DE 12-278

STATE OF NEW HAMPSHIRE

Intra-Department Communication

DATE: February 3, 2015
AT (OFFICE): NHPUC

FROM: Barbara Bernstein, Sustainable Energy Analyst NHPUC 3FEB'15PM4:32

SUBJECT: DE 12-278, Application of Hopkinton Hydro Project for Certification as a New Hampshire Class I Renewable Energy Source

TO: Chairman Martin P. Honigberg
Commissioner Robert R. Scott
Debra A. Howland, Executive Director and Secretary

cc: David K. Wiesner, Staff Attorney DKW

Summary

Commission Staff recommends denial without prejudice of the request by Contoocook Hydro, LLC (Contoocook Hydro) for Class I renewable energy certificate (REC) eligibility for the increased incremental electric generation output of the 0.25 megawatt (MW) Hopkinton Hydro Project (Hopkinton Hydro). Contoocook Hydro requests Class I REC eligibility based on the increase in average annual production of the Hopkinton Hydro facility from approximately 780 MWh to approximately 1,120 MWh. The relevant statute, RSA 362-F:4, I (i) sets forth very specific criteria for approval that must be demonstrated by the applicant. Under N.H. Code Admin. Rules Puc 2505.01(b), the applicant has the burden of demonstrating eligibility to be issued new RECs. Based on Staff's review and analysis of the application and supplemental information submitted by or on behalf of Contoocook Hydro, the applicant has failed to meet this burden. Staff also recommends that confidential treatment be granted for the documents and information submitted by the applicant in non-public unredacted versions.

Standard for Eligibility

Under RSA 362-F:4, I (i), Class I REC production includes the "incremental new production of electricity in any year from … any hydroelectric generating facility … over its historical generation baseline, provided the commission certifies demonstrable completion of **capital investments attributable to the efficiency improvements, additions of capacity, or increased renewable energy output that are sufficient to, were intended to, and can be demonstrated to increase annual renewable electricity output**. The determination of incremental production shall not be based on any operational changes at such facility but rather on **capital investments in efficiency improvements or additions of capacity**." (emphasis supplied). The term "historical generation baseline" is defined as "the average annual production of a hydroelectric facility from the later of January 1, 1986 or the date of

first commercial operation through December 31, 2005," under RSA 362-F:2, X (b).[1] The Commission's rules also address certification of incremental new electricity production. *See* N.H. Code Admin. Rules Puc 2505.05.

In order to be eligible to produce Class I RECs based on incremental electricity output above its 20-year historical generation baseline level, a hydroelectric facility therefore must demonstrate the following:

> (1) *capital investments* have been made in or to the facility;
> (2) the capital investments *are attributable to* efficiency improvements, capacity additions, or increased renewable energy output;
> (3) the investments *are sufficient to* increase annual renewable electricity output;
> (4) the investments *were intended to* increase annual renewable electricity output;
> (5) the investments *can be demonstrated to* increase annual renewable electricity output; and
> (6) the increase in annual renewable electricity output is *not due to operational changes* at the facility, but rather to *capital investments in efficiency improvements or additions of capacity.*

Application Review and Analysis

In connection with its application, Contoocook Hydro provided tables summarizing more than 70 separate improvements made to the Hopkinton Hydro facility between 2008 and 2012, and asserted that every one of these improvements represents an "efficiency improvement" that meets the eligibility standard criteria described above. The public redacted version of the applicant's tables listing and describing these improvements is attached to this memo as Appendix I. Staff believes that the number, nature, and variety of the claimed improvements far exceed that included in any prior application for Class I incremental hydroelectric output eligibility approved or even considered by the Commission. The applicant, through its consultant, submitted additional information on a number of occasions at Staff's request. The applicant's most recent submission was filed on January 14, 2015. Notably, however, neither the applicant nor its consultant provided a good faith estimate of the quantity of increased electricity production attributable to each listed improvement (either in kWh or on a percentage basis), despite Staff's repeated requests for this information over a period of many months. The applicant's consultant indicated it is not possible to provide such estimates, given the number and scope of the many improvements to the facility.

