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December 11, 2018

Maryalice Fischer
Certification Program Director
Low Impact Hydropower Institute

Subject: Recertification Recommendation for the Carver Falls Hydroelectric Facility (FERC # 11475, LIHI #107)

Ms. Fischer,

This letter contains my recommendation for recertification of the Carver Falls Hydroelectric Facility (the "Facility"). I complete a thorough review of the application materials and the public record for this Facility, and am recommending recertification for one new, five-year term, subject to the following conditions:

1. The facility Owner shall consult with Vermont DEC regarding run-of-river operations, identify any refinements needed to assure run-of-river operations are consistently maintained, and submit the results including agency comments and any operational refinements made, in annual compliance submittals to LIHI.
2. During the term of this certification, should a resource agency initiate consultation regarding passage or protection measures for migratory fish species, the facility Owner shall notify LIHI within 60 days, provide LIHI with a copy of the request, and the applicant's response. The facility Owner shall summarize the status of any fish passage measures planned or being implemented in annual compliance submittals to LIHI.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Peter Drown", written over a faint, illegible printed name.

Peter Drown, President
Cleantech Analytics LLC

I. Background:

The 2.25 MW Carver Falls Hydroelectric Facility (“Facility” or “Project”) is located on RM 3.8 of the Poultney River, spanning the Vermont/New York border and approximately 25 miles above Lake Champlain. Project works include a 25-foot-high, 515-foot-long concrete and stone masonry dam with two spillway sections, located at the top of an 80-foot natural waterfall, with a powerhouse on the south abutment containing two turbine-generating units operating in a run-of-river mode and generating approximately 6,578 MWh annually. There is a 700-foot-long bypassed reach from the dam, and the impoundment has a surface area of approximately 30.5 acres. The Facility is the only dam on the Poultney River. The Facility was initially constructed in 1894, and currently operates under the terms and conditions contained in the most recent FERC License issued in 2009 (and subsequently modified in 2011 and 2012.) Green Mountain Power Corporation (“Owner”) owns and operates the Facility. The Facility was originally certified as Low Impact on December 4, 2012, and the expiration date of the initial certification was extended to December 31, 2018 and again to March 31, 2019. On October 3, 2018, the Owner submitted a timely application for recertification. This application review for recertification was conducted using the 2nd Edition Handbook that was published in March 2016.



Figure 1 - Carver Falls Dam



Figure 2 - Carver Falls

II. Recertification Standards

In late 2017, LIHI notified the applicant of upcoming expiration of the Low Impact Hydropower Institute certification for the Facility. The notification included an explanation of procedures to apply for an additional term of certification under the 2nd Edition LIHI Handbook, including the new two-phase process starting with a limited review of a completed LIHI application, focused on three questions:

- (1) *Is there any missing information from the application?*
- (2) *Has there been a material change in the operation of the certified facility since the previous certificate term?*
- (3) *Has there been a change in LIHI criteria since the Certificate was issued?*

If the answer to any question is “Yes,” the Application must proceed through a second phase, which consists of a more thorough review of the application using the LIHI criteria in effect at the time of the recertification application. The letter noted that “because the new Handbook involves new criteria and a new process, the answer to question three for all projects scheduled to renew at this time will be an automatic ‘YES.’ Therefore,

all certificates applying for renewal will be required to proceed through both phase one and phase two of the recertification application reviews.

The Owner submitted an initial (phase one) application for recertification on July 10, 2017. LIHI Reviewer Jeff Cueto conducted the phase one review and noted several issues and deficiencies to address in the subsequent Phase II application. This Report comprises the Phase II review.

III. Adequacy of the Recertification Package

The Applicant provided an updated recertification application on October 3, 2018, which included additional supporting information. I have reviewed the application package, supporting comments and documentation and public records on FERC e-library posted since the original certification report (McIlvaine, 2013.) I also independently verified the submitted criteria were appropriate given the changes in the 2nd edition LIHI handbook.

The application was publicly noticed on October 9, 2018 and received no comments. However, I contacted VDEC who conducted a thorough review of operations data at the site and they provided a written email on December 7, 2018, which is incorporated into my review and conditions.

