

NUCLEAR REGULATORY COMMISSION

Docket No. 50-391

Tennessee Valley Authority

Watts Bar Nuclear Plant, Unit 2

Exemption

I. Background.

The Tennessee Valley Authority (TVA, the licensee) is the holder of Facility Operating License No. NPF-96 which authorizes operation of Watts Bar Nuclear Plant (Watts Bar), Unit 2. The license provides, among other things, that the facility is subject to all rules, regulations, and orders of the Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The facility consists of two pressurized-water reactors located in Rhea County in Tennessee.

II. Request/Action.

By letter dated April 15, 2022, as supplemented by letter dated April 25, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML22105A579 and ML22115A232, respectively), TVA requested one-time exemptions from the work hour requirements in Title 10 of the *Code of Federal Regulations* (10 CFR), part 26, "Fitness for Duty Programs," section 26.205(d)(7), pursuant to 10 CFR section 26.9, "Specific exemptions."

Section 26.205(d)(7) of 10 CFR provides, in part, that licensees may, as an alternative to the minimum days off requirements in 10 CFR 26.205(d)(3), ensure that individuals subject to the work hour controls in Section 26.205(d) do not work more than

a weekly average of 54 hours, calculated using an averaging period of up to 6 weeks. Section 26.205(d)(4) of 10 CFR provides that during the first 60 days of a unit outage, licensees need not meet the requirements of 10 CFR 26.205(d)(3) or (d)(7) for individuals specified in 10 CFR 26.4(a)(1) through 10 CFR 26.4(a)(4), while those individuals are working on outage activities. However, 10 CFR 26.205(d)(4) also provides that the licensee shall ensure that the individuals specified in 10 CFR 26.4(a)(1) through (a)(3) have at least 3 days off in each successive (i.e., non-rolling) 15-day period and that the individuals specified in 10 CFR 26.4(a)(4) have at least 1 day off in any 7-day period. Section 26.205(d)(6) states that the 60-day periods in 10 CFR 26.205(d)(4) and (d)(5) may be extended for each individual in 7-day increments for each non-overlapping 7-day period the individual has worked not more than 48 hours during the unit or security system outage or increased threat condition, as applicable.

Watts Bar, Unit 2, entered a refueling outage on March 1, 2022. During this refueling outage, the licensee also commenced a steam generator replacement (SGR) project. The outage, including the SGR project, was originally planned to be completed in mid-May, 2022, and TVA intended to administer work hour controls in accordance with 10 CFR 26.204(d)(4) and (d)(6). However, primarily due to adverse weather conditions and the emergent discovery of issues while removing the original steam generators and installing the replacement steam generators, the outage was delayed such that it is now scheduled to be completed by early June 2022. Due to these delays, TVA will not be able to complete outage activities within the period of time when outage work hour controls would be permitted in accordance with 10 CFR 26.205(d)(4), as extended by the allowances in 10 CFR 26.205(d)(6). Therefore, TVA requested one-time exemptions from 10 CFR 26.205(d)(7) to allow personnel to work less restrictive hours for an additional period to support the refueling outage.

Within the exemption request, TVA has identified two categories of affected personnel. Category A personnel are identified as those individuals performing activities directly in support of the SGR project; these activities constitute maintenance activities, as discussed in 10 CFR 26.4, “FFD [fitness for duty] program applicability to categories of individuals,” section (a)(4). Category A personnel include specialized craft workers such as, pipefitters, boilermakers, operating engineers, electricians, and iron workers. Category B personnel are identified as those individuals performing normal outage shutdown, startup, maintenance, fuel handling, and modification activities, which are not related to the SGR project, and are covered by 10 CFR 26.4(a)(1), (a)(2), and (a)(4). Category B personnel includes operations, health physics, chemistry, and maintenance personnel.