Staff believes that, in the absence of such information regarding the causal effects of listed improvements on the increased electricity output generated at the facility, it is not

[1] If the hydroelectric facility experienced an upgrade or expansion during the historical generation baseline period, then the actual generation for that entire period shall be adjusted to estimate the average annual production that would have occurred had the upgrade or expansion been in effect during the entire historical generation baseline period. RSA 362-F:2, X (b).

possible to determine the consequences if any one or more of the specified improvements is found to be ineligible based on the statutory criteria. This effectively leaves the Commission in a position where the application must be evaluated on an "all or nothing" basis, such that, if listed improvements are determined to be ineligible for incremental Class I treatment under RSA 362-F:4, I (i), then the application must be denied in its entirety.

Based on a thorough review of the applicant's list of nearly 70 claimed efficiency improvements to the Hopkinton Hydro project, Staff has concluded that a significant number of the listed improvements likely do not meet the relevant statutory standard. Table 1 prepared by Staff and attached hereto describes a sample set of these improvements that Staff believes potentially *would* meet the Class I REC eligibility criteria summarized above. Table 2 prepared by Staff and attached hereto describes a sample set of these improvements that Staff believes likely would *not* meet the Class I REC eligibility criteria summarized above.

Staff acknowledges these improvements may have been necessary to restore or preserve the ability of the Hopkinton Hydro facility to function. They may have represented necessary facility maintenance or repairs or beneficial modifications to the facility's operations. They undoubtedly represent a significant level of financial and managerial commitment on behalf of the project owner. It is unclear, however, whether these and other similar improvements listed by the applicant are "capital investments attributable to the efficiency improvements, additions of capacity, or increased renewable energy output that are sufficient to, were intended to, and can be demonstrated to increase annual renewable electricity output," as required for Class I REC eligibility under RSA 362-F:4, I (i).

Staff believes that a substantial number of the improvements listed by the applicant have not been demonstrated to meet the relevant statutory standard. Given that the applicant has the burden to support such a determination, and that the applicant has provided no basis for any determination of partial eligibility credit, Staff believes there is no alternative but to deny the application in its entirety. Staff therefore recommends that the Commission deny the Contoocook Hydro Class I REC eligibility application without prejudice.

Confidential Treatment of Submitted Documentation

The applicant submitted numerous documents, tables, schedules, data, and related information in non-public versions under requests for confidential treatment. Some of the information contained in these materials was and is publicly available on the web sites of other state regulatory agencies that have considered similar filings made by the applicant. Following a series of communications with Staff, the applicant has filed revised public versions of a number of these documents, tables, schedules, data, and related information.

As a result of these more recent filings, there are currently pending requests for confidential treatment only for four categories of information submitted by the applicant: (1) specific cost information related to the improvements made by the project owner, (2) copies of documents filed as non-public and subject to protective order with the Maine Public

Utilities Commission and/or the Rhode Island Public Utilities Commission, (3) copies of Federal Energy Regulatory Commission dam safety letters which represent "Critical Energy Infrastructure Information" under federal law and regulations, and (4) two descriptive words contained in a document identifying the four improvements that have had the greatest impact on increased electricity output from the facility.

Staff believes these four categories of submitted information warrant confidential treatment and Staff recommends that the Commission grant such treatment.

Table 1. Sample of Listed Improvements Potentially Eligible

Year	Description of Improvement	Description of Benefit
2008	Dam Improvements	Refurbished left side of dam to reduce leakage and increase structural stability of dam.
2008	Leaf Boom	Minimized debris on rack; allowed for increased production and reduced need for manual maintenance.
2008	Exhaust Fans	Cools generators to prevent overheating and subsequent shutdown of powerhouse.
2009	Modified Gates for Single Gate Operation	Reconfigured gate operation by installing new controls, increasing production particularly during low flows.
2010	Replaced Hydraulic Lines to Gates.	Enables gates to operate at higher head and colder temperatures.

