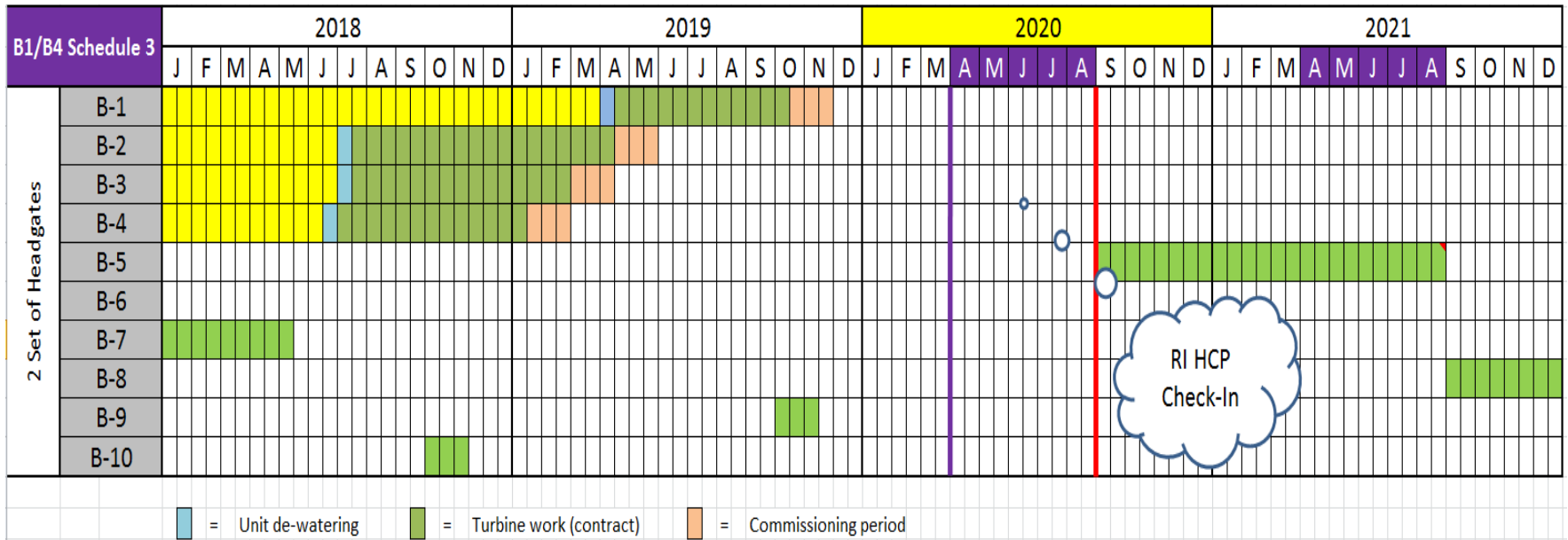
Andritz provided a bid for an alternate schedule and offered a discount if awarded in 2016.



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Alternate Schedule



- The alternate schedule has the least cost for the contracted construction and provides the earliest dates for the units to be returned to service.
- Provides the best risk mitigation for repair of B5 or B8 if they fail prior to HCP check-in.
- Provides time if additional repairs are required on B1-B4.
- Requires a third set of unit dewatering equipment.



Option Evaluation

DESCRIPTION	Option 1	Option 2	Alternate Schedule
Andritz Hydro Corp Base Bid	\$45,074,521	\$42,909,840	\$42,203,843
Andritz 3rd Unit Dewatering System			\$850,000
Budget for repair of items proposed for reuse, or purchase of new.	\$3,000,000	\$3,000,000	\$3,000,000
District purchased dewatering equipment (headgates, stoplogs, dewatering pumps)		\$2,000,000	\$2,000,000
District work for 3rd system dewatering			\$200,000
Contracted electrical install differential		\$350,000	\$500,000
Additional electrical feeds for welding machines/boring bars		\$50,000	\$100,000
Savings to award in 2016		-\$413,538	-\$1,240,615
Sales Tax 8.2%	\$3,942,111	\$3,927,497	\$3,904,285
Additional contracted engineering - 1 FTE 2 years, incremental		\$250,000	\$250,000
Additional plant operators - 5 FTE, 1 YR training plus 16 months construction (to be evaluated with safety assessment)		\$1,867,803	\$1,867,803
Subtotal costs	\$52,016,632	\$53,941,601	\$53,635,316
Outage time savings		-\$1,100,000	-1,900,000
Subtotal for option evaluation	\$52,016,632	\$52,841,601	\$51,735,316

