

(In Compliance With CFR Title 18, Subpart G. 4.61(c))

1. **PROJECT DESCRIPTION AND OVERVIEW**

Whitestone Power and Communications is proposing to develop the Whitestone Poncelet RISEC project near the confluence of the Delta and Tanana rivers (See map in Figure 1) under the Commission's new Hydrokinetic Pilot Project Licensing Process. The project would consist of the following:

- One pontoon-mounted, 12-foot wide, 16-foot diameter Poncelet undershot water wheel with a nominal capacity of 100 kW
- A float with a total footprint on the water surface of 34-feet by 19-feet
- Float-to-shore mooring system and electrical power transmission cabling
- Vessel mounted switch gear and appropriate navigational safety appurtenances

Whitestone Power and Communications proposes to develop the project as follows:

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011-2016: Obtain hydrokinetic pilot project license and test project for at least three years under its auspices.

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Key Component	Description		
No. Gen Units, Capacity	100kw (at 25-35% efficiency)		
Turbine Type	Epicyclic Transmission, Permanent Magnet Generator (36-Pole, 480 V, 3-phase, 30:1 gear ratio)		
Plant Operation	Automatic, Non-Peaking		
Estimated Annual kWh Production	217 MWh		
Estimated Average Head	NA*		
Reservoir Capacity	NA*		
Estimated Hydraulic Capacity Cubic Feet/Sec	NA*		
Estimated Average Flow, Feet/Sec	Min=5fps, Max=16fps		
Size, Capacity, Materials: Wheel	12' Long, 16' Diameter Cylinder. 5086 Aluminum		
Size, Capacity, Materials: Blades	36 blades, 4'wide, 2'deep. HDPE		

a. **Project Specifications**



WHITESTONE POWER & COMMUNICATIONS

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EXHIBIT A

Key Component	Description		
Size, Capacity, Materials: Float	2 pontoons (42" and 36" dia). Total Area 34'x19'		
Size, Capacity, Materials: Mooring System	See mooring specifications		
Size, Capacity, Materials: Power Transmission Lines	See product specifications, total cable length: 900 ft.		
Estimated Project Cost	\$1.4 million (see detail below)		
Estimated Environmental Monitoring Cost	See Testing, Monitoring and Surveillance Table Section 7(a)		
Estimated Environmental Components Cost	See Testing, Monitoring and Surveillance Table Section 7(a)		

*hydrokinetic run-of-river design precludes these project dimensions

b. Project Construction Cost Estimate

PROJECT CONSTRUCTION COST ESTIMATE DETAIL			
Poncelet Kinetics RHK100 Components			
Aluminum Wheel Frame and Chassis			
	Fabrications	\$120,000	
	Structural Pipe	\$6,444	
	Screw jacks	\$5,000	
	Fifth Wheel	\$2,000	
	Fasteners	\$4,000	
Pontoons			
	Debris Cone	\$1,500	
	Pontoons	\$22,000	
	Pulling Heads	\$11,000	
Blades		\$50,000	
Transmission		\$45,000	
Electronics and Generator		\$180,298	
Anchoring			



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EXHIBIT A

PROJECT CONSTRUCTION COST ESTIMATE DETAIL			
	Rock Anchors	\$10,000	
	Stabilizer Bridge	\$30,000	
	Rigging	\$10,000	
Safety			
	Railings	\$12,000	
	Demarcation	\$5,000	
Shipping		\$10,000	
Component Materials To	otal (FOB Seattle)	\$524,242	
Shipping			
Seattle to Anchorage		\$15,000	
Anchorage to Whitestone		\$4,800	
	Shipping Total	\$19,800	
Survey Fees			
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	Survey Total	\$15,000	
Assembly	Survey Iotal	\$15,000	
Assembly Assemble at Munson's Plant	4 Men, 4 weeks	\$15,000 \$60,000	\$90/hr shop
Assembly Assemble at Munson's Plant Disassemble and crate at Munson's Plant	4 Men, 4 weeks 4 Men, 2 weeks	\$15,000 \$60,000 \$30,000	\$90/hr shop charge
Assembly Assemble at Munson's Plant Disassemble and crate at Munson's Plant Re-assemble at Whitestone	4 Men, 4 weeks 4 Men, 2 weeks 3 Men, 4 weeks	\$15,000 \$60,000 \$30,000 \$24,000	\$90/hr shop charge \$50/hr skilled labor
Assembly Assemble at Munson's Plant Disassemble and crate at Munson's Plant Re-assemble at Whitestone	4 Men, 4 weeks 4 Men, 2 weeks 3 Men, 4 weeks Assembly Total	\$15,000 \$60,000 \$30,000 \$24,000 \$114,000	\$90/hr shop charge \$50/hr skilled labor
Assembly Assemble at Munson's Plant Disassemble and crate at Munson's Plant Re-assemble at Whitestone Intertie	4 Men, 4 weeks 4 Men, 2 weeks 3 Men, 4 weeks Assembly Total	\$15,000 \$60,000 \$30,000 \$24,000 \$114,000	\$90/hr shop charge \$50/hr skilled labor
Assembly Assemble at Munson's Plant Disassemble and crate at Munson's Plant Re-assemble at Whitestone Intertie Intertie	4 Men, 4 weeks 4 Men, 2 weeks 3 Men, 4 weeks Assembly Total 3 Men, 6 weeks	\$15,000 \$60,000 \$30,000 \$24,000 \$114,000 \$36,000	\$90/hr shop charge \$50/hr skilled labor
Assembly Assemble at Munson's Plant Disassemble and crate at Munson's Plant Re-assemble at Whitestone Intertie Intertie GVEA Hookup	4 Men, 4 weeks 4 Men, 2 weeks 3 Men, 4 weeks Assembly Total 3 Men, 6 weeks Contractor	\$15,000 \$60,000 \$30,000 \$24,000 \$114,000 \$36,000 \$30,000	\$90/hr shop charge \$50/hr skilled labor \$50/hr skilled labor
Assembly Assemble at Munson's Plant Disassemble and crate at Munson's Plant Re-assemble at Whitestone Intertie Intertie GVEA Hookup Parts	4 Men, 4 weeks 4 Men, 2 weeks 3 Men, 4 weeks Assembly Total 3 Men, 6 weeks Contractor	\$15,000 \$60,000 \$30,000 \$24,000 \$1114,000 \$36,000 \$30,000 \$50,000	\$90/hr shop charge \$50/hr skilled labor \$50/hr skilled labor
Assembly Assemble at Munson's Plant Disassemble and crate at Munson's Plant Re-assemble at Whitestone Intertie Intertie GVEA Hookup Parts	4 Men, 4 weeks 4 Men, 2 weeks 3 Men, 2 weeks Assembly Total 3 Men, 6 weeks Contractor	\$15,000 \$60,000 \$30,000 \$24,000 \$114,000 \$36,000 \$30,000 \$50,000 \$116,000	\$90/hr shop charge \$50/hr skilled labor \$50/hr skilled labor
Assembly Assemble at Munson's Plant Disassemble and crate at Munson's Plant Re-assemble at Whitestone Intertie Intertie GVEA Hookup Parts Deployment	4 Men, 4 weeks 4 Men, 2 weeks 3 Men, 4 weeks Assembly Total 3 Men, 6 weeks Contractor Intertie Total	\$15,000 \$60,000 \$30,000 \$24,000 \$114,000 \$36,000 \$30,000 \$50,000 \$116,000	\$90/hr shop charge \$50/hr skilled labor \$50/hr skilled labor
Assembly Assemble at Munson's Plant Disassemble and crate at Munson's Plant Re-assemble at Whitestone Intertie Intertie GVEA Hookup Parts Deployment Mule Boat	4 Men, 4 weeks 4 Men, 2 weeks 3 Men, 4 weeks Assembly Total 3 Men, 6 weeks Contractor Intertie Total	\$15,000 \$60,000 \$30,000 \$24,000 \$114,000 \$36,000 \$30,000 \$50,000 \$116,000 \$95,000	\$90/hr shop charge \$50/hr skilled labor \$50/hr skilled labor