Table 2. Sample of Listed Improvements Unlikely to be Eligible		
Year	Description of Improvement	Description of Benefit
2008	Rewound burned out coil	Safety air valve is required equipment for plant operations.
2008	Installed new tachometer	Continual failure of tachometer would shut plant down and reduce production. Replaced motor to keep plant on line and running. Dramatic increase in production, as this was a common failure. Plant used to stock broken spare parts. Production is increased by keeping stock of working critical spare parts on hand.
2008	Installed new Basler 3-P digital relay	Required upgrade by PSNH to maintain plant on line. Old relay deemed obsolete by utility, extended life of facility by protecting plant during grid instability.
2009	Ordered new separator filter for IR compressor	Keeps air compressor running which is intregral part of keeping trash racks clean and maintaining production.
2009	Posted new dam danger signs.	Brought facility into minimum compliance with FERC dam safety requirements.
2009	Ordered spare time delay 250 amp fuses	Keeps spare parts on shelf for immediate repair to enable plant to be on line quickly when fault occurs.
2009	Installed new smoke detector and hooked up to unit 3 of sensaphone	Installation of new smoke detection system for early warning of any conditions that produce smoke in powerhouse. Attached to powerhouse alarm system that notifies operator of problem.
2009	Replaced rotten beams in forebay in front of gates	Improved safety for operators and safety of other personnel, reducing risk of injury to personnel and equipment
2009	Installed new floating bobble line for boat barrier at dam	Upgrade existing system to replace inefficient system, reducing labor costs and increasing safety. Upgraded to minimum conditions of FERC license.
2010	Installed new starter on HPU motor	Installed to prevent failure. Maintains operations of gates that are critical component to safe and productive operation of plant. Without replacement of main hydraulic unit failure could have limited future operation
2010	Installed lightning arrestors	Installation of lightning surge arrestors on main switchgear. Adds protection to the main power source of the plant.
2011	Tested gearbox through Signum for synthetic oil	Adopted new oil test program to reduce overhead costs and pre- mature oil replacement and to monitor the condition of gearbox and HPU. (New maintenance protocol)
2011	Installed new metal roof	Old roof had reached end of previous useful life.
2011	Replaced batteries and maintainer ; spare inverter to keep backup of critical component available	Enabled plant to be safely shut down when grid power was down. This is a required emergency backup system. Without replacement of batteries and maintenance system facility cannot experience a controlled shutdown of the turbines during a loss of power.
2012	Replaced bearing cover	During annual inspection bearing cover was found to be loose and wearing shaft. Cover was rebuilt, repaired and reinforced to avoid future failures.

Appendix I

APPLICANT'S TABLES LISTING AND DESCRIBING ALLEGED EFFICIENCY IMPROVEMENTS

Hopkinton Hydro Project
2008 Capital and Efficiency Improvements

No.	Description of Improvements	Description of Improvement Benefit	When Completed	Age at Time of Refurbishment	New Useful Life	Total Cost
2008-1	Installed new 24-inch exhaust fan with thermostat and floor fans.	Keeps generators cool to prevent plant from shutting down due to overheating of powerhouse. Installed floor fans with thermostatic control. Turbine/generator units used to shut down when powerhouse temperature exceeded 130°F	May 2008	New piece of equipment[1]	15 years	[redacted]
2008-2	Installed new leaf boom.	Minimized debris on rack, increase production and reduce need for maintenance. Racks would clog and plant would shut down. Major improvement in production.	May 2008	New piece of equipment	15 years	[redacted]
2008-3	Replaced valve gaskets on G1 and G2 safety air valves.	Rebuilt safety air valves that are used to reduce torque on turbine. Valves were leaking causing substantial loss on production. Required piece of equipment to maintain safety of plant to reduce torque on turbine during shutdown and emergency shutdown. Now included on normal shutdown to protect equipment.	Jul. 2008	24 years[2]	5 years	[redacted]
2008-4	Rewound burned out coil on G2 air valve.	Safety air valve was not functional but is required equipment for plant operations. Rebuilt safety air valves are used to reduce torque on turbine. Required piece of equipment to maintain safety of plant to reduce torque on turbine during normal and emergency shutdown. Now included on normal shutdown to protect equipment.	Jul. 2008	24 years	4 years	[redacted]
2008-5	Replaced couplings on G1 and G2 speed tachometer.[3]	Continual failure of tachometer would shut plant down and reduce production. Replaced couplings and motor to keep plant on line and running. Dramatic increase in production, as this was a common failure.	Sep. 2008	<1 year	<1 year	[redacted]
2008-6	Installed new tachometer-Servotek.[4]	Continual failure of tachometer would shut plant down and reduce production. Replaced motor to keep plant on line and running. Dramatic increase in production, as this was a common failure. Plant used to stock broken spare parts on shelf. Production is increased by	Sep. 2008	New piece of equipment	1 year	[redacted]

