

**EXHIBIT A**  
**(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
- A staging area with two 40-ft storage connexes

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

- 2011-2016: Obtain hydrokinetic pilot project license and test project for at least three years under its auspices.

**a. Project Specifications**

<b>Key Component</b>	<b>Description</b>
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

**EXHIBIT A**

<b>Key Component</b>	<b>Description</b>
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., 480 volts
Interconnection Line Voltage	14,400 volts
Estimated Project Cost	\$1.4 million (see detail below)
Estimated Environmental Monitoring Cost	See Testing, Monitoring and Surveillance Table
Estimated Environmental Components Cost	See Testing, Monitoring and Surveillance Table

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

**b. Project Construction Cost Estimate**

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

**EXHIBIT A**

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

**EXHIBIT A**

PROJECT CONSTRUCTION COST ESTIMATE DETAIL			
Staging Materials		\$15,000	
Anchoring	2 Men, 4 weeks	\$10,000	\$25/hr Laborer
Stabilizer Bridge	3 Men, 1 week	\$3,000	\$25/hr Laborer
Float	3 Men, 1 week	\$3,000	
<b>Deployment Total</b>		<b>\$126,000</b>	
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	
<b>Equipment Rental Total</b>		<b>\$28,000</b>	
Testing			
Initial operational cross check	2 Men, 1 week	\$8,000	Engineering Contractor
Initial verification of debris management	2 Men, 1 week	\$8,000	
Testing of electronic capabilities and optimization	2 Men, 2 weeks	\$16,000	
Continuing testing and optimization over following two years estimated at 360 hours per year at an average cost of \$100 per hour		\$72,000	
<b>Testing Subtotal</b>		<b>\$104,000</b>	
Project Supervisor			
Manufacturing Oversight	150 hours	\$11,250	\$75/hr project manager
Plant Visit Travel		\$15,000	
Procurement	80 hours	\$6,000	

**EXHIBIT A**

PROJECT CONSTRUCTION COST ESTIMATE DETAIL			
Assembly Oversight	160 hours	\$12,000	
Project Coordination	80 hours	\$6,000	
<b>Project Supervisor Subtotal</b>		<b>\$50,250</b>	
Per Diem			
Intertie		\$16,800	\$100/day/man
Mechanical		\$25,200	
<b>Per Diem Subtotal</b>		<b>\$42,000</b>	
Fuel			
1000 gal	4.00/ gal	\$4,000	
<b>Fuel Subtotal</b>		<b>\$4,000</b>	
Contractor's Fees			
<b>Contractor's Fees Subtotal</b>		<b>\$240,000</b>	
<b>TOTAL PROJECT CONSTRUCTION COST</b>		<b>\$1,383,292</b>	

**EXHIBIT A**

**ANNUAL OPERATION AND MAINTENANCE COSTS**

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

<b>ANNUAL OPERATIONS AND MAINTENANCE COSTS</b>			
<b>Deployment</b>			
Stabilizer Bridge	3 Men, 1 week	\$3,000	\$25/hr Laborer
Float	3 Men, 1 week	\$3,000	
<b>Deployment Subtotal</b>		<b>\$6,000</b>	
<b>Testing, Monitoring and Surveillance</b>			
Initial operational cross check	2 Men, 1 week	\$8,000	Engineering Contractor
Initial verification of debris management	2 Men, 1 week	\$8,000	
Testing of electronic capabilities and optimization	2 Men, 2 weeks	\$16,000	
Continuing testing and optimization over following two years by contract with Hasz Consulting LLC	Hasz	\$36,000	
Estimated Environmental Monitoring Cost	Hasz	Costs included in contract with Hasz Consulting	
Estimated Environmental Components Cost	Hasz	Costs included in contract with Hasz Consulting	
<b>Testing Subtotal</b>		<b>\$68,000</b>	
<b>TOTAL</b>		<b>\$74,000</b>	

**c. Annual Operation and Maintenance Expense Narrative**

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

## **EXHIBIT A**

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.