Project Budget

DESCRIPTION	Option 1	Option 2	Alternate Schedule
Subtotal Costs (from previous page)	\$52,016,632	\$53,941,601	\$53,635,316
Excitation Equipment and installation	\$640,000	\$640,000	\$640,000
Governor Controls Equipment and install	\$3,000,000	\$3,000,000	\$3,000,000
District craft labor - unit dewatering, oil handling, unit disassembly, new electrical and communications, commissioning, turnover.	2,100,000	2,100,000	2,100,000
District labor and contract costs for project management, engineering, and inspection	4,900,000	4,900,000	4,900,000
Project Budget	62,656,632	64,581,601	64,275,316
Reduced outage time revenue		-\$1,100,000	-1,900,000
Evaluated Project Cost	\$62,656,632	\$63,481,601	\$62,375,316



Primary Evaluation Factors

- Economics – slight benefit for Alternate Schedule
- Completing B1-B4 work by HCP check-in
- Reducing economic and HCP check-in risks associated with unplanned outages (B5, B8, PH2)
- Safety challenges - being evaluated for mitigation options.
 - If can't successfully mitigate will work with contractor to revise outage schedule



Economic Evaluation of Alternate Schedule

Key metrics of economic analysis with selected sensitivities:

- Estimated Budget – \$64.3 million
- 13.9% Internal rate of return (IRR) using external price forecast
 - Value includes encroachment, capacity, energy and carbon value
 - Cost includes this contract, District labor, existing contract work for exciter work and governor controls, additional material and labor costs to support schedule

Sensitivities

- 14.4% IRR using the Chelan forward price curve
- 11.8% Scaled back capacity value
 - Sensitivities pencil out to provide economic value to customers



Benefits and Risks of Alternate Schedule

Benefits/Pros

- Least cost alternative considering contract, incremental equipment and labor, and revenue benefits
- Earliest return to service of B1-B4 and best risk mitigation for unplanned failures and schedule delays to have full unit availability for the HCP check-in
- Improved hydro unit availability sooner provides benefits for maintaining hydraulic capacity and optimizing value for the District and power purchasers

Risks/Cons

- Three (3) units out at the same time requires significant up front work to mitigate Human Performance risks before proceeding with accelerated schedule.
- Requires incremental work and cost to procure additional dewatering equipment.
- Requires additional labor and contract costs for engineering support, electrical work and construction supplies.



Recommended Path Forward

- Award the contract to Andritz Hydro Corp. for their Alternate Schedule proposal to maximize net value for the District and Customer Owners.



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Next Steps

- Human Performance Improvement (HPI)
 - Continue HPI training for personnel on this project
 - Complete the Human Performance Action Plan and Project Error Assessment during the planning phase of this project prior to initiation of on-site work
- Initiate contract(s) for additional equipment (does not require Board approval < \$3 million).
 - Headgates, stoplogs, pumps
- May require hiring of additional operators.
 - If decide to act proposal would be brought to the Board.



Board Action Requested Today

- Approve a resolution authorizing the General Manager to Award Bid 16-60 to Andritz Hydro Corp. for the Alternate Bid schedule and purchase of Andritz 3rd unit dewatering system for \$41,813,228.
- Revise combined budget of \$60 Million to \$64.3 Million.
- Revise combined 2017 budget from \$7.3 million to \$8.4 million.



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Questions ?



Appendix

Decision Evaluation Criteria



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Decision Evaluation Criteria

1. What is the impact on our Customer-Owners?

- The recommended Alternate Schedule provides an 13.9% internal rate of return when considering the accelerated schedule, increased efficiency and capacity, updated price forecasts for energy and capacity.
- The overall project cost and benefits for the alternative schedule, when considering the contract, internal costs, and value for the accelerated schedule is \$1.1M better than Option 2 and \$0.3M better than Option 1.
- Accelerated schedule provides better risk mitigation for future unplanned failures associated with B-5 and B-8 and better protects the Powerhouse 2 modernization timeline.



Decision Evaluation Criteria

2. What are the stewardship implications and impact to the environment?

- The alternative schedule provides the best schedule for completing the project in advance of the HCP check-in period.
- Provides risk mitigation for unplanned failures that could result in multiple units out during HCP check-in.