[1] "New piece of equipment"-indicates that the plant did not have this vital piece of equipment installed for reliable operation in 2008.
[2] Plant was purchased in 2008 by Petitioner. a 24-year period indicates that the equipment was past its useful life, and that refurbishment replaced original equipment
[3] See item 2008-15 for information on final refurbishment of this piece of equipment.
[4] See item 2008-15 for information on final refurbishment of this piece of equipment.

		keeping stock of working critical spare parts on hand.				
2008-7	Installed new vacuum contactor bottles g1 and g2.	Thermal imager enabled us to locate main vacuum contactor bottle overheating. Replaced before imminent failure. Stocked spare vacuum contactor, with spare bottles.	2010	24 years	20 years	[redacted]
2008-8	Purchased thermal imager,	Purchase thermal imaging device for continual inspection and monitoring of plant. Thermal imager has enabled problems to be discovered before they become critical. Has prevented shutdowns and increased production. Gives us time to locate and purchase replacement products for repair, while still being on line and operating. Major increases in production.	2012	New piece of equipment	15 years	[redacted]
2008-9	Installed new 100 cfm Ingersoll Rand gas powered compressor.	Made trash rack cleaning safer and more efficient for operators, reduced head loss, increased production, cut down time for operators	Aug. 2008	New piece of equipment	10 years	[redacted]
2008-10	Refurbished left side of dam facing upstream.	Reduce leakage. improved structural stability of dam, enable project to keep operating. Required and necessary to ensure longevity of dam structure.	Sep. 2008	200 years	100 years	[redacted]
2008-11	Refurbished trash racks.	Original trashracks were corroded and had reduced spacing due to thick rust and corrosion, thus reducing production and increasing headloss. Headloss was often over 1 foot through the racks, even when racks were cleaned. Major increase in production.	Oct. 2008	20 years	20 years	[redacted]
2008-12	Installed new motion sensor light and handrail.	Improved safety for operators and safety of other personnel, reducing risk of fall injury.	Oct. 2008	New piece of equipment	20 years	[redacted]
2008-13	Built and installed new 12V dc backup power supply.	Enabled plant to be safely shut down when grid power was down. This is a required emergency backup system; there was no system in place before installation. Without DC UPS 12V system facility cannot experience a controlled shutdown of the turbines during a loss of power.	Nov. 2008	New system	20 years	[redacted]
2008-14	Installed new Basler 3-P digital relay.	Required upgrade by PSNH to maintain plant on line. Old relay deemed obsolete by utility, extended life of facility by protecting plant during grid instability.	Sept. 2008	New piece of equipment	30 years	[redacted]
2008-15	Ordered new digital tachometer and proximity sensor for G2 I	Plant was blowing 250 amp fuses due to inaccurate signal from speed tachometer, causing instability in generation, and throwing plant off line. Old tachometer system was functionally obsolete. There was no feedback on cause of outage. New tachometer brought plant to industry standard using digital controls.	Dec. 2008	New piece of equipment	20 years	[redacted]
2008-16	Installed 1/3 hp 3-phase fan motor with seized	Critical component for cooling of gearbox, increased useful life span of gearbox. Existing motor was industry standard, but not functioning. Cleaned cooling mechanism-which was clogged due to lack of	Nov. 2008	24 years	15 years	[redacted]