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PROJECT CONSTRUCTION COST ESTIMATE DETAIL			
Anchoring	2 Men, 4 weeks	\$10,000	\$25/hr Laborer
Stabilizer Bridge	3 Men, 1 week	\$3,000	¢25/br Laborar
Float	3 Men, 1 week	\$3,000	φ25/III Laborei
	Deployment Total	\$126,000	
Equipment Rental			
Loader	4 weeks	\$5,000	
Skidsteer	4 weeks	\$2,000	
Excavator (for intertie)	2 weeks	\$3,000	
Anchor driving equipment	3 week	\$3,000	
Transportation	12 weeks	\$15,000	
Equip	oment Rental Total	\$28,000	
Testing			
Initial operational cross check	2 Men, 1 week	\$8,000	
Initial verification of debris management	2 Men, 1 week	\$8,000	
Testing of electronic capabilities and optimization	2 Men, 2 weeks	\$16,000	Engineering
Continuing testing and optimization over following two years estimated at 360 hours per year at an average cost of \$100			Contractor
per hour		\$72,000	
	Testing Subtotal	\$104,000	
Project Supervisor			
Manufacturing Oversight	150 hours	\$11,250	\$75/hr project
Plant Visit Travel		\$15,000	manager
Procurement	80 hours	\$6,000	
Assembly Oversight	160 hours	\$12,000	



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EXHIBIT A

PROJECT CONSTRUCTION COST ESTIMATE DETAIL			
Project Coordination	80 hours	\$6,000	
Project Supervisor Subtotal		\$50,250	
Per Diem			
Intertie		\$16,800	\$100/day/man
Mechanical		\$25,200	φ100/uay/man
	Per Diem Subtotal	\$42,000	
Fuel			
1000 gal	4.00/ gal	\$4,000	
	Fuel Subtotal	\$4,000	
Contractor's Fees			
Contract	or's Fees Subtotal	\$240,000	
TOTAL PROJECT CONS	STRUCTION COST	\$1,383,292	

c. Project Specifications Narrative

The following Project and Operations description follows the requirements of §4.61(c) for Exhibit A, with some needed expansions and adjustments to accurately describe a hydrokinetic project

Whitestone Power and Communications' RISEC device includes an undershot water wheel arranged according to the method of General Poncelet. The wheel drives an epicyclic transmission and permanent magnet generator. The main structure of the wheel as well as the chassis and other structural elements are constructed from aluminum with stainless steel fasters as needed. The blades of the wheel are a proprietary curved design constructed from high density polyethylene (HDPE). The pontoons on which the wheel is suspended are constructed from HDPE. The entire float will be moored to the shore and will have no submarine structures or cabling. At the date of this writing, the project is in the design phase and no construction has taken place.

The Poncelet Kinetics RHK100 consists of five major components:

- Main wheel with 36 fixed blades
- Support chassis and flotation



- Transmission and generator system
- Electronic controls and grid intertie
- Mooring and propulsion systems

d. Turbine Wheel

A 12-ft-diameter wheel constructed from 5086 aluminum will be used for this design. HDPE blades with a profile of 2-ft depth and 4-ft width will be fastened to the frame of the wheel. The design of the blades was formulated by Hasz Consulting, LLC (Hasz) of Delta Junction, Alaska and will be manufactured by Ferguson Industrial Plastics (FIP) of Washougal, Washington. The wheel is a modular, 3-stage design which gives an improved power signal and smoother operation.

If the wheel needs to be stopped for repair or inspection, it can be braked manually through the generator for a short period of time then lifted from the water; or it can be lifted from the water and allowed to coast to rest.

e. Chassis And Flotation

The wheel is supported on one side by the transmission flange and on the other side by a spherical, self-aligning bearing. Both supports can be adjusted for plunge depth of the blades in the water by the use of high-load, manual screw jacks. These jacks are also to be used for lifting the wheel entirely out of the water for the purpose of transportation or repair. The entire frame is constructed of 5086 aluminum and consists of closed box beams which are bolted together to create the decking of the float. These are bolted to long C-channels which run the entire length of either pontoon providing both the mounting surface for the structure as well as adding strength to the pontoons for the deployment and recovery operations. Due to the extreme harshness of Alaska winters, the craft will have to be deployed in the spring and removed from service during the winter.

The pontoons are manufactured from HDPE by Ferguson Industrial Plastics of Washougal, Washington. The drive train is on one side, causing uneven weight distribution. Therefore, one pontoon will be 42-in diameter and the other 36-in diameter. The ends of the pontoons will be capped with pulling heads capable of sustaining loads in excess of 200,000 lb which far exceeds the requirements of this application but represents the standard in the industry. Both pontoons are 34 feet long.

The entire craft will weigh approximately 20,000 lb. All appurtenances other than cables and mooring equipment will be located on the craft in order to minimize the footprint and increase ease of deployment and recovery. The entire deck is surrounded by safety



railings both between the wheel and the deck and shielding the deck from the surrounding river environment.

f. Transmission And Power Generation System

The transmission is an epicyclic or planetary transmission having a gear ratio of 30:1. This transmission is produced by Brevini USA. This design is recommended for several reasons. The slow speed of the wheel renders a belt system ineffective due to its prohibitively large size and the inefficiency of belts at low speed. The weight and expense associated with a chain drive system render it unsatisfactory. In addition, the life expectancy of chains is substantially lower than that for gear transmissions. Synchronized belt drives are slightly more advantageous than chains in that they do not require lubrication and sealed cases, but the dependability of these systems at low speed is unfavorable. Due to the expense of designing a gear transmission and having it custom made, it is recommended to use a stock transmission and the Brevini design is ideal for this particular application. The life expectancy of the transmission is 100,000 hours.

The AC electric generator is a 36-pole, 480 V, 3-phase, permanent magnet generator which is designed for low speed applications with its operating range between 0-rpm and 200-rpm. This generator allows the turbine to be used as a grid-tie system, standalone power producer or as a parallel assist to small power producers on finite grids. The versatility of the design is key to producing power in remote locations with severe conditions where the grid conditions are widely variable and unpredictable.

g. Electronic Controls And Intertie

The electronic controls system will be supplied by Energetic Drives, LLC. The system is based on Parker variable frequency drives which work efficiently to accept a wide range of frequencies and voltages and produce a clean power signal with a unity power factor. This control system allows for remote monitoring, startup, shutdown and manipulation and control of the turbine at all times either remotely or on site. In addition, the controls allow the operator to optimize the operation for grid-tie, standalone or parallel operation depending on the situation at hand. The programmable logic controller (PLC) also allows these settings to be changed automatically based on load or a daily, weekly or monthly time cycle depending on changing demand, parallel generators coming on or off line or other predictable changes to the active grid to which the unit is tied.

The grid-tie portion of the system is controlled by a Schweitzer relay which gives the system the ability to sense load, frequency, power factor and other critical values including taking the system offline in the case of a power failure on a large grid or any other emergency. The system is then also capable of bringing the turbine back online



once the problem is corrected. The entire system can also be disconnected and connected remotely or on site by an operator.

Marine grade, sealed shore plugs including breakaways will be used for all electrical connections. The breakaways will also be disconnects so that, in the unlikely event that the craft breaks loose from its moorings or some other emergency arises, the power can be quickly disconnected without injury or damage to operators or equipment.

