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September 11, 2012

Ms. Kimberly Bose  
Secretary  
Federal Energy Regulatory Commission  
888 First Street, N.E.  
Washington, DC 20426

Re: Sanford Project No. 2785

**Application for Non-Capacity Amendment**

Dear Secretary Bose:

Please find attached the application of Boyce Hydropower, LLC (“Boyce”), licensee for the referenced project, for a non-capacity related amendment to the project. The proposed amendment involves the replacement of an existing turbine with a new, more efficient turbine that will enable Boyce to meet the minimum flow requirements of the license with same hydraulic throughput, but generate more electricity for sale. In order to take advantage of the investment tax credit provisions of the American Reconstruction and Recovery Act, it is necessary for the new equipment to be placed into service by December 31, 2013, and the new turbine has a substantial manufacture and delivery timeframe. For that reason, Boyce requests that the Commission give expedited consideration to this application.

Finally, the application includes in Attachment 1 Exhibit F project design drawings. Because those are Critical Energy Infrastructure Information, Attachment 1 will be filed separately as non-public information.

If you have any questions or concerns, please contact Mr. Lee Mueller at 989-689-3161.

Sincerely,

John H. Clements  
Counsel to Boyce Hydro Power LLC

Attachments (public)  
Cc: Lee Mueller

# *BOYCE HYDRO POWER LLC*

A W.D. Boyce Trusts Legacy Enterprise

Lee W. Mueller & Stephen B. Hultberg, Co-Member Managers  
6000 S. M-30 (PO Box 15)  
Edenville, MI 48620  
*Tel: (989) 689-3161 Fax: (989) 689-3155*

6 September, 2012

Kimberly D. Bose, Secretary  
Federal Energy Regulatory Commission  
888 First Street, NE  
Washington, DC 20426

RE: P-2785  
Request for Non Capacity Amendment  
Sanford Water Power Project  
Boyce Hydro Power, LLC

Secretary Bose:

Please accept the following as Boyce Hydro Power, LLC's request for approval of a non-capacity upgrade license amendment to P-2785, Sanford Water Power Project, Sanford, Michigan.

## **(A) INITIAL STATEMENT**

Before the Federal Energy Regulatory Commission Application for License Non Capacity Upgrade

### **(1) Boyce Hydro Power, LLC as Applicant**

**(2)** Boyce Hydro Power, LLC  
6000 M-30  
Edenville, MI 48620 (989) 689-3161

### **(3) Citizenship**

The Applicant is a domestic corporation of the United States, and is the licensee for the water power project designated as Project No. 2785 in the records of the FERC, issued on 1 December, 1987 (41 FERC ¶ 62,192), as amended on 16 October, 1998 (85 FERC ¶ 61,9066. The license was transferred to the current licensee in June 2004. Notice of the change of the licensee's name to Boyce Hydro Power, LLC, was filed with the Commission on 12 July, 2007.

### **(4) Requested License Change**

The proposed changes to the license and the reasons why the proposed changes are necessary are stated below:

Boyce Hydro Power, LLC herein proposes to upgrade the existing Sanford Hydroelectric Station which is currently licensed to include 3 propeller vertical turbine generator units rated at 1.1 megawatts each, for a total station capacity of 3.3 MW. As designed, the hydraulic capacity of each machine is 720 cfs. A total licensed flow of 2160 cfs.

Boyce Hydro Power, LCC is requesting FERC approval to replace its existing unit #3 with a new vertical Kaplan turbine generator which is designed to have an operating range sufficient to generate the existing