	bearings on G2 with new motor.	maintenance. Increase overall efficiency of cooling of gearbox oil. Prevent overheating which can result in significant turbine efficiency loss				
2008-17	Replaced level sensor pressure transducer, installed dessicant with low wattage light bulb.	Replaced level sensor which is main control component of plant for reliable operation. Upgraded cabinet with dessicant and heating device to keep moisture out of new transducer, increasing useful life span of transducer.	Nov. 2008	3 years	10 years	
2008-18	Installed new Watt-hour meters on G1 and G2.	Watt-hour meters had reached end of useful life and needed replacement with industry standard.	Nov. 2008	24 years	20 years	
2008-19	Replaced saturated meter per PSNH requirements.	Plant had increased production due to upgrades so that existing meter was not able to accurately read production. Utility required meter to be changed to accurately read production.	Sep. 2008	24 years	10 years	
2008-20	Replaced transducer in G1 with new Crompton Paladin transducer-Spectrum Industries.	Transducer drives watt meter and is used to record production. Transducer had reached end of useful life span. Required replacement, New transducer meets industry standard and is part of shutdown mechanism to protect from overpower and underpower of generators.	Dec. 2008	24 years	15 years	
2008-21	Installed new spooler on gate 3	Replaced hydraulic spooler, part of gate control system, required to keep plant safely operational.	Dec. 2008	24 years	15 years	
	Total Costs					

Hopkinton Hydro Project
2009 Capital and Efficiency Improvements

No.	Description of Improvements	Description of Improvement Benefit	When Completed	Age at Time of Refurbishment	New Useful Life	Total Cost
2009-1	Ordered new TR5000 from electro-sensors for G2. Installed in April 2009.	Brought second unit up to industry standard with replacement of mechanical tachometer with digital tachometer with higher accuracy and safety settings to protect from underspeed and overspeed, required to put induction unit on line at right time. Longevity advantage for synching unit with grid.	April 2009	New piece of equipment[1]	20 years	[redacted]
2009-2	Installed new digital KW meter on G1.	Provides more accurate reading of output. and more reliable trip setting and shut down relay to determine when plant shut down during power production. Protects equipment from cavitation due to low flows. Bring up to industry standards with use of digital device.	Jan. 2009	1 year (Replacement made in 2008 failed)	10 years	[redacted]
2009-3	Installed new air compressor starter solenoid (new starter motor in 11/09; new solenoid in 12/09).	Keeps air compressor running which is integral part of keeping trash racks clean and maintaining production.	Dec. 2009	New piece of equipment	10 years	[redacted]
2009-4	Ordered new fan motors for G1 and G2 after G2 replacement motor burned out.	Critical component for cooling of gearbox, increased useful life span of gearbox. Existing motor was industry standard, but not functioning. Cleaned cooling mechanism, which was clogged due to lack of maintenance. Increased overall efficiency of cooling of gearbox oil. Prevents overheating which can result in significant loss of turbine efficiency.	Dec. 2009	25 year[2]	20 years	[redacted]
2009-5	Installed new gate limit switches (ordered 2 spare switches).	Critical component for operation of plant,. Without limit switch working, gates would not function and plant could not operate. Had reached end of previous useful life and was replaced with industry standard.	Nov. 2009	25 years	10 years	[redacted]

[1] "New piece of equipment"-indicates that the plant did not have this vital piece of equipment installed for reliable operation in 2009.
[2] Plant was purchased in 2008 by Petitioner, a 25-year period indicates that the equipment was past its useful life, and that refurbishment replaced original equipment

2009-6	Modified gates for single gate operation.	Reconfigured gate operation by installing new controls (see item 2009-5), increasing production particular during low flows.	Jan. 2009	New piece of equipment	20 years	[redacted]
2009-7	Posted new dam danger signs.	Brought facility into minimum compliance with FERC dam safety requirements.	May 2009	New piece of Equipment	15 years	[redacted]
2009-8	Installed new small center fan and set up thermostat for floor fans.	Keep generators cool to prevented plant from shutting down due to overheating of powerhouse. Install floor fans with thermostatic control. T/G units used to shut down for overheating when powerhouse temperature exceeded 130°F	Apr. 2009	New piece of equipment	20 years	[redacted]
2009-9	Installed new fuses on transducers in cabinets.	Fuses protect transducers during faults; thus, reducing catastrophic damage to control panel and reducing risk of system failure	Dec. 2009	New piece of equipment	10 years (or until voltage surge)	[redacted]
2009-10	Refurbished G2 gearbox, redipped G2 generator windings and brake coil, installed new bearings and on generator shaft.	Major overhaul of gearbox and generator winding required to extend previous useful life and reliability of unit. Anticipated to last for additional decade or more.	Sep. 2009	10-15 years	20 years	[redacted]
2009-11	Installed new smoke detector and hooked up to sensor 3 of sensaphone warning system	Installation of new smoke detection system for early warning of any conditions that produce smoke in powerhouse. Attached to powerhouse alarm system that notifies operator of problem.	Sep. 2009	New piece of equipment	10 years	[redacted]
2009-12	Installed new frazil timer.	Frazil timer relay circuitry installed to accommodate delayed start in winter when frazil ice is present to increase production when normally plant would shut down.	Dec. 2009	New piece of equipment	15 years	[redacted]
2009-13	Repacked gate cylinders and new bushings on two cylinders, straightened one bent cylinder and replaced badly	Major overhaul of hydraulic gate cylinders required to extend useful life and reliability of gates. Anticipated to last for more than a decade if limit switches and other components are maintained.	Dec. 2009	25 years	15 years	[redacted]