The cable running from the output side of the inverter/rectifier system is a 4-conductor, 4-ought, armored copper cable. It will be anchored at various points along its route from the float to the grid-tie-point. In order to satisfy the Commission's requirements for the system to be easily removable, the cable will be run along the surface of the ground and anchored using grouted ground anchors. The anchoring system is being developed by Williams Form Engineering, of Portland, Oregon.

h. Mooring And Propulsion Systems

Because of the harsh Alaskan winters, the turbine will have to be deployed each spring and recovered in the fall. For this reason, easily manipulated moorings systems will be needed. A well formulated approach to deployment and recovery will be necessary to avoid high labor costs and potential equipment damage. The turbine will be assembled on shore near the location of its deployment and slid into the water on the HDPE pontoons via an earthen ramp constructed for the purpose. The deployment process will be aided by a workboat which will be docked to the float and will help maneuver it in the water. This boat will push the float into position near the final mooring location.

Once in position, the float will be docked to a gangway using a similar device to the fifthwheel and pin connector used for large trucks and trailers. This gangway will hold the float at the desired distance from the shore and will have its own anchoring cable. The float will have an additional anchoring cable which will run at water level to the shore. This cable will act as a debris diverter as well as an anchor cable and will be a 3/4"diameter stainless steel aircraft cable. The gangway and the cable will work together to hold the float in position and hold it parallel to the direction of flow. Both anchoring systems will be adjustable for height as the river level rises and falls. Secondary tether cables will be in place in the event that the primary anchoring system fails. One of the cables will be designed to the rear of the craft and one to the front. These secondary cables will be designed to swing the craft to shore in the event of a mooring system failure. At the time of this writing, it is expected that the distance from the shore to the inner pontoon of the float will be approximately 30 ft.

The first advantage of anchoring to the shore rather than the river bed is that the tremendous down force that would accompany such an anchoring system is eliminated.



The second advantage is that by keeping the cable out of the water, it is not subject to catching submerged debris which would greatly increase the load upon it and possibly jeopardize its integrity. Finally, by anchoring the float to the shore with the cable making an angle of approximately 30 degrees to the direction of flow, the cable will act as a debris diversion device. Although it will not divert all debris, it will divert that debris which has an above water profile greater than six inches. This will keep large root wads and trees with large branches and protrusions from impinging on the wheel. Proximity to the shore also offers the advantage that most debris tends toward the middle of the stream.

An additional debris consideration is the risk of rocks falling from the rock face to which the float is moored. The risk of this incident is minimal and would probably require an earthquake to break rocks loose from the face of the cliff. Although there are rock slides on the bluff to which the project is moored and although these rocks do reach the river, these slides tend to occur where the slopes are less steep and the surface is covered with loose rocks. The proposed project has avoided these locations. It is moored at the base of a solid rock face which could be subject to rocks breaking loose but probably only in the event of a natural disaster.

The work boat mentioned above will be supplied by Munson Boats based in Seattle, Washington. It will be a variation of their 30-ft Packcat design equipped with pushing knees for assistance in deployment of the float. It will have twin 150 hp Honda outboard motors and will be built as a landing craft to assist in maintenance and installation duties.

i. Project Design, Manufacturing And Construction

The prototype to be tested as part of this project is being designed in full by Hasz. The design paradigm has focused around the objective of maximizing the use of commercial-off-the-shelf (COTS) technologies and integrating them with new ideas to create a system robust enough to withstand the harsh and demanding power generation environment in Alaska. This design process will be ongoing as the system is tested in situ over the license term. All design costs to date have been funded by WPC and through the Department of Energy's 2010 Marine Hydokinetic Technology Advancement grant opportunity.

j. Manufacturing

As stated above, a major tenet of the design paradigm was to maximize the use of COTS technologies. In keeping with this design goal, most of the important components are being integrated into the design from established manufacturers.



The transmission is manufactured by Brevini USA Power Transmission based in Yorktown, Indiana. The generator and electronic controls are being supplied by Energetic Drives, LLC based in Gresham, Oregon. The pontoons are being manufactured by Ferguson Industrial Plastics based in Washougal, Washington. The blades (Hasz proprietary design) are being manufactured by ACI Plastics based in Kansas City, Missouri. The anchoring systems are being supplied by Williams Form Engineering based in Portland, Oregon. All custom aluminum parts comprising the chassis, wheel frame, struts and other parts will be manufactured by qualified aluminum fabricators in Alaska, certified in aluminum welding procedures.

k. Construction

Construction of the system must take place on site due to the size of the float and wheel. At this point, WPC plans to construct the device in partnership with CE2 Engineers, Inc. (CE2) of Anchorage, Alaska and with personnel from the Alaska Energy Authority (AEA), a state agency which has assisted WPC throughout the process of design and will play a continued role in the deployment of these systems throughout the state pending a successful test period. CE2 is a highly respected remote construction management firm working exclusively in rural locations throughout Alaska, and has over 25 years of experience in constructing and operating complex technical systems in adverse and isolated conditions.

Pending the necessary funding and timely decision on the part of the Commission, WPC plans to commence the manufacturing and construction of the device over the summer and winter of 2011 with the goal of deploying the turbine during May 2012.

The grid-tie system will be constructed by Golden Valley Electric Association (GVEA) personnel assisted by WPC personnel during Spring 2012. WPC will supply all materials for the project. WPC expects the total ground disturbance to be less than 0.25 acre. The only permanent components will be the drilled rock anchors for anchoring the turbine and securing the grid-tie cabling. These anchors will be threaded rods of 2-inch diameter or less and will be less than 30 in number.

Having all necessary permits in hand by the end of 2011, WPC expects to begin construction in 2011 in order to deploy the turbine as quickly as possible following the Commission's decision. WPC expects the cost to manufacture and construct its Poncelet Kinetics RHK100 prototype to be \$1,400,000.00.

I. Efficiency And Return-On-Investment Projections

For a horizontal axis water wheel arranged according to the method of General Poncelet, the maximum efficiency is obtained when the tip speed of the blades on the wheel is 40%



of the velocity of the water. WPC has chosen a controls system which is comprised of a permanent magnet generator and a variable frequency inverter/rectifier system. This system will allow the generator to control the speed of the wheel and maintain the most efficient ratio of the rotational speed of the wheel to the speed of the water at all water velocities. This technology provides a significant efficiency upgrade over the standard induction generator design. The wheel is designed for a maximum water speed of 16 fps.

During the summer of 2010, the University of Alaska, Anchorage (UAA) completed a <u>velocity survey</u> for the purposes of this project over a 3,500 ft section of the Tanana River including the project area. The purpose of this study was to provide a benchmark from which return-on-investment numbers could be generated and to allow WPC to determine the best location for the float to be installed. There are many considerations that affect this decision, including: distance from intertie point to the main grid, ease of anchoring, aquatic habitat concerns, and others. However, the principle consideration was the location of fast-moving water within 100 feet of the shore line.

The survey was conducted using an Acoustic Doppler Current Profiler (ADCP) which measures water velocity as a function of depth and distance from a set point on the shore. The UAA team took measurements at 10 different transects spanning the entire project area as well as some measurements above and below the project area. This allowed WPC to make an informed decision concerning the location of the float and final project boundary delineation.





The numbers returned from the study were somewhat better than expected, particularly considering that the study was conducted in early June when the water is not at its highest point. Based on the June study results with an allowance for higher peak velocities during July, WPC expects to operate in water velocities at or exceeding 12 fps for a majority of the summer.

The output of the turbine is 107 kW at 15 fps and 7 kW at 6 fps, as shown in the diagram below.



Although the cost of electricity is widely variable, the average cost of power in remote communities in Alaska is approximately \$0.50. This number was used for the return on investment calculation depicted in the chart below.