IV. There have not been any “material changes” at the facility that would affect recertification

In accordance with the Recertification Standards, "material changes" mean non-compliance and/or new or renewed issues of concern that are relevant to LIHI's criteria. Based on my review of materials provided, review of FERC's public records, and consultation with the noted individuals, I found that there are no areas of noncompliance or new or renewed issues of concern. The previous LIHI Governing Board's vote to certify the Carver Falls Project was unanimous for a term of 5 years with the following specific condition:

1. Should Green Mountain Power elect to move forward on impoundment drawdown to perform gate testing and repair within the term of this LIHI Certification, a copy of approvals by applicable state resource agencies and FERC if required, of any sampling, analysis and preventative measures needed to ensure protection of the water quality from potential release of sediments, shall be forwarded to LIHI within two weeks of their receipt. A summary letter report at the completion of the work, denoting any problems encountered and remediation implemented, shall also be provided to LIHI within two weeks of project completion.

No reports of such drawdowns were made to LIHI or to FERC during the current certification term.

V. LIHI certification criteria are satisfied in all zones

In my opinion, the Applicant properly selected three zones of effect for the Facility. The Applicant defined Zone 1 (the “Impoundment Zone”) from the Carver Falls Dam approximately 2,400 feet upstream. This comprises the impoundment for the Project and appears to be accurately delimited. Zone 2 (the “Bypassed Reach Zone”) extends the length of the penstock from the south dam face to the powerhouse which connects to the tailrace. Zone 3 (the “Downstream Zone”) extends from the powerhouse approximately 4 miles downstream to the river's confluence with Lake Champlain.



Figure 3 - Carver Falls Zones of Effect

A. Ecological Flow Regimes

The Owner selected Standard 1, Not Applicable/De Minimis for Zones 1 and 3, and Standard 2, Agency Recommendation for Zone 2. There are fairly extensive flow requirements issued in the Water Quality Certificates from New York Department of Environmental Conservation, Vermont Agency of Natural Resources, and in the FERC license (although many of the specific requirements are redundant.) These agencies impact all zones, not just Zone 2. For example, the Owner is required to monitor impoundment levels and maintain these to not less than one inch below the top of the flashboards (Zone 1.) The Facility is required to operate in run-of-river operation, impacting all zones, but designed for the reach downstream of the project (Zone 3.) For these reasons, my review applies Standard 2, Agency Recommendation to all zones.

These flow requirements are included in an Operations Monitoring Plan approved by FERC on January 21, 2010. This plan describes procedures for complying with the Water Quality Certificate conditions, including run-of-river operation, bypass flow management, flashboard replacement, impoundment management, and monitoring and reporting. The plan also includes significant scientific and technical basis behind the conditions, based on project-specific features (turbine and gate rating curve, theoretical impoundment refill times, flashboard failure and corresponding spillage, etc.) In my opinion, the Plan is adequate to comply with the scientific and technical basis requirements of LIHI Standard 2 and includes significant comments from each resource agency involved in the requirements.

The Owner has implemented various flow monitoring and compliance measures at the site. These measures include monitoring gauges in each zone, from the impoundment to downstream reach, which allow for operations to be adjusted in real-time to comply with run-of-river requirements. These changes are made remotely by an operator in Green Mountain Power's control center in Rutland, Vermont. This operator also maintains records of hourly impoundment levels, and the downstream USGS gauge also provides real-time data to verify compliance. A Supervisory Control and Data Acquisition (SCADA) system provides the operator with real-time access to this data, and an alarm will trip if low impoundment levels are observed. In any case where on-site operation is needed, GMP can quickly deploy personnel to the project site.



Figure 1 - Carver Falls impoundment level gauge

During the term of this most recent LIHI certification, there were two instances of flow excursions at the site. During these occurrences, there were short deviations of run-of-river operation due to remote operation errors which were resolved by dispatching staff to the site. Neither occurrence was considered a license violation by FERC. In comments submitted with the LIHI application, the VDEC flagged flow management as a potential area of concern due to these instances, and also requested one year of operational flow data from GMP as part of their new review process to verify compliance with certification conditions and provide meaningful input into the LIHI review process. On October 3, 2018, the Owner's representative submitted one year of operational flow data (including project generation, headpond level, river flow, and flashboard data) to the VDEC for review and comment. On December 7, 2018, the VDEC provided a letter to me that summarized their review of the operations data. This letter noted additional deviations of run-of-river operations, and recommended the following condition:

“GMP shall consult Vermont DEC regarding run-of-river operations, identify any refinements needed to assure run-of-river operations are consistently maintained, and submit the results of this consultation to LIHI within 180 days.”