Decision Evaluation Criteria

3. What are the legal implications?

- The bid includes a reduced contract price valued at \$1.24M if awarded in 2016, which will require a special Board session to authorize the General Manager to enter into a contract for bid 16-60.
- The schedule and proposed contract require additional headgates, stop logs and pumps, which allows the District to maintain B-6 and B-7 warranty inspections following trial operation.
- Additional contracting resources may be required for procurement of additional headgates, stop logs and pumps.
- Contract has notice to proceed for each unit outage.



Decision Evaluation Criteria

4. What are the workforce/operations implications?

- Increased probability of significant human error due to an increased presence of precursors including time pressure, high workload, simultaneous and multiple tasks, lack of proficiency, and fatigue.
- Safety mitigation planning and HPI training for project staff.
- Additional Operations staffing is recommended to safely accommodate the increased level of activity and is included in the estimated costs primarily for human health and safety risk mitigation measures. The cost of adding a dedicated shift of 5 Operators for the project is estimated at \$1.87M. The incremental cost may secondarily benefit the District through longer term succession planning. This will be further evaluated with the safety assessment.
- Additional engineering and project management at a cost of \$250,000 is recommended to assist with dewatering equipment procurement and maintain the PH2 modernization studies.
- The electrical work required to support this project may exceed our internal resource capabilities and will require an estimated additional \$500,000 compared to Option 1.
- Additional power supplies need to support additional construction equipment and dewatering systems is required. These costs are estimated to be \$100,000.
- Engineering and Project Management will need to begin work on procuring headgates, stop logs and pumps.

Decision Evaluation Criteria

5. What are the other stakeholder implications?
- Long-term power purchasers should be supportive of the least overall project cost with consideration of additional costs offset by the value of the accelerated schedule.
 - Market slice and long-term purchasers will be supportive of increasing hydro unit availability sooner with the accelerated schedule, thus adding overall value.
 - The HCP Coordinating Committee will be supportive of the accelerated schedule to support maximum unit availability during the HCP check-in period.
 - FERC will be supportive of the accelerated schedule in maintaining hydraulic capacity.



Decision Evaluation Criteria

6. What are the impacts to Values?

Safety

- (-) Accelerated schedule with 3 units down at the same time exacerbates probability of human error by adding pre-cursors such as increased time pressure, high workload, simultaneous and multiple tasks, lack of proficiency, and fatigue.
- (+) Added new District internal position to focus and develop contractor safety program.
- (+) Requesting that contractor have personnel on-site for specific periods of time throughout the project dedicated to safety.
- (+) Proposing that the District add additional operational staff, including five (5) operators to manage the increase level of activity primarily for human health and safety risk mitigation measures. This will be further evaluated with the Human Performance Action Plan and Project Error Assessment.
- (+) Engineering and Project Management is proposing to perform additional work to perform feasibility studies to support powerhouse modernization.
- (+) Potential for increased project efficiency for B1 and B4 utilizing the same contractor for B5-B8
- (+) Continue Human Performance training for personnel dedicated to this project who have not completed the training.
- (+) Complete the outline for the Human Performance Improvement Action Plan and Project Error Assessment during the planning phase of this project and have complete prior to initiation of on-site work.

Decision Evaluation Criteria

Stewardship

- (+) Accelerated schedule provides the best opportunity for 10-unit availability in Powerhouse 1 by the HCP Check-in period starting in April 2020.
- (+) The net impact of costs and benefits including contract cost, incentives for early award, incremental equipment and personnel cost, unit value for accelerated schedule and mitigation for HCP check-in risk provides the best value for customer owners.
- (+) Returning the units to service sooner recovers lost plant hydraulic capacity sooner.



Decision Evaluation Criteria

Trustworthiness

- (+) Comprehensive analysis and enterprise-wide support helps make the best decision for our Customer Owners and in a transparent manner.
- (+) Optimizing the schedule and hydro unit availability and mitigating unplanned failure provides best value for existing contracts for long-term and market-based slice power purchasers
- (+) Helps facilitate building strong relations and efficiencies with proposed contractor who is currently working on the B5-B8 project.



Decision Evaluation Criteria

Operational Excellence

- (+) Proposed turbine design in the recommended bid includes increased capacity and unit efficiency that provides incremental value, increased flexibility and supports risk mitigation for successful HCP check-in
- (+) Returns mothballed units to service sooner in the proposed schedule.
- (+) Supports risk mitigation for future unplanned failures, primarily B5 or B8 which are at end of life.
- (+) Supports continuation of planned maintenance during the B1-B4 project and allows for B6 and B7 warranty inspections following their trial operation.

