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

PROGRESS REPORT: 2Q2011

JUNE 15, 2011

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

Progress Report: FY 2011, 2nd Quarter
Submitted: June 15, 2011

1. Total Project Funding

Denali Commission	$830,325
ORPC Alaska	$1,128,449

2. Updated schedule and milestone information as identified in the Project Work Plan

Project Deliverables

- Alaska Hydrokinetic Energy Research Center (AHERC) foundation and debris diversion literature surveys, data collection and final reports:

  Foundation Study Deliverables
  AHERC is no longer performing a foundation study for the project. ORPC Alaska, LLC (ORPC) is utilizing third party engineering resources to complete the design.

  Debris Study Deliverables
  The final report on the debris study was submitted to ORPC on April 14, 2011 (provided upon request).

- ORPC environmental and site characterization data collection for project design and Federal Energy Regulatory Commission (FERC) draft license application:

  No additional site characterization work has been completed.

- Prototype bottom support frame (BSF) and debris diversion system fabricated, deployed, tested, and retrieved at Nenana site:

  The prototype bottom support frame is nearly complete and undergoing final design details. The debris diversion system design and construction is dependent on debris data that will be collected during the 2011 field season, so it will not be designed or tested this year. ORPC has entered into an agreement with Marsh Creek, LLC as the lead contractor on the fabrication, deployment, testing, and retrieval of the bottom support frame.

- Additional field work required for FERC final pilot license application:

  ORPC has worked with University of Alaska Fairbanks (UAF) and consulted primarily with Alaska Department of Fish and Game (ADF&G), but also with National Marine Fisheries Service (NMFS) and other agencies on a pre deployment fish study plan. The pre deployment plan was approved by ADF&G and will be implemented beginning July 1, 2011.

- FERC Final License Application submitted by December 31, 2011:

  ORPC met with Golden Valley Electric Association (GVEA) on April 21, 2011 to discuss interconnect options and potential partnership on the Nenana RivGen™ Project. ORPC has continued to discuss the Nenana RivGen™ licensing pathway internally and will meet with GVEA in late June to define the ORPC/GVEA relationship and the permitting/licensing process.

- RivGen™ turbine generator unit (TGU) built and tested at Eastport, Maine test site:

  RivGen™ generator is under final design.

- Final Report on Nenana site characterization work and foundation system and debris diversion system performance:

  No work to report. Although there will be no debris diversion system tested, a report on the debris detection system will be written by AHERC.

- Final performance report on RivGen™ TGU test in Maine submitted to Alaska Center for Energy and Power (ACEP):

  No work to report

- A revised Scope of Work will be submitted in June 2011 (see Attachment A).

TimeLine

- AHERC foundation and debris diversion literature surveys, data collection and final reports completed December 31, 2010 (now anticipated December 31, 2011):

Foundation Study Timeline

November 2010 - December 2011	The foundation study has been removed from the AHERC scope of work due to the loss of key faculty performing the work. It will no longer be performed as part of this project.

Debris Study Timeline

November 2010 - December 2010	Review literature and existing debris mitigation technology and engineering.
December 2010 - January 2011	Provide results from literature review to ORPC about existing debris mitigation methods to help their design of a preliminary mitigation system. Provide preliminary concept designs for debris detection grate system.
November 2010 - April 2011	Design methods and equipment to measure debris statistics in conjunction with the foundation design study.
January 2011 - June 2011	Consult with ORPC on debris detection system during construction and installation.

August 2011 - September 2011	Measure debris statistics data from the debris detection system and other available instruments.
October 2011 - December 2011	Analyze data from the measurement program and approach, and provide data to ORPC for their debris mitigation system design for their 2012 demonstration. Prepare and deliver final reports.

- ORPC environmental and site characterization data collection for project design and FERC draft license application performed by October 1, 2010:

October 10, 2010	TerraSond geophysical field work completed.
January 6, 2011	Final report on geophysical work submitted to ORPC.