For Category A personnel, TVA requested a one-time exemption from the requirements of 10 CFR 26.205(d)(7) that would be applicable for a period not to exceed 60 days beyond the end of the current 60-day unit outage period in 10 CFR 26.205(d)(4) that began on March 1, 2022. During this exemption period, TVA would continue to administer work hour controls for Category A personnel in accordance with the outage-related minimum day off requirements listed in 10 CFR 26.205(d)(4), and TVA would also administer certain additional mitigating actions discussed in Section V of the Enclosure to the submittal letter. The exemption period for Category A personnel would conclude either at the end of the additional 60-day period (i.e., no later than June 29, 2022) or when Watts Bar, Unit 2, is connected to the electrical grid, whichever occurs first.

For Category B personnel, TVA requested a one-time exemption from the requirements of 10 CFR 26.205(d)(7) that would begin upon completion of refueling outage Schedule Milestone SGM0184 (the SGR project schedule milestone for turnover of the polar crane from the SGR project team to the TVA outage team). During the

exemption period, Category B personnel would be permitted to work in accordance with the minimum day off requirements in 10 CFR 26.205(d)(4) for a 60-day period. Similar to the provisions of 10 CFR 26.205(d)(6) for outages, this 60-day period could be extended for each individual in 7-day increments for each non-overlapping 7-day period of the 60-day period during which the individual has worked not more than 48 hours. Following the conclusion of the 60-day period for a given individual, normal (non-outage) work hour controls, would resume for that individual, in accordance with the requirements of 10 CFR 26.205(d)(7). The exemption period for Category B personnel would conclude when Watts Bar, Unit 2, is connected to the electrical grid.

III. Discussion.

Pursuant to 10 CFR 26.9, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR part 26 when the exemptions are authorized by law and will not endanger life or property or the common defense and security; and are otherwise in the public interest.

A. The Exemption is Authorized by Law.

The exemption for Category A personnel would authorize a one-time exemption from the requirements of 10 CFR 26.205(d)(7) to allow the use the less restrictive work hour controls provided in 10 CFR 26.205(d)(4) for up to an additional 60 days, no later than June 29, 2022, or until the reactor unit is connected to the electrical grid, whichever occurs first, to allow SGR activities to be completed. The exemption for Category B personnel would authorize a one-time exemption from the requirements of 10 CFR 26.205(d)(7) to allow the use the less restrictive work hour controls provided in 10 CFR 26.205(d)(4) for a 60-day period that would begin upon completion of refueling outage

Schedule Milestone SGM0184 and may be extended as described in 10 CFR 26.205(d)(6) (Category B personnel), or until the reactor unit is connected to the electrical grid, whichever occurs first, to allow normal outage activities to be completed. As stated above, 10 CFR 26.9 allows the NRC to grant exemptions from the requirements of 10 CFR part 26. The NRC staff has determined that granting of the exemptions is permissible under the Atomic Energy Act of 1954, as amended, and other regulatory requirements. Therefore, the exemptions are authorized by law.

B. The Exemption Will Not Endanger Life or Property.

The underlying purpose of subpart I of 10 CFR part 26 is to ensure that cumulative fatigue does not compromise the abilities of individuals to perform their duties safely and competently. The underlying purpose of 10 CFR 26.205(d)(7) is to provide a method for licensees to manage worker fatigue while a unit is in operation by limiting the number of hours that can be worked on a weekly basis, as averaged over a 6-week period. The underlying purpose of 10 CFR 26.205(d)(4) is to provide licensees flexibility in scheduling required days off while accommodating more intense work schedules associated with a unit outage. The underlying purpose of 10 CFR 26.205(d)(6) is to allow the flexibilities provided by 10 CFR 26.205(d)(4) to be extended when directly justified by an individual's actual work history.

For Category B personnel, TVA requested an exemption from the requirements of 10 CFR 26.205(d)(7) that would begin upon completion of refueling outage Schedule Milestone SGM0184 (the SGR project schedule milestone for turnover of the polar crane from the SGR project team to the TVA outage team). During the exemption period, Category B personnel would be permitted to work in accordance with the minimum day off requirements in 10 CFR 26.205(d)(4) for a 60-day period. In addition, similar to the provisions of 10 CFR 26.205(d)(6) for outages, this 60-day period could be extended for

each individual in 7-day increments for each non-overlapping 7-day period of the 60-day period during which the individual has worked not more than 48 hours. TVA cited Position C.10 from Regulatory Guide 5.73, "Fatigue Management for Nuclear Power Plant Personnel," which discusses the expectation that licensees should confirm that an individual transitioning from an outage at one plant to another "has had a 34-hour break period within the 9 days that precede the day on which the individual begins working for the receiving licensee." TVA stated that prior to the start of the additional 60-day period, Category B personnel would have a minimum of 3 consecutive days off.