### **d. 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

**EXHIBIT A**

**e. 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, WA. 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.

**f. 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.

**g. Transmission And Power Generation System**



## **EXHIBIT A**

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.

### **h. Electronic Controls And Inertie**

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

## **EXHIBIT A**

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.

### **i. 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 fifth-wheel 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 attached 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

## **EXHIBIT A**

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.

### **j. Staging and Storage Facilities**

The project staging area would be located approximately 1400 ft downstream of the project location on the opposite side of the river as shown in Exhibit G. This area is approximately 150 ft upstream of the docking area used by the community of Whitestone. The equipment at the site would consist of two 40-foot connex storage containers. These containers will contain the parts when the turbine is shipped to the site and will be retained after construction is complete to house tools and spare parts. The connexes will be painted to minimize their visual impacts on the docking area.

Also located at the staging area will be an earthen ramp which will be built for the purpose of deploying the turbine to the water and will only be necessary at low water levels such as in the spring and fall. Should a summer time recovery or deployment become necessary, the ramp would not be necessary. The ramp itself will be a small area of the bank roughly the width of the float (19-ft) which will be smoothed from the shore to the water line in order to make the sliding of the turbine float into the water a smoother and more controllable process. This will be accomplished using a backhoe and will need to be done each spring and fall. No erosion control measures are planned at this time. The reason for this is that the ramp will be washed away or refilled with silt and gravel by the river each summer during the high water time. No other people or entities will make use of this ramp or staging area and the project will not use any other facilities for these purposes.

**EXHIBIT A**

**k. 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.

**l. 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.

**m. 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.

## **EXHIBIT A**

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. The anchors for mooring the turbine to the shore will be threaded rods of 2-inch diameter or less and will be less than 30 in number. The anchors for securing the power transmission line will be threaded rods of 1-inch diameter or less and will be less than 100 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.

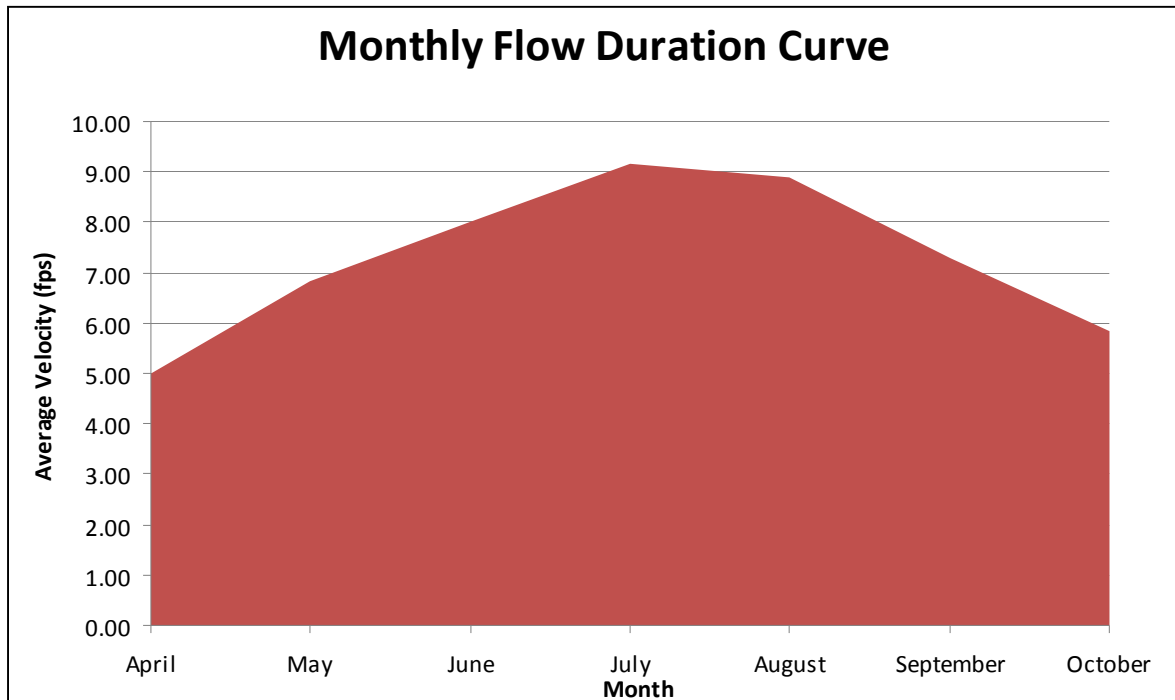
### **n. Efficiency And Return-On-Investment Projections**