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EXHIBIT A



m. Project Operation And Maintenance

The Whitestone Poncelet RISEC Project will operate using the natural river currents of the Tanana River. The WPC design captures energy efficiently from the flow of the current using an undershot wheel arranged according to the Poncelet method. The blade construction is from high density polyethylene (HDPE). This gives the system excellent resistance to both corrosion and the destruction from repeated impingement by trees and other debris which is so prevalent in Alaskan rivers.

The electronic control system chosen for this design will control all aspects of power generation including disconnecting the generator from the grid in the event of blackout and dissipating the power produced by the wheel until the grid can be reconnected. Additionally, these controls will bring the system back online when the grid is stabilized or after a repair. The controls will also act to optimize the speed of the wheel relative to the water.

The blades and wheel are designed to withstand the impact of a 1,500 lb tree without sustaining any damage or interrupting operations. The debris diversion cable which runs at an acute angle to the flow of the river is designed to deflect any debris with a large profile. In the event that a large log or tree is ingested by the turbine and damage is



caused or power is interrupted, the controls system will alert technicians of the issue via an alarm system which operates via Ethernet connection. This will alert the team to the need for repair or clearing of debris from the system. Technicians will be in place to deal with these issues although WPC is confident that the debris management systems formulated in this design will be effective.

Data acquisition will be controlled from the shore where the health and power variables of the unit can be read, interpreted and stored. A combination of these techniques will provide advance warning of failure and timely response should a failure occur. Night time inspections will also be necessary periodically in the spring and fall to insure that the marker lights and beacons are all operational. For a majority of the time during which the unit will operate, there will be 24 hour daylight. It is expected that the turbine will operate 24 hours per day while it is deployed with less than one day per month down time. Much of the necessary maintenance such as greasing of the axle and checking integrity of the unit can be performed during operation. Because the unit will be removed from the water each winter, any extensive repairs can be completed during the winter months.

Remote monitoring software allows the generator to controlled and connected and disconnected from the grid manually in the case of a failure of the automatic controls. However, the system is designed to operate unattended the majority of the time. It is not expected that the system will have to be monitored more often than a weekly inspection.

Maintenance should be minimal. The float will need to be visually checked for debris caught on it. In addition, it will need periodic inspections to verify that it has not been compromised in any way. However, all this should be possible from the shore. The health of the system should be readily observable both by sight and by inspection of the on-shore gauges monitoring power output. Should any of the blades be destroyed or should any part of the transmission or wheel be compromised, the power output signal will signal this to the monitor equipment and alert the operator. The oil level in the transmission will need to be checked every 1,000 hours along with the tightness of the belts. Other than this, the system should require very little maintenance.

Although the specific design considerations are not articulated here, the float will be demarcated in such a way that it will be clearly visible at night and complies with all USCG regulations. It is recommended that high efficiency LED strobes be used for this purpose. They could easily be powered by batteries and last for several weeks or even months at a time. This will not necessitate more maintenance but is a vital safety consideration.

The deck on the front of the float as well as the railing should be sufficient to prevent any boat, however small, from floating into the wheel while it is in operation in case of an



emergency. Should an emergency arise, medical and rescue personnel and equipment will be available from the nearby community of Whitestone to respond.

n. Annual Energy Production

In order to develop an estimate of the dependable capacity and average annual energy production in kilowatt-hours for a hydrokinetic facility using river current, a slightly different approach to hydrologic analysis must be outlined compared to the conventional hydroelectric requirements under the license application regulations.

- The minimum, mean and maximum flow (in cfs) is not applicable. Instead a velocity versus time profile must be developed which shows the variation of the river current during the spring, summer and fall. Because the river in question is glacially fed, there is a large amount of variability in its level and current velocity.
- Since there is no impoundment, area-capacity curves are not applicable.
- The estimated minimum and maximum hydraulic capacity (typically flow Q on the y-axis and efficiency on the x-axis) is redefined for a hydrokinetic RISEC device as velocity on the y-axis and efficiency on the x-axis. Therefore rather than a flow duration curve, a river current exceedance curve is generated. As there are no control wicket gates, efficiency is further defined as cut-in speed and best efficiency of the unit. Generator output under these conditions is easily defined.
- Tail-water rating curves are not applicable since this is an open-channel device.
- Power plant capability versus head and maximum, normal and minimum heads are also not applicable since the river current velocity determines the output of the generator.

During the summer of 2010, the University of Alaska, Anchorage (UAA) sent a surveying team to the project location to determine the velocity distribution of the river at that point and to ascertain whether suitable velocities were available for power production. They conducted velocity measurements at 10 different transects of the river over a total distance of approximately 3,500 feet along the path of the Tanana River. The survey was conducted using an Acoustic Doppler Current Profiler (ADCP) which gives velocity as a function of depth and horizontal distance from a set point on the bank of the river. The results of this study have led to the conclusion that this is a favorable site for power production with velocities as high as 14 fps measured relatively near the shore. WPC believes that, given the time frame of the study (June 11-12) and the known river behavior, it is likely that high velocities will be available for at least 5 months of each year, with the possibility of 6-7 months of operation depending on temperatures and river conditions.



Chart 1-Velocity distribution in a cross-section of the Tanana River at the site selected for project deployment



Because the Tanana River is glacially fed, the level and velocity of the river is highly variable within each season. This variation follows a fairly reliable trajectory within each season that varies little from year to year based upon USGS discharge charts dating back to the early 1970s as shown below. Losses due to the effects of an array do not apply to this project since it is a single unit application.

o. Water-To-Wire Efficiency

A key metric for all developers of kinetic hydropower is the water-to-wire efficiency which is the ultimate efficiency of the entire system from the power in the flowing water to the electrical power inserted into the grid or other end-use. This includes the cascaded efficiencies of the rotor, load-matching, drive train, seals, bearings, gearing, generator, cabling and power conditioning. The overall efficiency of the Poncelet Kinetics RHK100 is projected between 25% and 35%.

WPC has determined that the following requested information in Exhibit A is not applicable, based on kinetic hydropower technology and projects:

- The estimated average head on the plant
- The reservoir surface area in acres and, if known, the net and gross storage capacity



- The estimated minimum and maximum hydraulic capacity of the plant (flow through the plant) in cubic feet per second and estimated average flow of the stream or water body at the plant or point of diversion; for projects with installed capacity of more than 1.5 megawatts, monthly flow duration curves and a description of the drainage area for the project site must be provided
- Sizes, capacities, and construction materials, as appropriate, of pipelines, ditches, flumes, canals, intake facilities, powerhouses, dams, transmission lines and other appurtenances

2. PURPOSE OF PROJECT

The Whitestone Poncelet Kinetics RHK100 would be interconnected to the Golden Valley Electric Association (GVEA) grid system which supplies power to interior Alaska. Direct connection to the grid as a small power producer will be administered under the auspices of GVEA QF-1 tariff which governs renewable power production plants with a capacity greater than 25 kW.

3. LICENSE APPLICATION DEVELOPMENT COST

Whitestone Power and Communications estimates the cost of developing this application to be in excess of \$200,000. Due to the fact that this project is still in its infancy, much of the costs of this application have been spent in developing the design and researching and preparing the various permits and licenses necessary to install the device.

4. ON-PEAK AND OFF-PEAK PROJECT POWER VALUES

The project operates in run-of-river mode and therefore will not create on-peak or off-peak power values.

5. IMPACT TO EXISTING POWER PRODUCTION AND POWER VALUES

WPC is applying for an original license. No existing project power will increase or decrease as a result.

6. **REMAINING UNDEPRECIATED NET INVESTMENT OR BOOK VALUE**

The project is a new development project and no underappreciated net investment or book value will result.

7. ANNUAL OPERATION AND MAINTENANCE COSTS



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EXHIBIT A

Annual operations and maintenance costs are estimated in the matrix below.