There is a history of minor run-of-river flow deviations at Carver Falls. The Owner has demonstrated an ability to quickly address these deviations, and VDEC supports certification with this condition included. In my opinion, this is a reasonable condition that will encourage the Owner to work with VDEC to meet the requirements of run-of-river operations. I am recommending LIHI include this condition with minor modifications in the final recertification.

B. *Water Quality*

The Owner selected Standard 2, Agency Recommendation, for all zones at the Project. The State of Vermont classifies the Project-affected reach as Class B waters, and the downstream reach is classified as impaired due to elevated levels of mercury in walleye and the presence of water chestnut, an aquatic invasive species. On July 14, 2017, VDEC confirmed by email that the Facility does not contribute to this listing. The relevant agency recommendations (requirements) are included in the Water Quality Certificates issued by the states of New York and Vermont. These requirements were assessed during the 2015 Environmental Inspection by FERC, and no items of non-compliance were identified. Therefore, I find that the Project satisfies Standard 2, Agency Recommendations for all zones.

C. *Upstream Fish Passage*

The Owner selected Standard 1, Not Applicable/De Minimis for all zones at the Project. The Facility is located at an 80-foot waterfall which represents a natural upstream fish barrier that clearly limits the ability of most species to move upstream. However, VDEC noted by email on May 21, 2018 that American Eel have historically been able to ascend the falls and have been documented in Lake Bomoseen (which flows into Castleton River and eventually Poultney River.) Standard 1 requires that the Owner demonstrate that the Facility does not create a barrier to upstream passage. I contacted VDEC to understand the size of this eel population, whether they actively migrate up Carver Falls and whether the existence of the hydroelectric facility contributes adversely to the existence or migration of this species.

VDEC consulted with the Vermont Fish and Wildlife Department (FWD) and responded by letter dated December 7, 2018. They noted that it is difficult to estimate population size, but it was likely that the eels identified in Lake Bomoseen actively migrated up or past the Carver Falls Project. Although FWD is actively engaged with restoring American Eel populations in the Lake Champlain, they have not developed any plans for eel passage in the tributaries, including the Poultney River. VDEC noted that even though FWD has not developed any existing plans, the effort to restore American Eels downstream of the Project does pose a possible scenario where passage measures could be required at Carver Falls in the future. Therefore, they recommended the following condition:

“During the term of this certification, should a resource agency initiate consultation regarding passage or protection measures for migratory fish species, the applicant shall notify LIHI within 14 days, provide LIHI with a copy of the request, and the applicant’s response.”

Article 403 of the License reserves authority for the USFWS to mandate fish passage if the need arises. If this event is triggered, it is important for LIHI to be notified as this impacts a key goal of LIHI to allow for the safe, timely, and effective upstream passage of migratory fish. In my opinion, this is a reasonable condition and I am recommending LIHI include this condition with minor modifications in the final recertification.

D. *Downstream Fish Passage*

The Owner selected Standard 1, Not Applicable/De Minimis for all zones at the project. Due to the 80-foot waterfalls present at the Project. In the 1997 Environmental Assessment, FERC noted that the “conditions do not currently exist to support the installation of upstream or downstream fish passage facilities.” Coldwater fish species located in the impoundment and further upstream would not thrive in the downstream warmwater fishery. The downstream reach of the Project is the pertinent area of concern, as this stretch of the Poultney River to Lake Champlain is an important spawning area for walleye and has historically supported a population of American Eels. Although Section 18 of the FPA (reservation to prescribe fish passage in the future,) was maintained in the Project license, no such measures have ever been required. Impingement was also not determined to be an issue during Project licensing, due to low water velocities at the intake structure (which has 1.75-inch spaced trashracks.) The Owner adequately demonstrated that the Facility does not impose a barrier to downstream fish passage, because the waterfall is a natural barrier and no riverine fish populations are known to move down the falls. Therefore, the Project satisfies Standard 1, Not Applicable/De Minimis for all zones.