The NRC staff reviewed the schedules that had been worked by Category B personnel in various positions leading up to when TVA submitted the exemption request, as well as the originally planned work schedule for the remainder of the outage for Category B personnel (discussed in Table 1 of Enclosure 1 of TVA's submittal letter) to determine whether it would be appropriate to allow for a 60-day period for Category B personnel to use the flexibilities in 10 CFR 26.206(d)(4) and (d)(6), in addition to the 60 days of the current unit outage, from a fatigue management standpoint. The NRC staff noted that, for all positions except for Chemistry, individuals will have worked less than the 54-hour-per-week limit established for normal operating conditions in accordance with 10 CFR 26.205(d)(7) leading up to the start of the additional 60-day period for Category B personnel.

With regards to Chemistry personnel, the NRC staff noted that, under the most extreme scheduling case in accordance with the scheduling plan discussed in Table 1 of Enclosure 1 of TVA's submittal (including the 3 consecutive days off that will be provided to personnel), Chemistry personnel could potentially have worked up to 56 hours per week starting on March 14, 2022, and through the remainder of the first 60 days of the unit outage. However, this slight increase in the average hours worked per week, above the 10 CFR 26.205(d)(7) limits, is expected to be offset by the fact that the workers will

be guaranteed 3 consecutive days off prior to transitioning into the exemption period for Category B personnel.

The NRC staff further noted that, in accordance with the 60-day limit established by 10 CFR 26.205(d)(4), Chemistry personnel who are not eligible for an extension under 10 CFR 26.205(d)(6) would need to return to a 54-hour work week, in accordance with 10 CFR 26(d)(7), starting at the end of the first 60-days of the unit outage.

Therefore, depending on the actual date on which Schedule Milestone SGM0184 is completed, there is a possibility that Chemistry personnel will have returned to a 54-hour work week leading up to the start of the exemption period for Category B personnel.

Because Category B workers will be working a normal (or, in the case of Chemistry personnel, a near-normal) work schedule, in accordance with 10 CFR 26.205(d)(7), leading up to the additional 60-day period, the NRC staff determined that administering the minimum days off during the exemption period in accordance with the requirements in 10 CFR 26.205(d)(4) and (d)(6) will allow TVA to adequately manage cumulative fatigue among Category B personnel.

For Category A personnel, TVA requested authorization to apply the flexibilities allowed by 10 CFR 26.205(d)(4) for an additional period of up to 60 days beyond the first 60 days of the refueling outage that began on March 1, 2022. TVA identified several mitigating factors to justify this request. For example, TVA stated that, during the first 60 days of the refueling outage that began on March 1, 2022, when Category A personnel were scheduled to work 72-hour work weeks, they were given additional time off when available. This is reflected by the per-week work hour averages shown for various worker positions in Table 2 of Enclosure 1 of TVA's submittal letter. Additionally, TVA stated that during the exemption period it will implement alternative controls and mitigating actions, including the following:

- Personnel will not work more than 16 work-hours in any 24-hour period, and they will not work more than 72 work-hours in any 7-day period, excluding shift turnover.
- A minimum 10-hour break will be provided between successive work periods.
- 12-hour shifts will be limited to 72 work hours in a 7-day rolling period.
- A minimum of 3 days off will be provided in each subsequent 15-day period after the first 60 days of the outage.
- The calculation of work hours and days will include all work hours and days off during the applicable calculation periods, including those work hours and days off preceding initiation of the exemption period.
- Requirements will be established for behavioral observation and self-declaration during the period of the exemption. Specifically, the station will perform targeted management and peer to peer fatigue observations and the station will provide briefings with station personnel on the capability and process for personnel to self-declare fatigue.
- Prior to personnel going to the field, the process will include discussion of self-declaration of fatigue, with regards to both self-awareness and keeping watch on crew members.
- The station will promote fatigue awareness and perform targeted observations of fatigue signs using an observation program.