	pitted cylinder with new chrome plated stainless steel cylinder.					
2009-14	Replaced rotten beams in forebay in front of G1 gates.	Improved safety for operators and safety of other personnel, reducing risk of injury to personnel and equipment	2009	25 years.	20 years	
2009-15	Installed new floating bobble line for boat barrier at dam.	Upgrade existing system to replace inefficient system, reducing labor costs and increasing safety. Upgraded to minimum conditions of FERC license.	2009	New piece of equipment	15 years	
2009-16	Replaced turbine bearing bolts on G2.	Replacing broken bolts prevented major failure of bearing which would have caused catastrophic failure and taken plant off line for indeterminate period of time. Grease line repaired, so bearing now gets grease-which will protect bolts.	Jul. 2009	25 years.	10 years	
2009-17	Replaced burned terminals on primary powerhouse panel.	Drastically improved reliability of control system, facilitating increased production due to reduction of nuisance tripping of control equipment for both units.	Dec. 2009	25 years	10 years	
	Total Costs					

Hopkinton Hydro Project
2010 Capital and Efficiency Improvements

No.	Description of Improvements	Description of Improvement Benefit	When Completed	Age at Time of Refurbishment	New Useful Life	Total Cost
2010-1	Installed new vacuum contactor bottles G1 and G2.	Thermal imager enabled locating main vacuum contactor bottle before overheating and replacement before failure. Stocked spare vacuum contactor with spare bottles.	2010	26 years[1]	20 years	[redacted]
2010-2	Installed new overspeed protection.	Installed overspeed protection. Previously, there was no overspeed protection on generators. Lack of overspeed protection could have caused a major failure that will cause a loss of production and large expense.	Nov-10	New piece of equipment[2]	15 years	[redacted]
2010-3	Installed new starter on HPU motor.	Installed to prevent failure. Maintains operations of gates that are critical component to safe and productive operation of plant. Without replacement of main hydraulic unit failure could have limited future operation.	Jan-10	26 years	15 years	[redacted]
2010-4	Installed new Electrosensor 5000 on G1.	Brought first unit up to industry standard with replacement of digital tachometer with higher accuracy and safety settings to protect from underspeed and overspeed conditions, required to put induction unit on line at right time. Longevity advantage for synching unit with grid. Intermittent problem-resolved with replacement with same unit	Apr-10	New piece of equipment	15 years	[redacted]
2010-5	Replaced oil flow sensors.	Replaced with current industry standard solid state oil flow detection device. Senor monitors critical flow of oil through the gearbox, preventing overheating and seizure of the gears. Sensor extends anticipated life of gearbox.	May-10	26 years.	20 years	[redacted]
2010-6	Installed new thermostat on gearbox.	Upgraded old analog temperature sensing devices with new digital programmable thermostat relay. Thermostat gives more accurate and reliable feedback to the controls and provides critical protection of units.	May-10	26 years.	15 years	[redacted]
2010-7	Installed lightning arrestors on GI	Installation of lightning surge arrestors on main switchgear, Adds protection to the main power source of the plant.	May-10	New piece of equipment	15 years (or until	[redacted]

[1] Plant was purchased in 2008 by Petitioner, a 26-year period indicates that the equipment was past its useful life, and that refurbishment replaced original equipment