- Prototype bottom support frame and debris diversion system fabricated, deployed, tested and retrieved at Nenana site, July – September 2011:

March 1, 2011	PND Engineers, Inc. (PND) selected to design bottom support frame
May 1, 2011	Conceptual design selected
June 7, 2011	Design drawings completed for review
June 13, 2011	Permits for bottom support frame (BSF) testing submitted to Alaska Department of Natural Resources (ADNR), United States Army Corps of Engineers (USACE), and ADF&G
August 1, 2011	Bottom Support Frame and anchoring system assembly completed
August 15- Oct 1 2011	Bottom Support Frame tested and retrieved

- Additional field work required for FERC final pilot license application completed by October 31, 2011:

March 31, 2011	Meeting with Agencies in to scope fish studies for project
June 7, 2011	Fish Study plan finalized between ORPC and UAF
July 1 – Sept 1 2011	Fish Study performed

- TGU fabricated and tested at Eastport Maine Test site

Dec 31, 2011	TGU Fabrication complete

- FERC final pilot license application submitted

Jan 31, 2012	All permit and license applications completed

- RivGen™ TGU built and tested at Eastport Maine test site

March 31, 2012	Eastport testing complete

- Final Report on Nenana site characterization work and bottom support frame and anchoring system and debris detection system performance submitted to ACEP

January 31, 2012 Final Report submitted

- Final performance report on RivGen™ TGU test in Maine submitted to ACEP

April 31, 2012 Final report submitted

3. Narrative Summary

RivGen™ Bottom Support Frame and Debris Detection System

On March 1, 2011 ORPC selected PND and a contract was execute to perform the BSF design. Beginning in March 2011 ORPC began conversations with Marsh Creek as the potential lead contractor on the BSF fabrication, assembly, operation, testing, and decommissioning. A contract with Marsh Creek to perform this work was signed on June 3, 2011.

During April 2011 PND and ORPC worked through preliminary design concepts ranging from piling based concepts to an anchor and bottom support frame system. Marsh Creek joined in the preliminary design process on April 26. On May 11, 2011 a conceptual design was selected with consensus from all parties based on the BSF and anchor concept (see figure 1). A formal requirements document was submitted to PND on May 29, 2011. By June 7, PND had final review drawings out, and details of the design were refined through several meetings, the last on June 13, 2011 which included Marsh Creek, ORPC and PND. This design will allow for the testing of several methods of deployment and retrieval including testing components that would be critical to a piling based system to determine the viability of pilings for future deployments as well.

On June 8th ORPC and Marsh Creek employees travelled to Nenana to meet with local barge companies to discuss the project plans to be sure that there were no navigational or operational concerns with ORPC's deployment plans this season (see figure 2 for deployment area location) and to scope out contractors for barge and marine service support for the Project. This included meetings with Inland Barge, Crowley, and Ruby Marine. Based on this visit and work sourcing materials and construction cost estimates Marsh Creek is currently performing a cost estimate for the fabrication and testing of the BSF and anchor system.

Beginning in May 2011 the instrumentation package for data collection during the testing of the BSF and the debris detection system were being scoped at ORPC and AHERC respectively. Final decisions on the BSF instrumentation were made on June 3, 2011, and for the debris detection system on June 8, 2011. The components for this data acquisition are currently being ordered.

By June 13, 2011 all of the relevant permits for ORPC's BSF testing were submitted to agencies including submissions to ADF&G on June 6, ADNR on June 9 and USACE on June 13th. Permits for the fish study work to be completed by UAF were also submitted by UAF during this time.

Based on estimates for fabrication, assembly, transport, and mobilization for field work a target date of Aug 7, 2011 has been selected for the deployment of the prototype BSF and anchoring system, while this is later than the initial target date it will allow for the full 30 days of testing prior to removal by the end of October 2011.

AHERC Debris Detection and Fish Study

AHERC has been working with Jon Holmgren of Jon's Machine Shop on the Debris Detection System design. Following a completed design, ORPC contracted Jon's Machine Shop to build a prototype "tine" of the Debris Detection System(See Figure 2); the eventual system would consist of several of these tines. The prototype did not function as designed, so a second prototype is in the design process and will be fabricated to address the initial design issues. AHERC researched the required instrumentation for data collection from the Debris Detection System and submitted preliminary quotes to ORPC. A quote for the construction of a second tine is in the works, and ORPC will then be prepared to make a decision on how many tines and the associated instrumentation can be ordered within budget for the project.

