ASHRAE Twin Tiers Chapter

Cornell University Hydroelectric Plant - Tour and Presentation

March 19, 2019

Tour – ***Cornell Hydroelectric Power Plant,*** *Meet at: 616 Thurston Ave. Ithaca, NY 14853*
Dinner/Presentation – ***Statler Hotel,*** *130 Statler Dr. Ithaca, NY 14853*

Student Night

Speaker: Frank Perry – *Cornell University, Energy and Sustainability Group*

Description:
The first electrical generation facility in Fall Creek gorge was built in the early 1880's. That plant was powered by water from a dam just above the present dam, with a water wheel just above the present plant with a cable to a generator located near the Foundry. In 1904, the present plant was brought on line. Construction was preceded by replacing Triphammer Dam slightly west of its original location in 1896. Water is supplied to the plant from Beebe Lake by a five-foot diameter underground penstock, 1700 feet long. The existing intake dates to 1953 and was upgraded in 1981.

The original plant capacity was 300 kW with 2 Pelton Wheel turbines and two 30kW DC exciters. This was increased in 1913 by adding a 360 kW Francis turbine. The facility was overhauled in 1935 after being completely flooded. In 1957, No. 2 generator was replaced with a 175 kW unit. The plant capacity then stood at 850 kW @ 2,400 volts. In this configuration, the plant last operated in 1970. It was vandalized in 1972. In 1981, the plant was completely renovated, and all the original machinery removed. Two Ossberger crossflow turbines were installed with a total rated capacity of 1,840 kW. The plant, however, is limited to about 1,400 kW output because of the size of the penstock. This hydroelectric plant is "run of river", which means that no water is stored. At all times, 10 cfs must continue to pass over the dam. The average production for this plant is 5.0kWh to 6.2kWh.

This month's meeting will consist of a walking tour of the Cornell University hydroelectric dam described above and it's supporting facilities and will be followed by an overview of the major equipment, facilities, and technologies used to generate Cornell's hydroelectric power. Additionally, the theory and calculations used to determine many of the key parameters and inputs that govern the amount of energy generated from the plant will be discussed.

Frank currently works in Cornell's Energy and Sustainability group. Since 1991, Frank has managed the design and construction of about 21,000 trench feet of chilled water piping and 21,000 feet of steam and condensate piping. As the Hydro Enterprise manager, Frank has managed several major projects since 2007, including:

- *Installing new digital controls and all control wiring in the powerhouse and trash rack.*
- *Installing new speed increaser oil coolers.*
- *Replacing the powerhouse roof and stairs.*
- *Refurbishing both turbines and U1 generator.*
- *Rebuilding the 2.4kV switchgear.*
- *Rebuilding both speed increasers.*
- *Managing the Dam Stability Analysis.*
- *Currently 3 years into the FERC Relicensing (Federal Energy Regulatory Commission).*
- *Increasing production from 4.5 MkWh/yr to 6 MkWh/yr.*

Below is a timeline of Frank's experience at Cornell since he began his employment at the University:

- *1988 - Graduated from Alfred State College with an AAS Degree in Commercial Controls and an AS degree in Air Conditioning Design.*
- *1988 - Started with Cornell University Facilities Engineering (FE) as an Electrical/Mechanical Designer.*
- *1991 - Started Steam Distribution Design and Construction Management projects.*
- *1998 - Joined the Utilities Department as a PM for Distribution projects starting with the LSC distribution piping.*
- *2000 - Added responsibilities of Hydroelectric Enterprise Manager.*
- *2009 - CCHPP Assistant PM where I managed the CCHPP building civil construction along with the 3.1-mile gas line and two gas M&R stations.*

DATE: Tuesday, March 19, 2019
TIME: 5:00 PM

MEETING LOCATION: ***Please refer to parking attachment for details on meeting/parking locations.***

MEET FOR TOUR AT 5:00PM AT:
Martin Y. Tang Welcome Center
616 Thurston Ave.
Ithaca, NY 14853

MEETING:
Statler Hotel – Taylor and Rowe Rooms
130 Statler Dr.
Ithaca, NY 14853

AGENDA:
5:00 – 5:15: Arrivals & Networking
5:15 – 6:15: Hydroelectric Plant Walking Tour
6:15 – 6:30: Travel to Meeting at Statler Hotel
6:30 – 7:00: Chapter Meeting, Begin Dinner, & Social Time
7:00 – 8:00: Presentation

MENU:

Salads:
- *Garden Greens, Julienne Fresh Beets, Golden Raisins, Sliced Almonds, Maple Vinaigrette*
- *Fusilli Pasta Salad, Broccoli, Grape Tomatoes, Olives, Lemon Zest, Balsamic Vinegar*
- *Roasted Beet Salad, Goat Cheese, Oranges, Toasted Walnuts, Arugula, Citrus Vinaigrette*

Entrees/Side:
- *Dr. Baker's Cornell Chicken, Lemon-Thyme Jus*
- *Roasted Garlic Country Smashed Potatoes*
- *Oven Roasted Cauliflower, Brown Butter, Bread Crumbs, Fresh Herbs*
- *Green Beans, Frangelico and Almond Glaze*
- *Quinoa Cakes, Lemon and Dill Yogurt Sauce*

Desert:
- *New York Cheesecake, Tart Cherry Compote, Whipped Cream*
- *Flourless Chocolate Torte, Dark Chocolate Ganache, Berry Coulis*

Refreshments:
- *Coffee, Decaf, Assorted Teas, Water*
- *Cash Bar - Includes Beer, Wine, Sparkling Wine, Soda, Sparkling Water*

REGISTRATION: http://twintiers.ashraechapters.org/page-programs.html - **Early registration pricing available on or before 3/14/2019**

MAPS & PARKING:

Link: Tour Parking

Link: Dinner Parking

1. Park at forest home drive parking lot which is next to Chilled Water Plant 1 and across the street from the Human Ecology Building. Guests can arrive after 4:30 and can park at no charge.
2. Walk to the Tang welcome center where the tour will start just after 5:00pm.
3. Following the tour, drive from the forest home parking lot to the Hoy parking garage. You can park here as well at no charge. If the weather is nice, you are more than welcome to walk from forest home drive to the Statler. Your vehicle is free to park at Forest Home Drive for the entire evening if you wish.
4. Walk from the Hoy parking garage to the Statler Hotel. The chapter meeting and dinner will begin at 6:30.

Refer to the attachment on the following page for more details.