The NRC staff reviewed TVA's scheduling plan for Category A personnel. Because Category A workers have been provided with 1 day off every 7 days, and because, as discussed in Section IV of Enclosure 1 of TVA's submittal letter, those workers have typically worked consistent 12-hour schedules, there is a reasonable expectation that the day off, plus the time after a worker's preceding shift and before a

worker's subsequent shift, will provide about 36 consecutive hours of time off once every 7 days. Furthermore, 10 CFR 26.205(d)(2)(ii) requires that licensees shall ensure that individuals have, at a minimum, a 34-hour break in any 9-day period. Based on these considerations, the NRC staff determined that Category A personnel will receive at least a 34-hour break within the 9 days that precede the 60-day exemption period.

The NRC staff noted that compliance with the 34-hour break requirement discussed in 10 CFR 26.205(d)(2)(ii) does not, on its own, constitute adequate management of cumulative fatigue for workers, and that this requirement is intended to be implemented with the other work hour control requirements discussed in the other sections of 10 CFR 26.205. However, the NRC staff considered the required minimum 34-hour break period in conjunction with the fact that, leading up to the 60-day exemption period, Category A personnel will not have worked the full 72 hours per week allowed in accordance with the minimum days off required by 10 CFR 26.205(d)(4) for personnel performing maintenance activities in accordance with 10 CFR 26.4(a)(4). As shown by Table 2 of Enclosure 1 of the licensee's submittal letter, personnel will have only worked, on average, 58 to 66 hours of the allowed 72 hours per week. Because personnel will have been working, on average, 6 to 14 hours less than the maximum number of hours that are permitted by regulation during outage conditions, there is added assurance that cumulative fatigue can be adequately managed by the minimum 34-hour period they must provide prior to the start of the subsequent 60-day period.

One additional factor that the NRC staff considered for Category A personnel is the fact that a significant portion of the work being performed by these personnel consists of maintenance activities that will be subject to verification (e.g., via non-destructive examination) or post-maintenance testing. This provides some assurance that potential fatigue-related errors that may occur will be identified and resolved. However, the NRC staff did not rely exclusively on the additional assurance provided by

activities such as non-destructive evaluation (NDE) as a basis for its determination that the exemption would not endanger life or property, because (in accordance with Position C.2 of Regulatory Guide 5.73) individuals performing NDE are not necessarily subject to work hour controls and, as such, their performance could be potentially degraded by fatigue.

The NRC staff determined that the added scheduling margin from Category A personnel not having worked full 72-hour weeks leading up to the exemption period, along with adherence to the alternative work hour controls discussed in Section V of Enclosure 1 of TVA's submittal letter, will allow TVA to adequately manage cumulative fatigue among Category A personnel during the requested 60-day exemption period.

Because TVA proposed adequate alternative controls and mitigation measures for managing cumulative fatigue among Category A and Category B personnel for the duration of the requested one-time exemptions, the NRC staff determined that the requested one-time exemptions will not endanger life or property.

C. The Exemption is Consistent with the Common Defense and Security.

The proposed exemptions would authorize one-time exemptions from the requirements of 10 CFR 26.205(d)(7) to allow the use of the less restrictive work hour limitations provided in 10 CFR 26.205(d)(4) for up to an additional 60 days for Category A personnel, and for 60 days, which may be extended in accordance with 10 CFR 26.205(d)(6), for Category B personnel. The proposed exemptions are not applicable to security personnel nor do they have any relation to security issues. Therefore, the common defense and security is not impacted by these exemptions.

D. The Exemption is in the Public Interest.

In considering whether the requested exemptions would be in the public interest, the NRC staff considered several factors, including:

- the extent to which the need for an exemption was reasonably avoidable by the licensee;
- the interests of the licensee;
- the public health and safety interests of the communities that are impacted by the safe operation of the plant; and
- the potential adverse impacts on communities resulting from the further-extended shutdown of the unit, which would be prolonged if fewer resources were to be available as a result of TVA needing to resume usual (non-outage) work hours prior to completion of the refueling outage.