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 velocity survey 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.

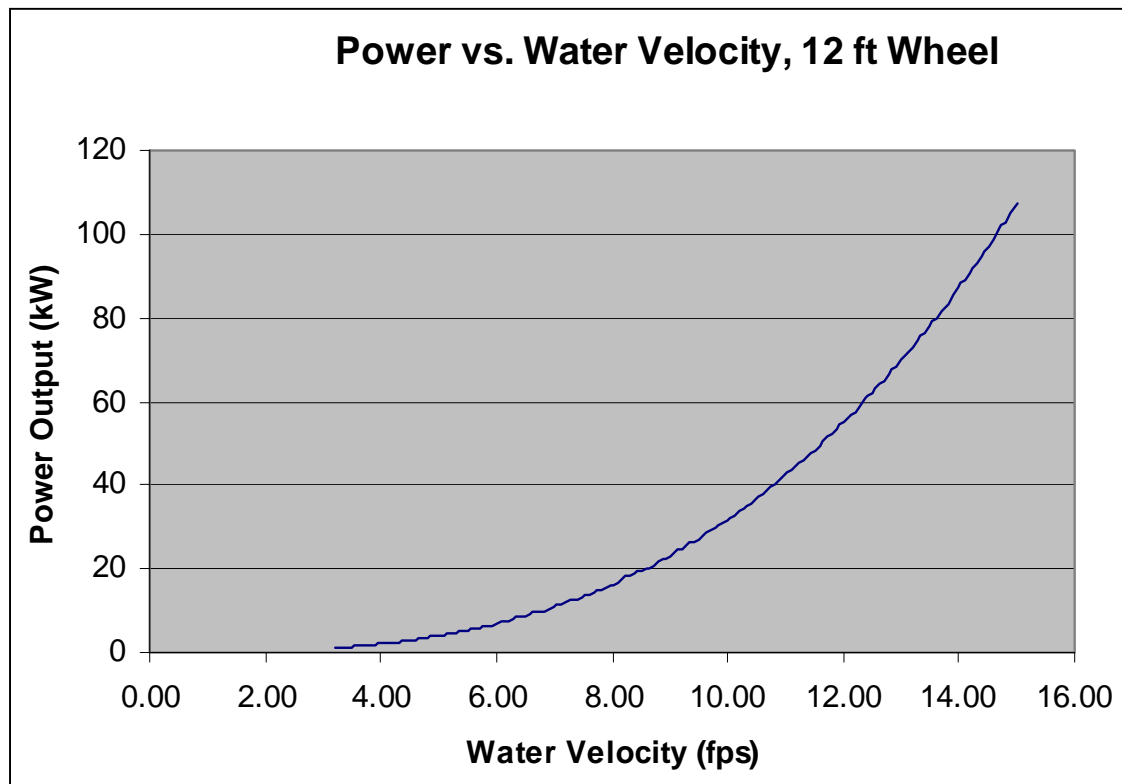
**EXHIBIT A**



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.