ANNUAL OPERATIONS AND MAINTENANCE COSTS			
Deployment			
Stabilizer Bridge	3 Men, 1 week	\$3,000	\$25/br Laborer
Float	3 Men, 1 week	\$3,000	
Deployme	ent Subtotal	\$6,000	
Testing, Monitoring and Surveilance			
Initial operational cross check	2 Men, 1 week	\$8,000	
Initial verification of debris management	2 Men, 1 week	\$8,000	
Testing of electronic capabilities and optimization	2 Men, 2 weeks	\$16,000	Engineering Contractor
Continuing testing and optimization over following two years estimated at 360 hours per year at an average cost of \$100 per hour		\$36,000	
Test	ing Subtotal	\$68,000	
	TOTAL	\$74,000	

Annual Operation and Maintenance Expense Narrative a.

The purpose of the project as proposed is to determine the maintenance and operations costs and compare them with construction costs and the energy produced in order to confirm that the design is feasible for energy production in remote locations. All systems and operations will be insured by the Whitestone Community Association's general liability insurance policy which offers coverage up to \$1,000,000.00. All necessary administrative staff, equipment and supplies are already maintained by WPC at its own costs and will not be charged to the project.

WPC will seek to obtain a funding agreement with a third party which will provide funding not only for manufacturing and construction of the device but also for monitoring, testing, maintenance and operation on a time and materials basis. WPC plans to purchase enough extra parts from the manufacturers as part of the purchase price to facilitate three years of testing. In addition to this, WPC will seek funding for an engineer and a technician to test the various segments of the design in order to recommend and implement any necessary changes and upgrades to the design during the test period. WPC



expects these costs to be less than \$200,000.00 and will seek funding for them as part of funding for construction. Deployment and recovery costs will be part of the construction cost. In the event of an emergency or required shut down or end of license recovery, WPC will assume all costs for removal of the turbine and appurtenant systems using labor and infrastructure it maintains at its own expense on a perpetual basis.

8. <u>DETAILED SINGLE-LINE ELECTRICAL DIAGRAM</u>.

9. SAFE MANAGEMENT, OPERATIONS, AND MAINTENANCE STATEMENT (as per Appendix C, Licensing Hydrokinetic Pilot Projects White Paper, April 2008)

a. Monitoring Plans

i. Environment: Fish, Wildlife, Plants, Soils, Recreation, Land Use

Because of the small footprint of the proposed installation, the project is expected to have minimal impacts. The turbine moves at slow speeds and incurs a low pressure differential. The only moving parts below surface are the turbine blades and these have only two-foot penetration below the river surface. The pressure differential is small enough (under 1 psi) that juvenile salmon are not endangered, and the turbine moves slowly enough (at 40% river velocity) that no danger to fish or waterfowl is anticipated. Additionally no components are mounted on or anchored to the river bottom, so no shore or river bottom disturbance is predicted. Nonetheless, during inspections of the craft, technicians will specifically check for injured or trapped waterfowl, game or fish, or project site disturbances.

Public safety is another important consideration. As mentioned previously, the purpose of this project is to determine craft suitability under a variety of loading and environmental conditions; it is anticipated that for the duration of deployment, at least one technician will be on site full-time during business hours; this will allow for observation and attenuation of any boating-related hazards. Surveillance cameras will also be added for site monitoring; additionally signs and LED buoys complying with USCG regulations for night time and inclement weather visibility will be installed and checked as part of daily routine craft/site inspections. Since this section of the Tanana is not heavily traveled (approximately one boat per hour between 6 AM and 8 PM), and since debris diversion cables will prevent accidental collisions, it is not anticipated that this installation will pose a danger to the public. An additional level of protection for boaters is provided by the decking which prevents anything taller than 18-in from river surface from traveling between the pontoons and into the turbine.



Hasz will be responsible for observing and recording any environmental damages above threshold levels for the following environmental factors: cultural heritage, ecology, landscape, lighting, noise and vibration, pollution, topsoil, traffic, recreation, and waste disposal. For the purposes of this application, it is proposed to define threshold levels as those which would inflict permanent or irreversible environmental damages during or after the licensing period; disrupt or halt the livelihood or recreation of residents or visitors, or impose a landscape change that would inhibit or prevent transportation, incur habitat loss, and/or which could not be reversed before the end of licensing period. These observations will be summarized by Hasz in an annual report provided to FERC.

Environmental Emergency Incident Reporting Protocol

In the event of craft failure or potential public safety emergency, it is the responsibility of supervising responder to alert relevant authorities and agencies regarding the nature of the emergency.

In the event of an environmental emergency, it is the responsibility of the supervising responder to alert, and if necessary, coordinate emergency response procedures with local authorities, as well as appraise Hasz which shall notify the Department of Natural Resources, Department of Fish and Game, Alaska Department of Environmental Conservation, United States Fish and Wildlife Service, and the Army Corps of Engineers within 24 hours of an environmental incident. In the event of an accident involving personnel injury, the supervisor must alert and coordinate with local emergency medical personnel. Hasz shall be responsible for contacting relevant authorities within 24 hours of an incident, and shall also record the incident and include it in its annual report.

General Project Facility and Operations Monitoring

The RISEC float and its location will be monitored on a weekly basis by trained technicians. All scheduled maintenance will be logged as well as important device events and repairs. A workboat equipped for repairs and recovery of the float will be available at all times along with a trained crew.

The RISEC float will be monitored by a web based monitoring system which will record power values and video feed of the device and its surroundings as well as GPS location. All operations and procedures will be OSHA-compliant.



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EXHIBIT A

b. Safeguard Plan

Project Safety Plan

The RISEC float and its location will be monitored on a weekly basis by trained technicians. All scheduled maintenance will be logged as well as important device events and repairs. A workboat equipped for repairs and recovery of the float will be available at all times along with a trained crew.

The RISEC float will be monitored by a web based monitoring system which will record power values and video feed of the device and its surroundings as well as GPS location. All operations and procedures will be OSHA-compliant.

Worker Safety

Hasz shall be responsible for training and supervising full and part-time laborers involved with craft assembly and deployment, and shall establish and enforce worker safety protocols as follows:

- Require hearing protection near loud equipment.
- Require hard hats on site.
- Require eye protection on site.
- Ensure safety shoes for workers.
- Provide first-aid supplies and trained personnel on site
- Require personal floatation device usage for marine activity
- Require strict adherence to all applicable OSHA safety standards

Personnel Responsibilities

Hasz will supervise environmental monitoring and assessment including engineering and technical supervision and assembly and deployment site inspections. The development of procedures to monitor construction to achieve the environmental and safety objectives as well as training for assembly personnel and emergency technical response personnel will also be the responsibility of Hasz. Purchasing and maintenance of environmental monitoring and emergency response equipment, and coordination with local emergency response teams as well as local, state and federal authorities and agencies will be the responsibility of the project supervisor. Additionally Hasz shall conduct weekly "tool-box talks" with workers to discuss environmental and safety standard compliance. Also Hasz shall coordinate with all local and state authorities regarding environmental



compliance, and shall be responsible to appraise relevant authorities of any environmental incident or breach of environmental objectives.

Pre-Construction Monitoring

Prior to craft assembly, preconstruction activities shall be as follows: transport of materials to assembly site, unloading and staging construction materials, and basic site preparation for the assembly process. During this phase, Hasz shall discharge the following responsibilities: daily inspections to ensure compliance with environmental objectives, training of workers (including relevant environmental and safety training), and weekly "tool-box talks" with workers regarding safety and environmental standards. Also Hasz shall coordinate with all local and state authorities regarding environmental compliance, and shall be responsible to appraise relevant authorities of any environmental incident or breach of environmental objectives.