Regarding the extent to which the issues that led to the outage delays could have been foreseen and prevented, TVA noted in the Enclosure to the supplemental letter that the SGR project was originally scheduled to occur during the fall 2023 outage, but that it was moved up to the spring 2022 outage due to in-service inspection results on one of the aging steam generators that indicated degradation warranting expedited replacement. This discovery also resulted in the decision to commence with the spring 2022 outage early (early March, as opposed to mid-April), to limit the runtime of the affected steam generator. This resulted in significant impact on the planning for the project. However, despite the accelerated nature of project planning necessitated by these circumstances, TVA also discussed its consideration of potential schedule risks in planning the project, as depicted in Table 1 in the Enclosure to the supplemental letter, which included margin built into the schedule to account for various potential issues/delays, including weather-related delays. TVA also provided, in Revised CNL-

22054 Table 4 of the Enclosure to the supplemental letter, explanations for the various emergent discovery issues that delayed the project after it commenced, including the reasons that several of these delays could not have been reasonably foreseeable.

The NRC staff considered the fact that TVA took reasonable measures, in accordance with its processes, to consider possible issues that may arise and incorporated appropriate margin into the schedule. The NRC staff considered TVA's explanations for issues that did arise and determined that a substantial portion of the delays experienced were not foreseeable and preventable. The NRC staff also noted that the decision to move up the SGR project was conservative in nature and was intended to ensure that the unit did not operate with unacceptable steam generator degradation that could have been potentially adverse to safety.

In the Enclosure to the supplemental letter, TVA discussed the potential impact of the requested exemption on the broader community. Earlier completion of the outage will potentially allow for a return of the unit to an operating status in time to support summer energy demands. TVA stated that, without exemption, and with the resulting delayed restart of the Unit 2, TVA will be challenged from a reliability and environmental compliance perspective, as the area supplied by the unit transitions further into a period of the year characterized by warmer weather and higher loads. TVA discussed the likelihood that additional generation from the company's fossil-fuel-based sites would be necessary to make up for the lost generation from an extended outage of Watts Bar, Unit 2, which would result in reliance on a lower-reliability, higher-emission sources of electricity production.

The NRC staff considered the balance of public interest considerations, weighing the potential impact of the Watts Bar, Unit 2, outage needing to be further extended if the exemption were not approved, due to the reduced availability of personnel under a resumption of normal (non-operational) work hours. The NRC staff also considered the

potential impacts resulting from an increase in overall cumulative fatigue due to personnel working longer work hours for an extended period, beyond that of a typical outage under the established regulatory limits. As explained above, TVA proposed adequate alternative controls and mitigation measures for managing cumulative fatigue among Category A personnel for the duration of the requested one-time exemption, and TVA will have adequately managed fatigue for Category B personnel leading up to the start of the requested exemption period. Based on these considerations, the NRC staff concluded that: there is not expected to be a significant impact on public health and safety as a result of the increase in cumulative fatigue; earlier conclusion of the Watts Bar, Unit 2, refueling outage may allow TVA to meet elevated electrical demands without reliance on additional fossil fuel sources; and TVA took reasonable measures in its project planning to foresee and prevent project/outage delays where possible. Therefore, the NRC staff finds that approval of the requested exemptions is consistent with the public interest.

E. Environmental Considerations.

The Commission has determined that granting the exemptions from the requirements 10 CFR 26.205(d)(7) involves (1) no significant hazards consideration, (2) no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, (3) no significant increase in individual or cumulative public or occupational radiation exposure, (4) no significant construction impact, and (5) no significant increase in the potential for or consequences from radiological accidents.

(1) Under 10 CFR 50.92(c), there is no significant hazards consideration if the action does not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of

accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

The proposed exemptions are administrative in nature because they extend the timeframe when less restrictive hours can be worked for Category A and Category B personnel. The proposed exemptions have no effect on systems, and components (SSCs) and no effect on the capability of the SSCs to perform their design function. The proposed exemptions do not make any changes to the facility or operating procedures and do not alter the design, function, or operation of any plant equipment. Therefore, the exemptions do not increase the probability or consequences of an accident previously evaluated.