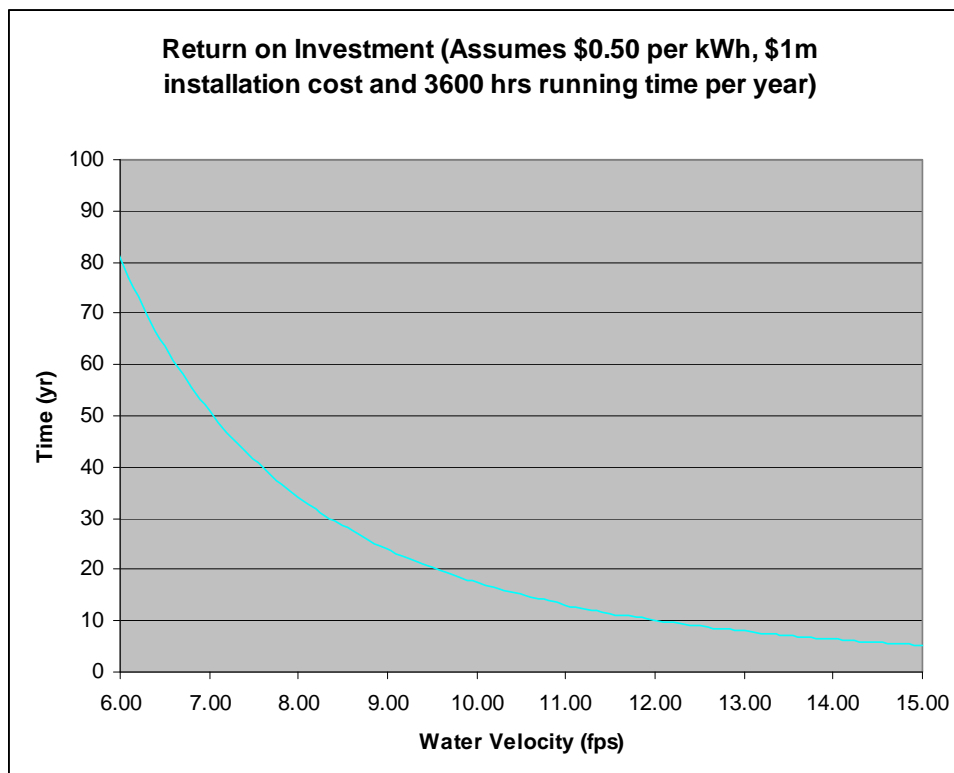
**EXHIBIT A**



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.



**EXHIBIT A**



**o. 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



## **EXHIBIT A**

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 be 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

## **EXHIBIT A**

emergency. Should an emergency arise, medical and rescue personnel and equipment will be available from the nearby community of Whitestone to respond. The anchoring cables will run from either side of the craft to the shore at the water line. These cables will have an angle to the direction of the current of not more than 30 degrees. This will allow them to deflect an unpowered boat from floating into the craft. In addition, after additional consultation with the USCG at the request of FERC, it was decided to add signs above and below the installation warning boaters to avoid the north shore of the river. This should further diminish the chance of collision. WPC will also employ on-craft video surveillance as well as daily inspections to insure that the system is operating properly.

