UAF 11-0017
NENANA, ALASKA HYDROKINETIC RivGen™ POWER SYSTEM

PROGRESS REPORT: 4Q2012

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ORPC ALASKA, LLC
725 Christensen Drive, Suite 6
Anchorage, Alaska 99501
Phone: (907)-339-7939
www.orpc.co
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Narrative Summary
The goal of the Nenana, Alaska, Hydrokinetic RivGen™ Power System Project (Project) was to assess and demonstrate the potential of a hydrokinetic power system in Alaska (Figure 1). The Project proposed to finalize site and technology concerns in preparation for deployment of ORPC’s RivGen™ turbine generator unit (TGU) at Nenana, Alaska. The Project included the design and building of a bottom support frame and debris diversion system as well as pre-deployment fish studies, which were completed by University of Alaska Fairbanks School of Fisheries under AHERC’s work at the Nenana site in August 2011.

Figure 1. The RivGen™ device.

During the last quarter of the Project (January – March 2012), construction of the RivGen™ generator, a direct-drive permanent magnet generator, was completed in February 2012. The generator was then shipped to Alexander’s Welding and Machine in Greenfield, Maine, for final assembly to the rest of the turbine generator unit (TGU) on March 19.

Meanwhile, the RivGen™ advanced design cross flow (ADCF) turbines were fabricated and assembled by Hall Spars and Rigging of Newport, Rhode Island. The foil molds were completed on January 6. Once the molds were completed, foil fabrication began. On February 1 the first RivGen™ foil was fabricated, and by February 16 all of the foils were completed and ready for the foam core to be added (Figure 2).
The final designs for the disks, shaft, and alignment system were analyzed and accepted in early January. The steel turbine shaft fabrication and machining were completed on February 15, and by February 24 all of the turbine components were completed. Assembly of the turbines was completed and inspected by early March, and the turbines were shipped on March 5, 2012 (Figure 3).

The entire assembly was completed on March 26 and was shipped on a flatbed truck to ORPC’s testing facility in Eastport, Maine, on March 27 (Figure 4).
Once the TGU arrived in Eastport, Maine, at Perry Marine and Construction’s (PMC) Deep Cove facility, it was prepared for attachment to ORPC’s research vessel, the *Energy Tide 2*.

On March 29, the *Energy Tide 2* was brought from its mooring to the boat ramp at the PMC facility and then driven from the staging area to the boat ramp (Figure 5). During this pick, the total weight of the TGU was confirmed to be 21,800 lbs.
Once at the boat ramp, the two cranes lifted the TGU off of the flatbed and moved the TGU to the *Energy Tide 2* (Figure 6).

![Image of TGU being moved]

*Figure 6. Moving the TGU to the Energy Tide 2.*

On April 6, the *Energy Tide 2* was moved from the boat ramp to the Shackford Head mooring during the morning’s high tide. The *Energy Tide 2* was successfully attached to the mooring and preparations were made for the first tests of the RivGen™ TGU, which commenced in April 2012 (Figure 7).
Figure 7. Moving the RivGen™ TGU on the Energy Tide 2 to the test site.