Construction and Assembly Phase Monitoring

Craft assembly and installation activities will involve a crew of five to ten workers, and shall involve the usage of heavy equipment such as a front end loader for installing heavy components, and a cable skidder for moving assembled craft. During this phase, Hasz shall be responsible for daily inspections and supervision to ensure compliance with environmental objectives. Additionally Hasz shall be responsible to train all temporary personnel involved in construction, assembly and deployment in relevant safety and environmental standards. Also, Hasz shall conduct weekly "tool-box talks" with workers to discuss safety and environmental compliance. Hasz shall coordinate with all local and state authorities regarding environmental compliance, and shall be responsible to appraise relevant authorities of any environmental incident or breach of environmental or safety objectives.

Deployment and Operations Phase Monitoring

This proposal involves the assembly and deployment of craft at low water levels during spring, followed by an intensive testing regime during operational months, and disestablishment and disassembly during fall. During operational months, Hasz shall be responsible for procurement and maintenance of secure storage facilities and appropriate tools for emergency environmental response. Additionally, Hasz shall train personnel as on-call emergency responders to environmental incidents or breach of project environmental objectives.



Hasz shall conduct daily inspections of deployment site during the first summer season of operation to ensure compliance with environmental and safety objectives. Additionally, Hasz shall be responsible to appraise relevant authorities of any environmental incident or breach of environmental or safety objectives.

Remote Safety Monitoring System

The proposed project shall follow a safety objectives plan to protect personnel and public interest, as well as concurrently protecting against environmental hazards. Hasz shall be responsible to provide engineering and technical supervision for the proposed project. Additionally, Hasz shall be responsible to procure, install, and maintain a robust and comprehensive remote monitoring and control system. This SCADA interface will provide remote access to real-time information from onboard sensors including load, voltage and current outputs, and turbine speed. Integrated into this system is a positional monitoring unit which senses craft motion and alerts a response team in the incident of craft movement; additionally, an array of surveillance cameras will be installed, both as a visible deterrent to unauthorized access, and to monitor and record such access. These cameras will also provide remote visual inspection capability for debris buildup or other threats to the integrity of the float.

Inspection Schedule

Safety and environmental inspections shall be conducted concurrently by Hasz. During the assembly and construction phase, inspections shall be conducted daily. During the initial summer season of operation, inspections shall be conducted daily. Detailed records of these inspections shall be maintained and available to FERC personnel or other resource agencies upon request. This shall include both inspections of craft and mooring integrity and function, as well as function of remote monitoring system itself. After the first season of deployment, Hasz shall assess the results of the inspection regime to determine if weekly inspections will be sufficient to protect against breach of safety or environmental objectives.

Daily craft and site inspections will include checking cables for wear, fraying, or corrosion and mooring components for signs of wear, stress or lodged debris; inspecting turbine, transmission, and generator components for wear, improper installation, and signs of vandalism or damage; inspection and testing of monitoring and alarm system, including testing and inspection of surveillance cameras, and cellular alarm dialing systems; and inspection of signage and buoys.



The following inspection checklist will be used as the basis of the daily inspections.

Daily Monitoring and Inspection Checklist:

- 1. Mooring connections securely fastened
- 2. Mooring locations free from erosion/damage
- 3. Mooring system and float free of debris
- 4. Turbine operating normally, gauges, instruments, and surveillance equipment operational
- 5. Boating traffic characterization
 - a. Size of crafts
 - b. Density of traffic
 - c. Interaction between turbine and boat traffic
- 6. Wildlife interaction with the mooring system
- 7. Avian and aquatic interaction with the turbine wheel
- 8. Recreational and wildlife interaction with the electrical intertie structures and easement
- 9. Impact of turbine operation on river conditions including wake, turbulence, current redirection, etc.

Data from each daily inspection shall record all the above information and daily reports shall be stored in a secure location. Within 30 days of the end of each operating season, Hasz Consulting, LLC shall submit a summary of the daily inspections to WPC detailing the interaction of the turbine with its surrounding environment. The report shall specifically address the following items:

- 1. A characterization of the total downtime during the season, the causes for the lost operational time and recommended solutions
- 2. A characterization of the type and density of boat traffic and the nature of its interaction with the turbine float
- 3. A characterization of any deficiencies in operating procedures and an assessment of necessary safety and environmental measure to be taken during the next season



Additionally Hasz shall be responsible to provide training for emergency response personnel on a seasonal basis including mock-up emergency shut-down procedures to ensure that emergency response personnel remain competent and familiar with tools and techniques needed to address environmental or safety incidents.

Annual assessment of safety equipment and functionality shall be conducted prior to final installation at the beginning of each operating season. This shall include a test of functionality of GPS locating device, cellular dialing system, and SCADA control system.

Additionally Technicians will conduct annual tests of the emergency shutdown procedure, including receiving an emergency signal from onboard sensors, meeting at rally point, accessing craft, disconnecting power, and raising wheel to stop turbine.

Progress Report Schedule

Hasz shall report annually to relevant local, state, and federal authorities and agencies as required regarding environmental and safety incidents, and any protocol changes or meaningful feedback from emergency and technical personnel crews.

Additionally, Hasz shall alert relevant authorities within 24 hours of any environmental or safety incident, and shall include record of violation in periodic progress reports. At this time WPC has been advised that no state or local agencies will require progress reports unless major changes to the project scope occur or unless there is an unforeseen incident which would harm the environment or public safety. For this reason, Hasz will publish an annual progress report detailing the findings of each season of operation as relates to public safety and environmental integrity.

Anticipated Level of Effort

The previously mentioned SCADA monitoring system will require a fiberoptic/Ethernet connection. A remote GPS position monitoring and alert system will be included. The proposed project implementation budget includes provision for costs of environmental and safety training, equipment procurement and maintenance, and engineering supervision.



Facility Failure Safety Plan

Several precautionary measures shall be employed to reduce possibility of failure, identify and attenuate failure modes, and design proper monitoring/alarm systems. Significant reduction in failure probability is afforded by the mooring system design. First, a rigid linkage structure between shore and craft which is rated for a 20,000 pound load would prevent craft motion outside of linkage pivot range in the event of a mooring or debris diversion cable failure. Additionally redundant mooring cables on the rear of the craft are installed to prevent the craft drifting downriver with the current in the event of mooring system failure.

It is not anticipated that either the primary or redundant safety mooring cables would break since they are designed with a factor of safety of 3. Nonetheless some consideration of equipment recovery in case that craft should drift downriver is still necessary.

To attenuate risk of equipment loss and to facilitate emergency craft recovery, deployment efforts shall involve two boats; thus in the instance of engine failure or mechanical incident, the extra boat shall be used to secure craft and prevent a safety or environmental incident. Before and during mooring cable attachment, the craft shall be securely fastened to the work boat with attachment cables as depicted in Figure 4, below.





Figure 4: Boat Attachment Apparatus

Typically, if even one of the mooring components is intact and correctly attached, the craft will not drift more than thirty feet downstream, and would easily be recovered by towing into position with the work boat, whereupon it would be fastened by cables.

Instrumentation for Mooring System Failure Alarm

Since the event of an unaddressed remote location craft mooring cable failure would be detrimental in terms of power output and craft damage, mooring system integrity will be evaluated using a SCADA type positional monitoring system employing a Dynamic Global Positioning System coupled with an excursion monitoring/reporting software package. If the system senses the craft moving outside of the defined excursion envelope, an alarm will sound to indicate mooring cable failure; this system interrogates onboard GPS sensors for craft position every five seconds, updates a five-year data-logged history of craft positions and headings at a one-minute sampling rate, and additionally records alarms and events in a data log.



The proposed positional monitoring system is tolerant of power outages and currently supports the following industry standard communication protocols:

- MODBUS RTU Over TCP
- MODBUS ASCII/RTU/TCP
- NMEA 0183

Means of Alerting Technicians

The proposed SCADA system interfaces with a Protalk CV3 alarm dialing system with cellular amplification, integrated cellular module with voice and SMS text capabilities. This alarm system is tolerant of power outages, and may be programmed for four different shifts, is highly modular, and has low footprint. It will continue to dial numbers in its database until technicians give confirmation of alarm notification.