E. *Watershed and Shoreline Protection*

The Owner selected Standard 2, Agency Recommendation, for all zones at the Project. The Project boundaries include a Vermont Land Trust conservation parcel, and the lower Poultney River area is designated as one of

Vermont's four Outstanding Resource Waters¹. The area is remote and heavily forested (primarily cedar, pine, and hardwoods,) and the Project lies in a ravine that is 100 feet tall on the top of the falls and 200 feet tall below. The Poultney River downstream travels a broader corridor that includes sections of floodplain forest and wetlands with natural riparian vegetation. The Poultney River at a single 22-mile-long segment is one of the longest segments of natural stream corridor in the state of Vermont, providing ample canoeing opportunities, an unbroken wildlife migration corridor and a high degree of biodiversity.

Standard 2 for this criterion requires a shoreline management or other watershed management plan. The Owner relied on the FERC license condition for run-of-river operation as compliance, which in itself is insufficient to meet this criterion. However, due to the designation of the Project's downstream reach as an Outstanding Resource Water, the VANR developed a management plan in 1992 to protect and preserve the resource. The goal of this plan is to "seek to manage certain activities affecting the water quality, flows, course, current, and cross-section of the Lower Poultney River to preserve and enhance the exceptional natural, cultural, scenic, and recreational values of the river and river corridor..." FERC determined that there was no conflict with this plan during the most recent relicensing process. Furthermore, the goals of this plan were clearly considered in the relicensing process by including citations to the plan in specific Water Quality Certificate conditions. Therefore, in my opinion the Project satisfies Standard 2, Agency Recommendation for all zones.

F. Threatened and Endangered Species

The Owner selected Standard 2, Finding of No Negative Effects, for all zones. The Owner solicited input from federal (USFWS) and state (NYDEC and VANR) to determine the extent to which threatened and endangered species are present, and whether the Project has any impact on those species. Since the Project is located in both New York and Vermont, all species that are on each state's (and federal) listing must be considered, and the Owner did so. Both resource agencies provided a detailed review and modified the previous list to include all species currently present at the Project, including upland species and in an expanded impoundment area. These species include:

- Indiana Bat (endangered)
- Northern Long-eared Bat (threatened)
- Green Dragon (threatened)
- Meadow Horsetail (threatened)
- Eastern Sand Darter (threatened)
- Channel Darter (endangered)
- Cylindrical Papershell (endangered)
- Pocketbook (endangered)
- Fluted-Shell (endangered)
- Fragile Papershell (endangered)
- Black Sandshell (endangered)
- Pink Heelsplitter (endangered)
- Giant Floater (threatened)

The VANR stated: "the biologists associated with this review concurred that the Project should continue to negligibly impact these species if it is operated according to the conditions specified in its 401 Water Quality Certificate, particularly those specifying a run-of-river regime. However, deviations from run-of-river operations, have the potential to adversely affect several of the species listed here."

¹ https://anrweb.vt.gov/PubDocs/DEC/WSMD/Mapp/Docs/mp_ORW-LowerPoultneyRiverMgmtPlan_August1992.pdf

This statement is suitable as a “Finding of No Negative Effect,” so the Project satisfies this standard for all zones. The NYDEC did not provide any conclusions about the project’s impact on fish and wildlife.

In regard to the federally listed bat species, GMP is required to abide by License Article 405, which includes tree removal restrictions to avoid potential take of Indiana bats. There is record of one violation of License Article 405 in a notification from GMP to the FERC on April 17, 2014. On April 3, 2014, GMP conducted timber harvesting without notifying the relevant resource agencies and following other requirements in Article 405. The oversight was discovered and GMP halted the logging on April 9, 2014, after five days of logging. The relevant resource agencies were notified, and each concurred that given the cold weather and time of year, it was unlikely that any adverse impact to the Indiana bat population occurred. Given this was the only incident of this violation occurring, FERC determined this was not a license violation by letter October 31, 2014. To ensure that these incidents don’t happen in the future, GMP’s Forestry Department was provided a copy of Article 405 and was briefed on need for advance notification for all future tree-clearing activity.