licensed minimum flow. The requirement for minimum flow discharge was established by the Commission's order issued 16 October, 1998 (Ordering Paragraph (D)). Article 401 requires a minimum flow of 210 cfs for all hours of the year except for the walleye spawning period of 15 March – 30 April, during which a minimum flow of 650 cfs is required. The 16 October, 1998, order discussed installation of a low-flow turbine as one means of passing the minimum flow and required submission of a plan to pass the minimum flow release. However, the then-Licensee was not able to economically install a minimum flow turbine expressly to generate the lost energy from the minimum flow order, and the approved minimum flow release plan (107 FERC ¶ 62,266 (2004)) is based on the turbines installed when the license was issued. Boyce Hydro Power, LLC's herein-proposed design will allow the new replacement unit to generate at the minimum flow value of 210 cfs, and at the same time will avoid the very expensive rehabilitation cost necessary to restore the existing 1923 Allis Chalmers turbine generator to OEM specifications. Because the new turbine is guaranteed to provide power at approximately 85% combined efficiency (water to wire), the replacement of the existing 69% efficient turbine generator set will provide both minimum flow generation and more electrical generation with the same station maximum rated hydraulic capacity (720 cfs x 3 =2160 cfs, the new replacement machine is designed to utilize the same flow of 720 cfs as the existing unit it replaces).

#### **(5) State Law Requirements**

(i) The Statutory or regulatory requirements of the state in which the project is located that affect the project as proposed with respect to bed and banks and to the appropriation, diversion and use of water for power purposes: The requirement to obtain a water quality certification or waiver is found in section 401(a) of the Clean Water Act, which provides that "[a]ny applicant for a federal license or permit to conduct any activity...which may result in any discharge into the navigable waters," shall provide the permitting agency with a certification from the applicable state.

As stated above, there is no increase in hydraulic capacity from the proposed turbine upgrade. The turbine upgrade will be in the efficiency of the use of the current water flow and therefore there will be no increase in hydraulic capacity. The water will enter the replacement turbine at the same location as the existing turbine, and will discharge in the same location as the present design.

(ii) The steps which the Applicant has taken or plans to take to comply with the law as cited above are: As discussed above, Boyce Hydro Power, LLC believes an application for water quality certification or waiver thereof is not required.

#### **(C) REQUIRED EXHIBITS FOR NON-CAPACITY RELATED AMENDMENTS**

The revised station capacity will increase the existing station total of 3.3 MW by 300 KW, for a total station capacity of 3.6 MW. The proposed increase also does not exceed increase limit of 2.0 MW imposed by this section. The proposed design increases the electric capacity of the station by 9%. The existing design hydraulic capacity does not increase and does not exceed the threshold of 15% increase. Therefore, this is a non-capacity related amendment, as defined at 18 CFR § 4.201(b). A non-capacity related amendment application must contain "those exhibits that require revision in light of the nature of the proposed amendments." 18 CFR § 4.201(c).

All exhibits for the project remain the same except those which deal with plan and section of the Sanford powerhouse. Revised Exhibit F drawings associated with the proposed upgrade are attached.

#### **(D) CONSULTATION AND WAIVER**

The three-stage consultation requirements of 18 CFR § 4.38 do not apply to this amendment

application. See 18 CFR § 4.38(a)(6)(v). Therefore, Boyce Hydro Power, LLC is required to consult with resource agencies, Indian tribes, and members of the public “to the extent that the proposed amendment would affect” their interests. 18 CFR § 4.38(a)(7). Boyce Hydro Power, LLC, believes that as a result of the zero increase in the station hydraulic capacity and continued adherence to the existing minimum flow requirements will result in no change in water quality or effects to fish and wildlife, recreation, or cultural resources. Therefore, Boyce Hydro Power, LLC, believes that no other entity’s interests are affected by the proposed change and that the Commission’s public notice of the application will provide sufficient opportunity for review and comment.

Sincerely,

A handwritten signature in black ink that reads "Lee W. Mueller". The signature is written in a cursive style and is underlined with a solid black line.

Lee W. Mueller  
Architect and Co Member Manager  
Boyce Hydro Power, LLC

Attachments

1. Exhibit F proposed revisions (Drawings 1.0.00, 1.2.00, 1.3.00, & 1.4.00)
2. Table of Original installed turbine generators Sanford Project
3. Specification for proposed replacement Kaplan T/G

**Attachment 2**

**Sanford Project No. 2785**

**Table of Original Installed Turbine Generators**

HOLLAND, ACKERMAN & HOLLAND  
CONSULTING ENGINEERS

7 E. LIBERTY ST.  
ANN ARBOR, MICH.

20 N. WACKER DRIVE  
CHICAGO, ILL.

WOLVERINE POWER CORPORATION

GENERAL DATA ON PLANTS

SANFORD PLANT:

<del>NORMAL</del> HEAD WATER	625.0
Drainage Area	1020 sq. mi.
Pond Area at El. 625.0	<del>1526</del> <del>2115</del> acres
Top of Embankment	El. 631.0
Top of Raking Platform	" 631.0
Top of Generator Floor	" 632.0
Top of Radial Gates	" 626.5
Top of Concrete Crest of Spillway	" 616.5
Number of Spillway Bays	6
Width of Bay #1 (South end)	25'-4-1/4"
Width of Bays #2 to #5 Incl.	22'-0"
Width of Bay #6 (North end)	25'-4-1/4"
Elevation of Wheelpit Floor	El. 605.0
Elevation of Draft Pit Floor	" 586.5
Elevation of Normal Tailwater	" 599.0
Width of Wheelpit	21'-0"

*Power house size* — 25' x 71'

3 - 76" Type NX Allis Chalmers  
Turbines - 1800 HP. at 28' head, 225 RPM.  
Open Wheelpit - Steel Draft Tube, bell shape  
(Vertical) (Q = 720 CFS. per unit)

3 - 1375 KVA. Allis Chalmers Generators  
2300 V. 3 ph. 60 cycle - 225 RPM.  
with direct connected 26 KW. 125 V.  
exciters.

Wolverine Power Corporation Substation

3 - 1500 KVA. single phase - 60 cycle - 2300/37500  
volt transformers.

Transferred  
to Consumers  
Power

**Attachment 3**

**Sanford Project No. 2785  
Specifications for Proposed Replacement Turbine**



**MAVEL Americas, Inc.**

**Equipment Proposal**

**Sanford Hydroelectric Project  
Tittabawassee River, Michigan**

**Project No. 0-23452**

**Rev. D: Updated Pricing – with gearbox**



# 1. CUSTOMER

**Owner:**

Boyce Hydro Power, LLC  
6000 S. M-30  
Edenville, Michigan 48620  
Tel: (989) 689-3161 Fax: (989) 6893155  
[lwmueller@boycehydrollc.com](mailto:lwmueller@boycehydrollc.com)

**Consulting Engineer**

Stephen Doret  
Mill Road Engineering  
[Sdcmillroadengineering@verizon.net](mailto:Sdcmillroadengineering@verizon.net)

# 2. PROPOSAL REQUEST

Mavel, a.s. (“Mavel“ or “Supplier“) received a request from the Project Engineer Stephen Doret, on behalf of the Owner the W.D. Boyce Trusts (together, the “Customer“), for a revised proposal to provide equipment for the Sanford hydroelectric power plant (“Sanford HPP“) on the Tittabawassee River in Michigan. This request for a revised proposal was based on a meeting in early November in the Czech Republic and later meetings at the project site in December and January.

The plant currently has three 1.1 MW Allis Chalmers turbines. The Customer has noted that due to a relicensing in 1998 a minimum flow value of 210 cfs is required at the power plant. Therefore, they intend to replace the least efficient machine in the powerhouse with a Kaplan turbine and also update the switch gear and controls for the other two units. The Customer noted that due to the conditions at the site, the replacement unit should call for minimal or no excavation.

In an October 2011 request for an updated proposal, the Customer provided revised site parameters. The original March 2009 and new site parameters are indicated below:

Customer Provided Site Parameters	October 2011	March 2009
<b>Flow</b>	720 cfs	548 cfs
<b>Head</b>	28 ft	27 ft
<b>Customer’s Estimate of Installed Power</b>	1400 kW	1100 kW

Mavel supplied its first proposal for the project in March 2009. This was updated in October 2011.

Mavel’s October 2011 update recommended the use of the KVK1900K4 turbine This solution was discussed at a meeting in the Czech Republic at the beginning of November. As this solution called for some excavation, it was agreed that Mavel would endeavor to find a solution that would not require any excavation.

This compromise solution provides for the installation of Mavel one vertical Kaplan turbine KVK2240K5 with parallel gearbox and high speed vertical generator, which was presented December 20<sup>th</sup>, 2011. This proposal improved the proposed solution to minimize project civil cost.