Professor Andy Seitz of UAF fisheries working with AHERC has designed a pre deployment fish study, and a target start date of July 1, 2011 has been set for the study. AHERC has applied for the permits for the mooring of a fish study barge, and the ultimate start date will be dictated most likely by the timing for the acquisition of these permits, and the completion of contractual documents with UAF. Equipment for the study, including nets anchoring gear and the lease of a fish study barge, have begun to be ordered for the study.

RivGen™ TGU

Design of the RivGen™ TGU continues for testing in Eastport, Maine.

4. Before and After Pictures

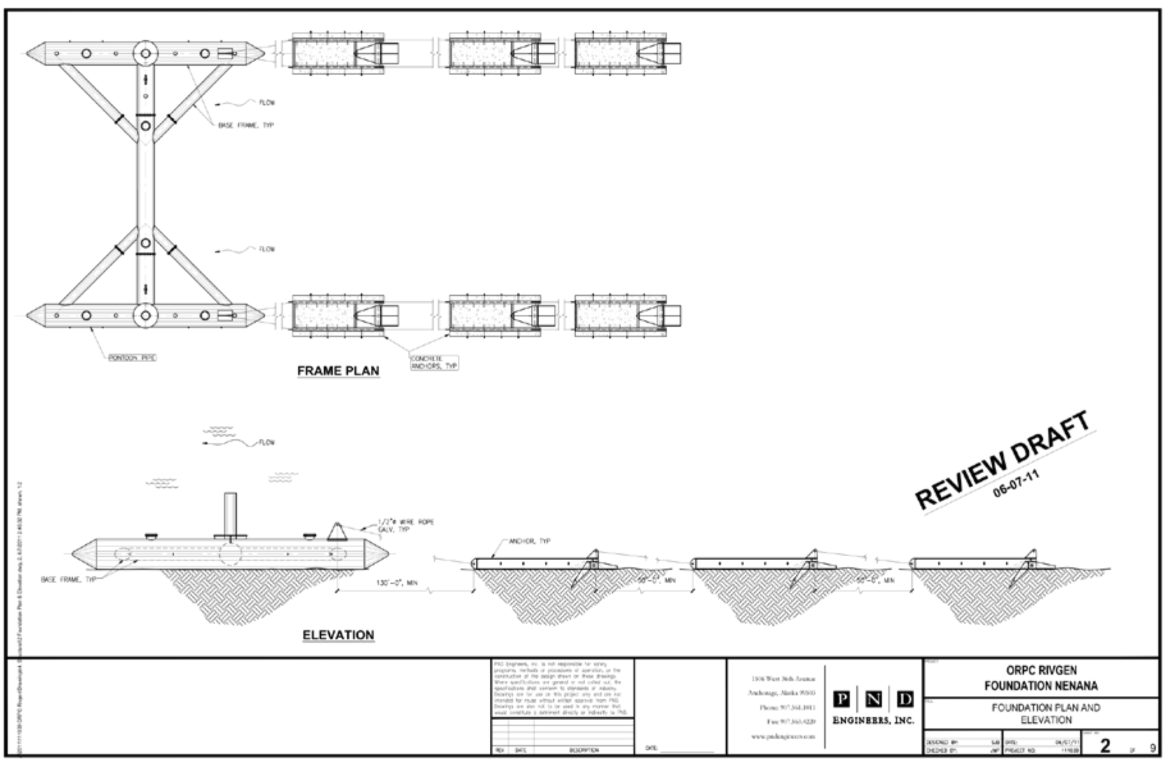

Figure 1. Design Review drawing of bottom support frame and anchoring system

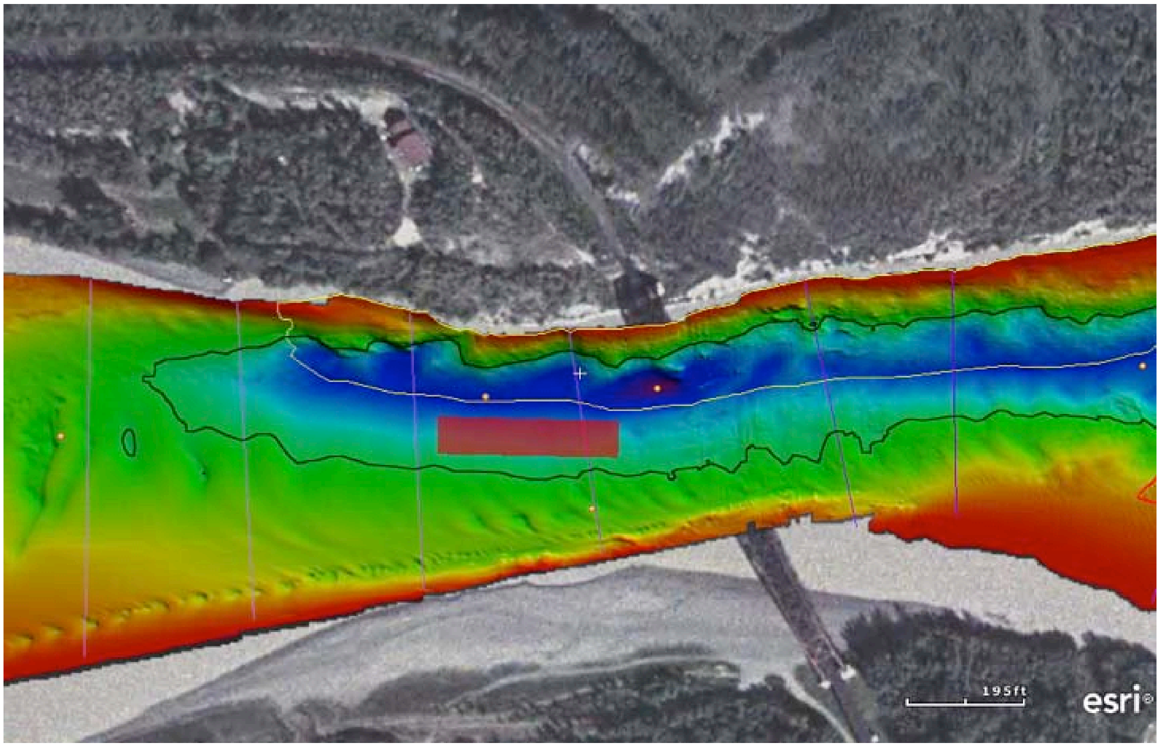

Figure 2: Deployment area for anchors and BSF in red box. Nenana railroad bridge is evident. Colors indicate water depth and riverbed surface features.

Figure 3. Prototype Debris Detection System tine

Total Project Expenditures for the Project as of the end of the Reporting Period

Total Project expenditures as of the end of 2Q2011 include the following:

Denali Funds

1.	Site Characterization Consultant (TerraSond):	$80,000 (invoiced UAF and received reimbursement/grant funds)
2.	Foundation Design, BSF (PND Engineers):	$14,000 (have not yet invoiced UAF)

ORPC Alaska Share

1.	ORPC personnel time:	$23,606.73
2.	RivGen™ Generator and Electronics Design (CPI):	$124,646.64

3. Instrumentation Consultant (R. M. Beaumont Corp): $1,332.00
4. Structural Engineer (R. M. Beaumont Corp): $1,123.00
5. GIS Consultant(s) (SGC, TerraSond): $3,455.00

Modified Budget

Based on the more accurate quotes received for the project over the past months, and the inclusion of new and necessary line items for project completion, as well as the omission of debris diversion system construction several changes to the original project budget have been made. This new budget and the revised scope of the project will be submitted in June 2011.