### **p. 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.

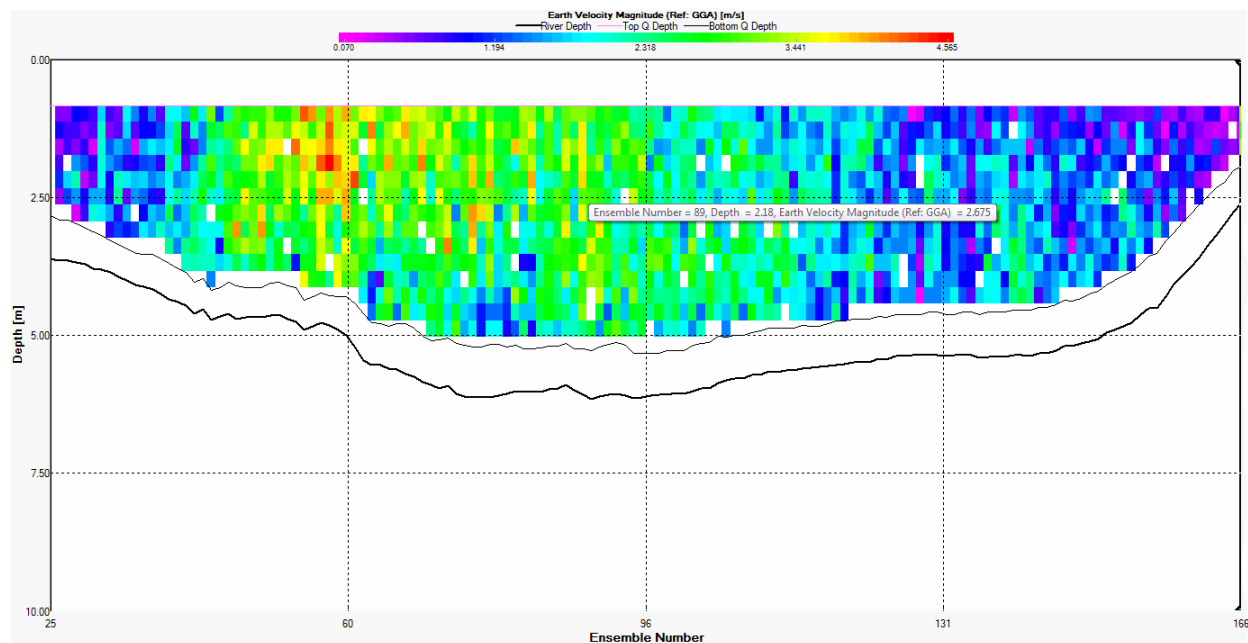
- The minimum, mean and maximum flow (in cfs) is not applicable. Instead a velocity versus time profile must be developed which shows the variation of the river current during the spring, summer and fall. Because the river in question is glacially fed, there is a large amount of variability in its level 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

**EXHIBIT A**

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.