The proposed system also has built-in radio port and public address systems which may be programmed with redundant alert capability in after-hours situations.

An additional consideration for the SCADA monitoring/alarm system is alarm cascade. Since the Protalk interface is capable of supporting a wide array of specific alarm messages from digital and analog inputs, it is important that the acquisition and broadcast of craft data be configured to give technicians optimum awareness of the mode of failure and extent in the event of emergency involving several alarms from multiple component failures. The integrated PLC interface would then organize the alarm cascade such that technicians would be able to differentiate a transmission rotation stoppage caused by a debris jam from one caused by mooring cable failure or transmission component failure. This allows emergency personnel and technicians to best prepare themselves to address emergency situations.

Emergency Response Plan

This proposal includes the following delineation for full-time and emergency personnel responsibilities and methodology:

Rapid emergency response by technical personnel is available at any time during operational months. A rotating personnel schedule system will allow for a senior technical supervisor, a pilot and crew of two technicians to be selected from a pool of qualified workers as first responders at any given time. Trained technicians shall be equipped with cellular phones or use their personal cellular



devices as well as redundant CB or Military Spec- long range radio system such as used by volunteer fire departments and emergency medical service teams to rally members.

Emergency Response crew responsibilities are as follows: The technical supervisor is responsible for assembling a response crew, assessing the nature of emergency, and following emergency attenuation procedures in the event of emergency. Additionally, he/she is responsible for the maintenance of safety equipment and tools used in emergency response. Technical supervisors also are responsible for coordinating with relevant local, state, and federal authorities and agencies in the event of an emergency.

The pilot is responsible for the operation of work boats and vehicles in the event of emergency, and for their maintenance (ie: fueling and basic repairs).

Each member of the response crew is responsible for his/her availability for the duration of their scheduling period. This means that each member must keep their cellular phones and/or radios charged and working during this interval.



Figure 5: Workboat Hauling Rigid Strut Support Sections

Emergency Responder Response Time

Response time varies with technician proximity. During day-time emergency response, a down-river technician is expected to confirm alarm in under a minute, and reach a motor vehicle rally point in under fifteen minutes. An up-river technician may require up to fifteen minutes to reach an upriver boat launch and a



further five minutes to reach downriver boat launch. It is anticipated that departure of a repair/emergency response team from boat launch in work boat may be effected in under thirty minutes. The boat trip from launch to craft area is less than one minute.

It is anticipated that night-time response may require up to twenty-five minutes for team departure from down-river boat launch. In either case, docking the craft and disembarking will likely require no more than one minute.

The purpose of this installation is primarily to test the proposed design for suitability under a variety of loading and environmental conditions. Consequently it will already be subject to a robust monitoring protocol. A full craft and site inspection will be carried out by a qualified technician daily. During business hours, at least one technician will be on duty monitoring craft. Technicians have full or part-time jobs within a 1.5 mile radius of the craft. Each of these technician is equipped with a cell-phone. During day-time emergency response, a technician is expected to confirm a cell-phone text or voice alarm in under a minute, and reach a motor vehicle rally point in less than ten minutes. It is anticipated that departure of a repair/emergency response team from boat launch in work boat may be effected in under fifteen minutes. The boat trip from launch to craft area is less than one minute.

After business hours, technicians reside in domiciles within a 1 mile radius of craft. It is anticipated that night-time response may require up to twenty minutes for team departure from down-river boat launch. In either case, docking the craft and disembarking will likely require no more than one minute.

Location of Emergency Response Personnel

The proposed technicians all have full or part-time jobs, with varying proximity to craft site. Since emergency response is inherently time-critical, response teams would be picked based on proximity rather than scheduling during day-time hours from 6 AM to 6 PM. From 6 PM to 6 AM, it is proposed to employ a rotating schedule of technicians who would be alerted first to an emergency condition. Consequently response type would be categorized as day-time or night-time type response.

A day-time approach would be based on proximity of technicians based upon work-place locations. Under this paradigm, the technician first reaching the rally point would assume the role of senior technician, and would assemble a response team from available workers.



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The night-time approach would be based upon a rotating scheduling system that spreads after-hours emergency response among a pool of qualified individuals. This ensures that a number of persons remain qualified for emergency operations.

In event of an emergency, the first responder to reach the rally point shall assume the role of technical supervisor, and will be responsible for designating piloting and technical responsibilities among the remaining responders. Additionally, the technical supervisor shall coordinate with local emergency responders if need be and is responsible for appraising the project supervisor at Hasz, of environmental or safety incidents within 8 hours of incident occurrence.

Emergency Response Guidelines

In the event of an alarm, technicians would respond in accordance with following general procedure:

- Alarm input triggers alarm system, which broadcasts radio and cellular signals until confirmation is received, and logs alarm event in database.
- Technicians give single button confirmation response, and converge to a common rally point.
- Supervisor confirms that appropriate team members have assembled, assigns team duties, determines and acquires required safety equipment and tools based on SCADA system.
- For teams converging to "downriver" rally point, pilot technician uses specialized off-road motor vehicle to transport response team and equipment to boat launch area.
- Senior Technician confirms that appropriate team members are present at work boat.
- Pilot activates project work boat, which is equipped with safety equipment including spot-lights, crane and winch, high visibility personal floatation devices, and anchoring and towing equipment. Work boat is piloted to craft site.
- Senior Technician assesses damage, hazards, and potential risks, and determines suitable attenuation plan.
- Response team carries out appropriate attenuation plan, ensuring operator safety and craft integrity as primary goals.
- Technician team ensures that all tools, equipment, and vehicular conveyances used are properly stowed and maintained after usage, and if necessary, senior technician alerts a repair crew to attend or modify craft as needed.
- Senior Technician reports to supervisor at Hasz within 8 hours.



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Annual Coordination with Responding Agencies

Local EMS and fire department services are exclusively volunteer-based, and have no watercraft. Consequently, the proposed plan does not rely upon local emergency response services, and no effort shall be made to coordinate with such agencies. Instead, Hasz shall supervise and train a specialized response team equipped with proper tools, as well as land and aquatic transportation.

Prevention of Unauthorized Access

During operation, the proposed installation is located in swift water, and anchored by submerged cables to the vertical face of a 250-ft high rock cliff; it is practically accessible exclusively by boat. It is anticipated that the probability of unauthorized or accidental access will be substantially attenuated by the remote location and difficulties associated with accessing craft. Unauthorized access is further discouraged by warning signs, which will alert boaters to hazards caused by the presence of submerged cables, rotating turbine components, and high voltage wires and electrical hardware. Surveillance cameras will be visibly mounted on the craft to discourage vandalism or theft as well as monitoring interaction between the public and the installation.

Additionally, operator safety and unauthorized access prevention will be maintained by two fences on the craft. The outer perimeter fence railing system prevents unauthorized persons from accessing the craft deck, and protects operators and technicians from falling off the craft. The rotating turbine components are cordoned off by an additional inner fence which prevents unauthorized or accidental access to turbine should unauthorized persons gain access to craft.

All onboard adjustable controls, including onboard SCADA controls, electrical panel boxes, screw-jack height controls, and craft fifth-wheel attachments and anchoring attachments, will be maintained in lockout mode when not in use by qualified personnel. This will prevent unauthorized tampering with craft or turbine settings, or accidental release of craft from anchoring system.