ATTACHMENT A

NENANA RIVGEN™ POWER PROJECT PHASE 1: Q3 2010 – Q1 2012

This document describes recent revisions to the scope of work and schedule for the Nenana RivGen™ Power Project Phase 1 (Project), which is funded in part by an Emerging Energy Technology Grant (EETG) awarded to ORPC by the Denali Commission and administered by the Alaska Center for Energy and Power (ACEP). ORPC is requesting changes to the Project Work Plan section of the Professional Service Contract with University of Alaska Fairbanks (UAF), dated 08/20/10 (see suggested eits to the work plan) and awaits ACEP for final revisions to the contract.

The previously approved Project's scope of work included the following:

- ORPC's environmental and site characterization data collection for project design and Project Licensing/Permitting completed
- Prototype bottom support frame and debris diversion system fabricated, deployed, tested, and retrieved at Nenana site
- Project permitting and licensing applications submitted
- RivGen™ turbine generator unit (TGU) built and tested at Eastport, Maine
- AHERC debris diversion literature surveys, data collection and final reports completed
- Final report on Nenana site characterization work and bottom support frame and debris diversion system performance completed
- Final performance report on RivGen™ TGU test in Maine completed

ORPC will complete all of this work as planned with three primary revisions:

- It was originally anticipated that data from AHERC's debris study would be available in 2011 to inform the design of the debris diversion system. Due to Project delays no data was collected in 2010, so the debris diversion system will not be built in 2011. Instead, a debris detection system will be designed, built and operated to provide the data on debris to inform design parameters for a debris diversion system, which will be built and installed as needed based on this debris data in 2012, prior to turbine installation.
- The testing schedule of the RivGen™ TGU in Eastport, Maine has changed. As it is unlikely to test during December 2011 according to the current schedule, testing will be done in the 1st Quarter 2012. Exact dates are TBD based on when the RivGen™ TGU fabrication and attachment to the *Energy Tide 2* research vessel is complete. An updated test schedule will be provided by October 2011 with advance notice to ACEP personnel to allow observation of the RivGen™ TGU testing in Maine.
- ORPC is reallocating a portion of the Denali Commission funding to support a pre-deployment fish study by AHERC from July - September 2011 at the Nenana site. This will be critical to permitting the RivGen™ Power System installation in 2012.

The revised Project will unfold as follows:

- In August 2010**,** ORPC completed data collection for choosing optimal locations for RivGen™ TGU deployments based on bathymetry and current velocity measurements. ORPC also completed data collection at sites of interest to quantify the river bed substrate for the completion of bottom support frame design.

- Any additional field work required for the Project's implementation and permitting will be completed in the second and third quarters 2011. This additional work will be scoped as required by project engineering and resource agency consultations. This will include pre-deployment fish studies, which will be completed by UAF fisheries personnel under AHERC's work at the Nenana site from July – September 2011.

- ORPC will oversee design and fabrication of a bottom support frame for the Nenana site, which will be ready for deployment and testing by August 2011. Concurrently AHERC will provide ORPC with a final design and parts list for a debris detection system in time to fabricate it and integrate it with the bottom support frame prior to deployment. The testing of the bottom support frame will verify the efficacy of deployment and retrieval procedures, as well as its persistence in maintaining location in the Tanana River.

- AHERC will oversee data collection from the debris detection system to quantify debris loads in the water column used by the RivGen™ TGUs.

- ORPC will complete the fabrication of the RivGen™ TGU including the turbines, TGU chasis, and generator. This system will be tested aboard ORPC's state-of-the-art *Energy Tide2* research vessel in Cobscook Bay, Maine, to verify that the TGU meets power output and performance specifications prior to its shipment to Alaska. This testing will be completed in the first quarter 2012.

- AHERC completed its literature survey on the state-of-the-art debris diversion systems on April 14, 2011 and submitted it to ORPC. AHERC will also compile a report on the 2011 debris detection system testing and data collection. These reports will help to inform the design of a debris diversion system if one is deemed necessary from the 2011 debris detection system data collected.

- By January 31, 2012 ORPC will submit a report on the performance of bottom support frame and debris data collection to ACEP for inclusion in their final report on the Project.

- By April 31, 2012 ORPC will submit a final performance report on the RivGen™ TGU test in Maine.