G. *Cultural and Historic Resources Protection*

The Owner selected Standard 2, Agency Recommendations, for all zones. As part of the 2009 License, the Owner was required to submit a Historic Properties Management Plan (HPMP), which they did on February 25, 2010. The HPMP incorporated comments from the Vermont Division for Historic Preservation (VDHP) and the New York State Historic Preservation Office (NYSHPO), and was approved by FERC on May 3, 2011. This plan includes the agency recommendations and is sufficient to meet LIHI criteria for this standard. The HPMP includes an extensive description of the history of the watershed, and western Vermont in general, from the Paleoinian period to modern times. Several archaeological sites, along with the dam and appurtenant structures themselves (originally built in 1893) all contribute to the historicity of the location and activities at the site are governed by the HPMP. Section 6 of this plan, *Treatment Measures and Management Procedures*, describes multiple procedures necessary for managing these historic resources. They include (1) staffing and training; (2) communication and consultation; (3) treatment measures and management review; (4) unanticipated discovery of new archaeological resources; (5) looting and vandalism control; (6) discovery of human graves or remains; and (7) discovery of cultural objects. Since the most recent LIHI certification, the FERC record has been silent on any matters concerning cultural and historic resource protection, and the Owner appears to be in compliance with the HPMP and the Project satisfies Standard 2, Agency Recommendation for all zones.

H. *Recreation*

The Owner selected Standard 2, Agency Recommendation, for all zones. As part of the 2009 License, the Owner was required to submit a Recreation Plan, which they did on February 25, 2010. The Recreation Plan incorporated comments from the NYDEC and VANR, and was approved by FERC on June 21, 2010. This plan includes the agency recommendations and is sufficient to meet the LIHI standard for this criterion. The recommendations primarily include recreational enhancements to the Project including access points, a viewing platform for the falls, canoe portage route, provision for car-top boat access, signage and a soil erosion and sediment control plan. The FERC completed a Project site inspection in 2015, and found the Project was in compliance with requirements for recreational resources. In the follow-up report, FERC identified several areas of action to improve recreational access at the site, including removing vegetation at the portage site. The Owner completed this within two months of the request and also regraded an access road and repaired two picnic tables. Given the prompt attention to these two matters, and the additional track record of compliance with recreational requirements at the site, I find the Project satisfies Standard 2, Agency Recommendation for all zones.

VI. Conclusion

In my opinion, the materials provided and referenced above are sufficient to make a recertification recommendation, and no further application review is needed. In conclusion, I recommend the Carver Falls Hydroelectric Facility be LIHI certified[®] to one new, five-year term, with the following conditions:

1. The facility Owner shall consult with Vermont DEC regarding run-of-river operations, identify any refinements needed to assure run-of-river operations are consistently maintained, and submit the results including agency comments and any operational refinements made, in annual compliance submittals to LIHI.
2. During the term of this certification, should a resource agency initiate consultation regarding passage or protection measures for migratory fish species, the facility Owner shall notify LIHI within 60 days, provide LIHI with a copy of the request, and the applicant's response. The facility Owner shall summarize the status of any fish passage measures planned or being implemented in annual compliance submittals to LIHI.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read 'Peter R. Drown', with a large, sweeping flourish at the end.

Peter R. Drown, President
Cleantech Analytics LLC

Attachment 1
Agency and Applicant Communications

Date: December 7, 2018

Contact Person: Eric Davis, River Ecologist

Agency: Vermont Department of Environmental Conservation

[Next Page]



Peter Drown <peter.drown@gmail.com>

Eels at Carver Falls

Davis, Eric <Eric.Davis@vermont.gov>
To: Peter Drown <peter.drown@cleantechanalytics.com>
Cc: "McHugh, Peter" <Peter.McHugh@vermont.gov>