The proposed exemptions do not make any changes to the facility or operating procedures and do not alter the design, function, or operation of any plant equipment. Similarly, the proposed exemptions do not authorize any physical changes to any SSCs involved in the mitigation of any accidents. Therefore, the exemptions do not create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed exemptions do not authorize alteration of the design basis or any safety limits for the plant. The exemptions would not impact station operation or any SSC that is relied upon for accident mitigation. Therefore, the exemptions do not involve a significant reduction in a margin of safety.

For these reasons, the NRC has determined that approval of the exemptions requested involves no significant hazards consideration.

(2) The proposed exemptions do not authorize any changes to the design basis requirements for the SSCs at Watts Bar, Unit 2, that function to limit the release of non-radiological effluents, radiological liquid effluents, or radiological gaseous effluents during and following postulated accidents. Additionally, the exemptions do not change any requirements with respect to the conduct of radiation surveys and monitoring.

Therefore, there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

(3) The proposed exemptions do not affect the limits on the release of any radioactive material or the limits provided in 10 CFR part 20 for radiation exposure to workers or members of the public. Additionally, the exemptions will not increase or decrease the amount of work activities that must be completed in order to connect the reactor unit to the electrical grid. Therefore, there is no significant increase in individual or cumulative public or occupational radiation exposure.

(4) The exemptions do not involve any changes to a construction permit; therefore, there is no significant construction impact.

(5) The proposed exemptions do not alter any of the assumptions or limits in the licensee's accident analyses. Therefore, there is no significant increase in the potential for or consequences from radiological accidents.

(6) In addition, the requirements from which these exemptions are sought involve other requirements of an administrative, managerial, or organizational nature. Accordingly, the exemptions meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(25)(vi)(I). Therefore, in accordance with 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the NRC's consideration of these exemption requests.

IV. Conclusions.

Accordingly, the Commission has determined that, pursuant to 10 CFR 26.9, the exemptions are authorized by law, will not endanger life or property or the common defense and security, and are otherwise in the public interest.

The Commission hereby grants Tennessee Valley Authority a one-time exemption from 10 CFR 26.205(d)(7) for Category A personnel (i.e., those performing maintenance or directing maintenance activities as discussed in 10 CFR 26.205(d)(4) and in direct support of the spring 2022 SGR project) to allow the use of the minimum days off requirements discussed in 10 CFR 26.205(d)(4) for a 60-day period starting on May 1, 2022 (following the current 60-day outage period that began on March 1, 2022). While the exemption is in effect, TVA will also implement alternate work hour controls for Category A personnel, as discussed in Section V of Enclosure 1 to their submittal letter dated April 15, 2022. The exemption for Category A personnel shall end either at the end of the approved 60-day period (not to exceed June 29, 2022) or at the time when Watts Bar, Unit 2, is connected to the electrical grid, whichever occurs first.

The Commission hereby grants Tennessee Valley Authority a one-time exemption from 10 CFR 26.205(d)(7) for Category B personnel (i.e., those individuals performing normal outage shutdown, startup, maintenance, fuel handling, and modification activities, who are covered by 10 CFR 26.4(a)(1), (a)(2), and (a)(4), and are not directly related to the SGR project) to allow the use of the work minimum day off requirements discussed in 10 CFR 26.205(d)(4) for a 60-day period that shall begin upon completion of Schedule Milestone SGM0184 (i.e., turnover of the polar crane from SGR project team to the TVA outage team). This 60-day period may be extended for each individual subject to the exemption in 7-day increments for each non-overlapping 7-day period the individual has worked not more than 48 hours during the 60-day period as described in 10 CFR 26.205(d)(6). Following the conclusion of the 60-day period for a given individual, normal (non-outage) work hour controls, in accordance with requirements of 10 CFR 26.205(d)(7), shall resume for that individual. The exemption for Category B personnel shall end when Watts Bar, Unit 2, is connected to the electrical grid.

Dated at Rockville, Maryland, this 29th day of April, 2022

For the Nuclear Regulatory Commission.

Gregory Digitally signed by
F. Suber Gregory F. Suber
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Gregory F. Suber, Deputy Director,
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