[2] "New piece of equipment"-indicates that the plant did not have this vital piece of equipment installed for reliable operation in 2010.

	and G2.				hit by lightning)	
2010-8	Installed fuses in control cabinets.	Fuses protect potential transformers during faults, reducing risk of both catastrophic damage to control panel and system failure	May-10	New piece of equipment	10 years (or until voltage surge)	[redacted]
2010-9	Installed G2 safety air valve system operating on compressed air.	Coil had failed, been replaced and then failed again. New system designed to operate on compressed air. Increase longevity of valve assembly and operation. Critical component for reducing torque on turbine. Upgraded to industry standard using readily available components.	Aug-2010	2 years. (Rewound coil had failed after 2 years, new piece of equipment)	20 years	[redacted]
2010-10	Installed new flexible grease lines to G2 runner bearing.	Grease lines maintain grease to bearing. Without replacement. catastrophic failure could have occurred due to lack of grease to turbine, shortening operating life of bearing. Failure to do so would result in complete facility shutdown.	Jul-10	26 years.	20 years	[redacted]
2010-11	Replaced G1glass flow meter.	Replacement of glass required to ensure proper reading and prevent damage to gearbox.	May-10	26 years	20 years	[redacted]
2010-12	Rebuilt grease pump.	Grease flow to main bearing was insufficient; refurbishment of grease pump enabled proper operation and increased operating life of lower bearing.	May-10	26 years	20 years	[redacted]
2010-13	Rebuilt dipsticks.	With upgraded dipsticks, improved maintenance and operating life of gearboxes	Dec-10	26 years	30 years	[redacted]
2010-14	Replaced hydraulic lines to gates.	Enables gates to operate at higher head and colder temperatures	Aug-10	26 years	20 years	[redacted]
	Total Costs					[redacted]

Hopkinton Hydro Project
2011 Capital and Efficiency Improvements

No.	Description of Improvements	Description of Improvement Benefit	When Completed	Age at Time of Refurbishment	New Useful Life	Total Cost
2011-1	Refurbished gates with UHMW adhesive on downstream side of gates.	Required refurbishment. The lifespan and functionality of gates had decreased almost to point of limited usability. Refurbishment averted over $50,000 for new gates, thus avoiding down time and increasing production and reliability.	Mar. 2011	27 years[1]	10 years	[redacted]
2011-2	Installed new oil pump on G1 gearbox.	Replaced with new oil pump which moves oil through the gearbox, preventing overheating and seizure of the gears and extending anticipated life of gearbox.	May 2011	27 years	20 years	[redacted]
2011-3	Tested gearbox oil through Signum for synthetic oil.	Adopted new oil test program to reduce overhead costs and pre-mature oil replacement and to monitor the condition of gearbox and HPU.	Mar. 2011	New maintenance protocol	Perpetual	[redacted]
2011-4	Installed new metal roof.	Old roof had reached end of previous useful life.	Aug. 2011	27 years	20 years	[redacted]
2011-5	Replaced seal on G2 at base of generator.	Replaced oil seal with industry standard. Replaced original factory seals with higher temperature seals to increase longevity and life expectancy of seals which are critical to containment of oil in the gearbox.	Mar. 2011	10 years	10 years	[redacted]
2011-6	Replaced G1 bearings with SKF 6320-ZC3S1 bearings.	Due to thermal imaging scanning of plant, early failure of bearings was detected. Bearings were replaced before imminent failure, thus allowing increased production and reduced downtime. . Investment extended facilities useful life span by reducing the risk of system failure.	Nov. 2011	27 years	10 years	[redacted]
2011-7	Modified transformer on high side with tygon tubing, to test oil levels. Replaced blown	Installation of new visual oil level sensor allows for additional monitoring of oil in transformer. Facility was shut down due to blown high voltage bushing in transformer, bushing was replaced and oil was renovated to enable plant operation. Refurbishment increased useful lifespan and avoided expensive replacement of transformer.	Nov. 2011	Modification to 27 year old equipment	10 years	[redacted]