**q. Water-To-Wire Efficiency**

## **EXHIBIT A**

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**

**EXHIBIT A**

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

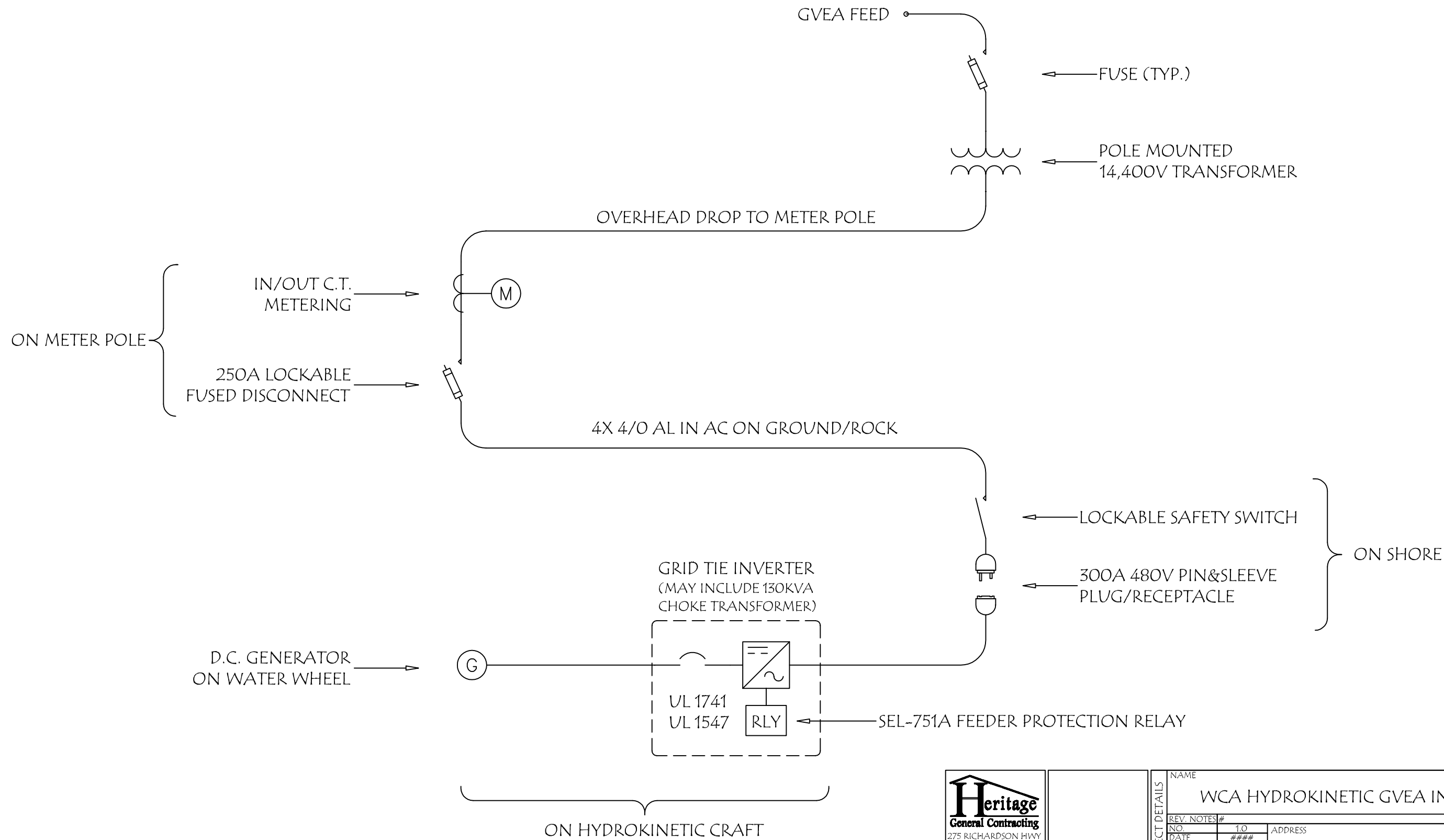
**5. IMPACT TO EXISTING POWER PRODUCTION AND POWER VALUES**

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. DETAILED SINGLE-LINE ELECTRICAL DIAGRAM.**



**Heritage**  
 General Contracting  
 275 RICHARDSON HWY  
 DELTA JCT. AK 99737  
 TEL: (907) 895 9889

FOR  
 WCA

NAME	NO.	##
WCA HYDROKINETIC GVEA INTERTIE		
REV. NOTES#		
NO.	1.0	ADDRESS
DATE	###	P.O. BOX 1229
CURRENT	14.01.2011	DELTA JUNCTION
DRAWN	JMB	
CHECKED	JBM	

SHEET TITLE	SHEET NO
LINE DIAGRAM	1.0

**EXHIBIT A**

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

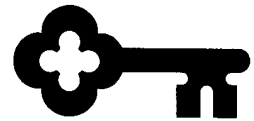
**a. Monitoring Plans**

- i. Environment: Fish, Wildlife, Plants, Soils, Recreation, Land Use: These plans can be found in a separate document as part of this filing called “Part 3.Environmental Monitoring and Safeguard Plan”.

## **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.

  
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

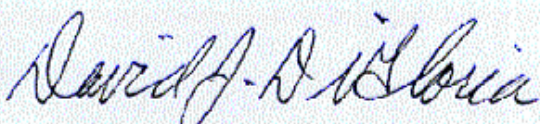
This letter will serve as notification that Whitestone Farms will irrevocably continue to financially support Whitestone Community Association, dba Whitestone Power & Communications.

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:



David J. DiGloria  
Treasurer