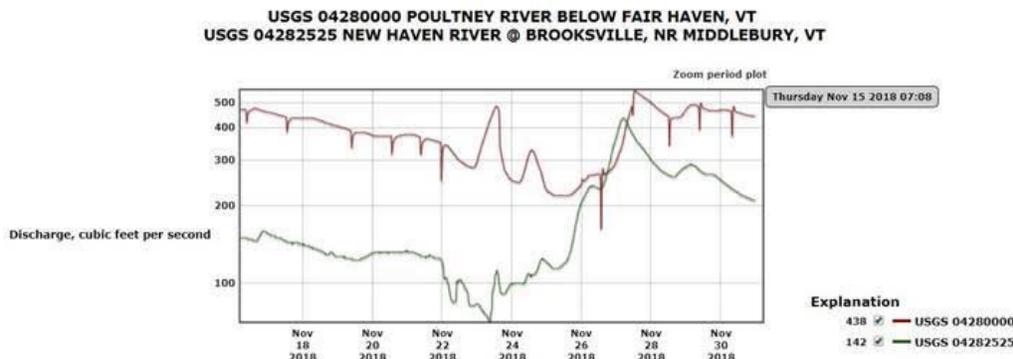
Fri, Dec 7, 2018 at 5:09 PM

Hi Peter,

Thank you for your consultation on this application.

As you know, the Department of Environmental Conservation (DEC) has been reviewing the pending LIHI application for the Carvers Falls Hydroelectric Project to be certified as Low Impact. Prior to submitting its LIHI application, the applicant engaged Agency staff. Subsequently, DEC provided input by e-mail dated July 14, 2017 on water quality and rare, threatened and endangered species. In addition, the Agency requested one year of operations data to confirm compliance with water quality certification (WQC) conditions for its formal review. The Agency has completed its review and supports certification of the facility, but recommends two conditions regarding flows and fish passage to ensure the project complies with the terms of its water quality certification and satisfies LIHI's criteria. Please allow me to elaborate on these issues briefly.

The Agency issued a water quality certification for the Carvers Falls Hydroelectric Project in 2008, with FERC originally licensing the facility in 2009 (there have been subsequent amendments, but are minor, and are not addressed here). Condition B of the WQC and Article 402 of the FERC License require instantaneous run-of-river operations. The operations data provided to the Agency (August 2016-July 2017), as well an analysis of more recent below project flows with an unregulated gage indicate that while operations generally comply with condition B, and certainly the Agency believes it is the intent of the applicant to comply, there are numerous, even frequent deviations form instantaneous run-of-river operations. It appears from the operations data, which includes generation info that these events are related to some sort of equipment malfunction (turbine trip, sensor mis-read, etc.) at the site. Please see the hydrograph included below for reference.



Thus, there is an opportunity and a need to refine run-of-river operations at the project. The Agency is happy to engage with the applicant on these issues to identify the cause and the appropriate remedy.

Additionally, American eel, a catadromous species, have historically been able to ascend Carver Falls and access upstream habitat. The Department of Fish and Wildlife has documented eel presence in Lake Bomoseen during both past creel surveys and electrofishing efforts. Lake Bomoseen flows into the Castleton River and then the Poultney River upstream of the dam at Carvers Falls. While the data indicates presence, it does not allow an estimation of population size. Given the estimated age of the individuals captured, the age of the dam, and their life history requirements, it is likely these individuals actively migrated up Carver Falls (and over or around the dam). While individuals appear to be able to pass the dam, it likely slows upstream migration for the individuals that do pass and impedes passage for others.

As part of this review, the Agency has consulted biologists with the Vermont Fish and Wildlife Department (FWD) on the need for upstream and downstream passage for American eel. While currently there is a substantial management effort to restore the American eel to Lake Champlain outlined in The Strategic Fisheries Plan for Lake Champlain (Lake Champlain Fish and Wildlife Management Cooperative, Fisheries Technical Committee, 2009), the FWD has not made any plans regarding eel recovery or passage in Lake Champlain tributaries. FWD to date has not recommended eel protection or passage measures for the project, though this could change in the future as more data becomes available or fisheries management objectives change. As such, the Agency recommends including a condition that requires the applicant to notify LIHI of any such request, as well as the applicant's intended action. While the Agency does not anticipate making any such request in the near term, it seeks to raise the possibility of future passage concerns given ongoing management efforts and considering the importance of fish passage criteria within the LIHI review process.

Recommended Conditions:

1. GMP shall consult Vermont DEC regarding run-of-river operations, identify any refinements needed to assure run-of-river operations are consistently maintained, and submit the results of this consultation to LIHI within 180 days.
2. During the term of this certification, should a resource agency initiate consultation regarding passage or protection measures for migratory fish species, the applicant shall notify LIHI within 14 days, provide LIHI with a copy of the request, and the applicant's response.

Thank you for consideration of our comments in your review.

Eric

Eric Davis, *River Ecologist*

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