[1] Plant was purchased in 2008 by Petitioner, a 27-year period indicates that the equipment was past its useful life, and that refurbishment replaced original equipment

	high voltage bushing and binary transformer					
2011-8	Replaced batteries and maintainer in DC HPU, spare inverter to keep backup of critical component available	Enabled plant to be safely shut down when grid power was down. This is a required emergency backup system. Without replacement of batteries and maintenance DC UPS 12V system facility cannot experience a controlled shutdown of the turbines during a loss of power.	Dec. 2011	27 years	4 years	[redacted]
2011-9	Installed new check valves for HPU	Required refurbishment, original component had reached end of useful life expectancy.	Dec. 2011	27 years	20 years	[redacted]
2011-10	Bought two-stage compressor.	Installed more reliable compressor to drive safety air valve for more reliable operation of critical system.	Dec. 2011	New piece of equipment[2]	15 years	[redacted]
	Total Costs					[redacted]

[2] "New piece of equipment"-indicates that the plant did not have this vital piece of equipment installed for reliable operation in 2011.

Hopkinton Hydro Project
2012 Capital and Efficiency Improvements

No.	Description of Improvements	Description of Improvement Benefit	When Completed	Age at Time of Refurbishment	New Useful Life	Total Cost
2012-1	Refurbished G2 capacitors to avoid shorting.	Complete overhaul of G2 capacitor bank to facilitate more robust connections. Previous capacitors continued to fail. Required for reliability of safety system. Replaced capacitors to maintain system stability and protection of generator from surges caused by instability in grid. Previous system was obsolete and damaged.	Apr. 2012	28 years[1]	10 years	[redacted]
2012-2	Replaced G2 bearing cover.	During annual inspection G2 bearing cover was found to be loose and wearing shaft. Cover was rebuilt repaired and reinforced to avoid future failures. Fixed G1 bearing cover to avoid same.	Jun. 2012	28 years	10 years	[redacted]
2012-3	Installed dry transformer.	Upgraded and reconfigured powerhouse electrical system.	Jun. 2012	New piece of equipment[2]	20 years	[redacted]
2012-4	Replaced relay-G1 safety air valve.	Replaced relay and circuit control of critical component. Safety air valve was not functional but is required for safe plant operations. Required piece of equipment to maintain safety of plant by reducing torque on turbine during normal and emergency shutdown. Now included on normal shutdown to protect equipment.	Jun. 2012	28 years	10 years	[redacted]
2012-5	Refurbished shaft.	Shaft on G2 turbine was weakened by loose bearing cover. Refurbished shaft.	Sept 2012	28 years	20 years	[redacted]
2012-6	Refurbished dam.	Refurbished undermined foundation of dam and by placing 28 cubic yards of gunnite on dam.	July 2012	>200 years	100 years	[redacted]
	Total Costs					[redacted]

[1] Plant was purchased in 2008 by Petitioner, a 28-year period indicates that the equipment was past its useful life, and that refurbishment replaced original equipment

[2] "New piece of equipment"-indicates that the plant did not have this vital piece of equipment installed for reliable operation in 2012.

SERVICE LIST - EMAIL ADDRESSES - DOCKET RELATED

Pursuant to N.H. Admin Rule Puc 203.11 (a) (1): Serve an electronic copy on each person identified on the service list.

Executive.Director@puc.nh.gov
amanda.noonan@puc.nh.gov
barbara.bernstein@puc.nh.gov
Christina.Martin@oca.nh.gov
jwebb@apx.com
lori@communityhydro.biz
susan.chamberlin@oca.nh.gov
suzanne.amidon@puc.nh.gov
tom.frantz@puc.nh.gov
w.shortiii@verizon.net

Docket #: 12-278-1 Printed: February 03, 2015

FILING INSTRUCTIONS:

a) **Pursuant to N.H. Admin Rule Puc 203.02 (a), with the exception of Discovery, file 7 copies, as well as an electronic copy, of all documents including cover letter with:**

DEBRA A HOWLAND
EXECUTIVE DIRECTOR
NHPUC
21 S. FRUIT ST, SUITE 10
CONCORD NH 03301-2429

b) **Serve an electronic copy with each person identified on the Commission's service list and with the Office of Consumer Advocate.**

c) **Serve a written copy on each person on the service list not able to receive electronic mail.**