### 3. PROPOSAL SUMMARY

Mavel recommends the replacement of one of the Allis-Chalmers unit with a vertical Kaplan turbine type **MAVEL KVK2240K5**. This turbine has runner diameter of 2240 mm and five runner blades. The turbine is connected to the turbine to a higher speed generator by utilizing a parallel gearbox. Total installed power is 1450 kW (includes gearbox and generator losses). The delivery time is 12 months.

Utilizing the documentation of the existing power plant received from the Customer, the installation of the recommended turbine would require no excavation and minimal demolition. The turbine will be set in the existing open flume. The steel water tight vertical cylinder will be around the turbine shaft to protect gearbox and other unit instruments against the water. A vertical generator will be located at elevation of existing power plant floor on the steel frame embedded to existing floor. In addition, it will be necessary to construct a draft tube diffuser downstream of the power plant.

Installation of the turbine to the open flume reduced turbine efficiency compared to a solution with a turbine installed in semi-spiral scroll case as presented in the previous solution. To improve turbine efficiency as much as possible, Mavel recommends that the turbine in the open flume be offset from the existing turbine centerline. Also, it is recommended that the wall of existing flume in the area of the turbine distributor will be slightly modified to create a scroll case shape as shown on attached drawing.

### 4. DESCRIPTION OF EQUIPMENT

#### 4.1 Turbine

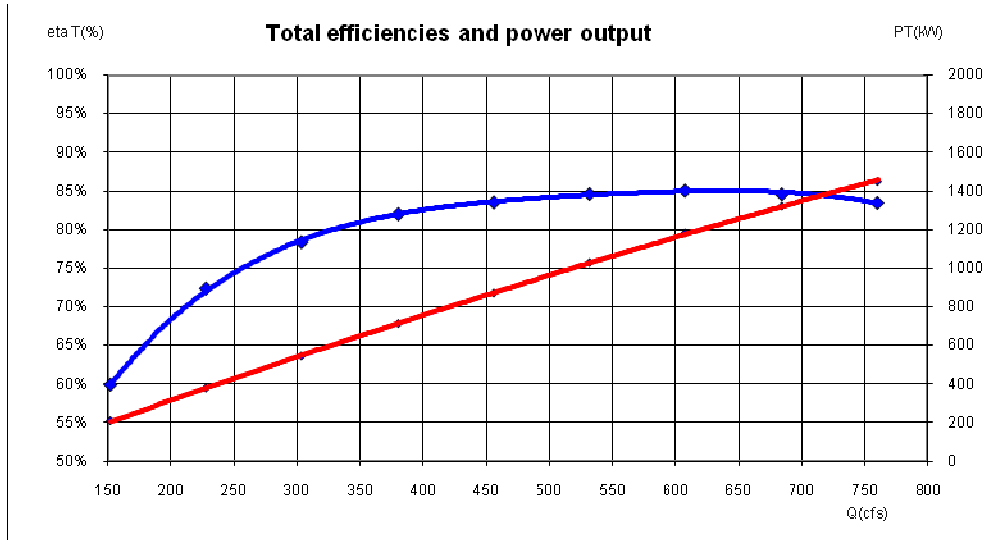
The recommended **MAVEL KVK2240K5 turbine** set would include the following:

- transmitters of guide vane position
- complete set of sensors
- hydraulic pressure unit
- parallel gearbox
- steel vertical water tight cylinder
- gearbox support
- steel generator frame
- cooling and lubricating unit
- part of draft tube made of steel
- technical documentation

#### Parameters

Number of units	1
<b>Net head</b>	<b>28 ft</b>
Water flow	720 cfs
Unit output power	1400 kW
Suction head	+ 5.5 m
Runner diameter	2240 mm
Turbine speed	163.3 rpm

**Turbine/Gearbox/Generator Efficiencies & Power Outputs at Net Head Hn = 28 feet**



**Generator**

**Generator Parameters**

Number of units	1
Type of Generator	Synchronous
Generator Rating	1611 kVA
Power Factor	0.9
Voltage	3 phase 4160 V
Frequency	60 Hz
Speed	720 rpm