Signage

Warning signage shall be installed on craft in accordance with US Coast Guard protocols, both to warn public against unauthorized access to deployed craft and alert workers to potentially hazardous situations. As shown in below, these signs shall include three standard USCG signs warning marine traffic of submerged cable and other navigational hazards. Additionally crush hazard placards in



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accordance with American National Standards Institute (ANSI) Z535.2 color coding shall be placed at each corner of fencing surrounding the turbine, as well as on both height adjustment mechanisms (see figure *I-1011*). Electrical shock hazard placards shall be placed by generator, as well as upon both cabinets, and a non-skid floor sign shall mark a trip zone by the bridge strut. Also, signs warning against access by unauthorized personnel shall be posted on both ends of the craft, as well as by the bridge strut (see figure *I-1011*, *I-1012*).







SAFETY SIGNAGE



4 '

CABLE



c. Project Removal Plan

The proposed craft is designed to be installed and disestablished rapidly and safely at the beginning and end of each operating season. It is anticipated that two technicians will be able to raise the water wheel entirely out of the water using a screw jack array, and bring it to a halt in approximately three minutes.

The turbine may be readily removed from water while craft remains stationary, which allows the easy implementation of emergency measures to modify or temporarily cease craft operation. Additionally, in the proposed plan, technicians will be able to completely remove all project components from the site (except the threaded rock anchors in cliff face) in less than five hours. The following measures will be applicable for the duration of the operating season.

In the event that the Senior Technician's assessment dictates a temporary cessation of power generation, a crew of two technicians may apply load breaks and use screw jack adjustors to raise turbine out of stream flow to stop turbine. This procedure will require less than five minutes, and stops all moving parts on craft.

In the event that the assessment requires a complete removal of all craft components from installation site, a full disestablishment may be effected in 9 hours. Ideally two boats will be utilized to remove craft from deployment site as follows:

- Pilot docks work boat into rear craft fitting; technician buckles attachment cables on boat to craft.
- Two technicians utilize screw jacks to lift turbine out of water. Load breaks are thrown, and power cables are disconnected.
 - (The above two steps will require approximately one an hour.)
- Work boat pushes craft forward to remove tension from mooring cables.
- Technicians on secondary boat detach primary and secondary mooring cables from the bluff, maintaining secure hold on cable ends.
- Technician on craft reels in mooring cables while work boat prevents craft from sliding downstream.
- Technician on craft releases fifth wheel pin lock, allowing work boat to move craft freely.

It is anticipated that the above four steps will require approximately three hours.

• Pilot guides work boat and craft to shore, where craft may be winched entirely out of water.

Staging the craft on a level section of shore, winching it in using a skidder, and safely preparing it for off-season storage will probably require five hours.



It is predicted that withdrawing craft from deployment site will require nine hours for a crew of four technicians.

d. Navigation Safety Plan

Signs and LED buoys complying with USCG regulations for night time and inclement weather visibility will be installed and checked as part of daily routine craft/site inspections. Since this section of the Tanana is not heavily traveled (approximately one boat per hour between 6 AM and 8 PM), it is not anticipated that this installation will pose a danger to the boating public. An additional level of protection for boaters is provided by the decking which prevents anything taller than 18-in from river surface from traveling between the pontoons and into the turbine.

e. Emergency Shutdown and Removal

The proposed craft is designed to be installed and disestablished rapidly and safely at the beginning and end of each operating season. The turbine may be readily removed from water while craft remains stationary, which allows the easy implementation of emergency measures to modify or temporarily cease craft operation. Additionally, in the proposed plan, technicians will be able to completely remove all project components from site except the threaded rock anchors in cliff face in less than five hours. The following measures will be applicable for the duration of the operating season:

In the event that the Senior Technician's assessment dictates a temporary cessation of power generation, a crew of two technicians may apply load breaks and use screw jack adjustors to raise turbine out of stream flow to stop turbine. This procedure will require less than five minutes, and stops all moving parts on craft.

In the event that the assessment requires a complete removal of all craft components from installation site, a full disestablishment may be effected in 9 hours.

Ideally two boats will be utilized to remove craft from deployment site as follows:

- Pilot docks work boat into rear craft fitting; technician buckles attachment cables on boat to craft.
- Two technicians utilize screw jacks to lift turbine out of water. Load breaks are thrown, and power cables are disconnected.
- The above two steps will require approximately one an hour.
- Work boat pushes craft forward to remove tension from mooring cables.
- Technicians on secondary boat detach primary and secondary mooring cables from the bluff, maintaining secure hold on cable ends.



- Technician on craft reels in mooring cables while work boat prevents craft from sliding downstream.
- Technician on craft releases fifth wheel pin lock, allowing work boat to move craft freely.

It is anticipated that the above four steps will require approximately three hours.

• Pilot guides work boat and craft to shore, where craft may be winched entirely out of water.

Staging the craft on a level section of shore, winching it in using a skidder, and safely preparing it for off-season storage will probably require five hours.

It is predicted that withdrawing craft from deployment site will require nine hours for a crew of four technicians.



Figure 6: Strut Assembly Diagram



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Site Maintenance after Removal

Once the craft has been removed from deployment site, and cables reeled in, the only remaining mooring components are the rigid suspension support member (Figure 6), rock anchoring system, and power intertie components with GVEA grid (including a run of armored cable). The rigid support member is a compact modular design which prevents the current from sweeping the craft toward the shore and is an important component in the mooring system. The support is comprised of three modular 10-foot sections pinned together, and secured to the shore by a pintle-hitch assembly; it is anticipated that a pilot, supervisor, and two engineers may require six hours to disassemble and remove bridge.

The five-foot threaded rock anchors are designed by Williams Form Engineering. These are permanent structural components that are grouted into the rock face. Over winter these will be covered with plastic caps to prevent thread corrosion. If required, these rock anchors may be cut or ground flush with the rock to leave minimal long-term impacts at installation site.

The only permanent fixture at the deployment site are four sets of one inch diameter rock anchors for securing the bridge and mooring cables, and a 900-foot by 20-foot easement for the armored cable. The easement will need to be cleared of brush for the installation of cable, however the armored cable only requires a one foot wide clearance, and no large trees will be cut down. The armored cable will be anchored into the ground using grouted thread anchors, which may be either capped or cut flush with rock face. Since no trees of substantial size shall be cleared, there is no anticipated need for replanting efforts following removal of craft due to emergency or license termination.



FINANCIAL ASSURANCE

In accordance with FERC's whitepaper, WPC is providing financial assurance for all project costs including complete project removal and site remediation at the conclusion of the license term or at the request of the Commission.



Key Bank National Association 100 Cushman Street Post Office Box 71230 Fairbanks, AK 99701

Tel: 907 452-2146

March 15, 2011

TO WHOM IT MAY CONCERN

RE: White Stone Farms

White Stone Farms, in conjunction its associated business entities, has an active line of credit with this bank in the amount of 1,200,000.00. Current availability is the full amount of the line.

The line of credit has a review and renewal date of July 20, 2011. The line has always been used in complete compliance with credit requirements and the payment history has been excellent.

The business is a valued client of this bank. If you need further recommendations or information, please contact me directly at 907-459-3314.

teven Chause Steven C. Krause

Vice President Commercial Banking KeyBank N.A.

Whitestone Farms

PO BOX 1229 Delta Junction, AK 99737 Phone: (907) 895-4938 * Fax: (907) 895-4787

November 28, 2006

Letter of Guarantee

This letter will serve as notification that Whitestone Farms will irrevocably continue to financially support Whitestone Community Association, dba Whitestone Power & Communications.

This guarantee insures a continuance of all payments on the part of Whitestone Farms for all costs and debts incurred by Whitestone Power & Communications. It is in our best interest to continue to pay for this service in exchange for the benefit that this utility provides.

We have interlocking directorships on the two boards, including Mr. David DiGloria, the treasurer; Mr. Nyron Wheeler and Mr. Jack Frederick.

If further information is required, please feel free to contact us.

Signed:

widd-DiSlouia

David J. DiGloria Treasurer