



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE 3

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 149 TO FACILITY OPERATING LICENSE NO. DPR-77

SUPPORTING AMENDMENT NO. 135 TO FACILITY OPERATING LICENSE NO. DPR-79

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

1.0 INTRODUCTION

By letter dated January 22, 1990, the Tennessee Valley Authority (TVA) proposed changes to Section 3/4.3.3, "Monitoring Instrumentation," of the Sequoyah Nuclear Plant, Units 1 and 2, Technical Specification (TSs). The proposed changes are to revise TS 3/4.3.3.7, "Accident Monitoring Instrumentation," and the associated Tables 3.3-10 and 4.3-7. These changes would revise the requirements in TS 3/4.3.3.7 in the following manner: (1) delete Table 4.3-7 and add requirements to Surveillance Requirement (SR) 4.3.3.7; (2) transfer the action statements for Limiting Condition for Operation (LCO) 3.3.3.7 to Table 3.3-10 and revise the action statements, the total number of instrument channels available, and the minimum number of channels required; (3) add information on the specific instrument loops to the instruments listed in Table 3.3-10; (4) add four instruments and delete seven instruments from Table 3.3-10; and (5) revise the TS Bases for the accident monitoring instrumentation. This is TVA's TS Change Request 89-30.

The modifications to upgrade the instruments to the provisions in Regulatory Guide (RG) 1.97, Revision 2, Instrumentation For Light-Water-Cooled Nuclear Power Plants To Assess Plant Conditions During And Following An Accident," December 1980, were completed during the Cycle 4 refueling outage for each unit (i.e., March to June, 1990, for Unit 1, and September to November, 1990, for Unit 2).

2.0 EVALUATION

The proposed changes in TS Change Request 89-30 can be broken down into five categories. These categories are listed above and they will be evaluated separately. These evaluations are given below:

2.1 Delete Table 4.3-7

Table 4.3-7 lists the surveillance requirements for the accident monitoring instrumentation given in Table 3.3-10. The surveillance requirements are

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monthly for a channel check and every refueling outage for the channel calibration. TVA has proposed to add these same requirements in SR 4.3.3.7 instead of Table 4.3-7, and then delete Table 4.3-7, because they are the same for every accident monitoring instrument listed in Table 3.3-10. Because the proposed changes do not change the surveillance requirements for the instruments in Table 4.3-7, the staff concludes that these changes are acceptable.

TVA also proposed to have the footnote for the containment area monitors in Table 4.3-7 to be a footnote to SR 4.3.3.7 with a reference to these monitors. This proposed change is an administrative change to continue the description of the channel calibration for these monitors with Table 4.3-7 deleted. The proposed change does not revise the description of the channel calibration for these monitors; therefore, the staff concludes that the proposed change is acceptable.

2.2 Transfer Action Statements to Table 3.3-10

TVA has proposed to have the action statements for TS 3/4.3.3.7 in Table 3.3-10. The intent is to transfer the requirements currently in the action statements from LCO 3.3.3.7 to Table 3.3-10. This format is used in other tables in the TSs. The proposed action statements in Table 3.3-10 were reviewed against the current ones to determine if any of the current requirements were being changed. This review took into account that the columns in Table 3.3-10 were being revised by the proposed changes. Instead of "Required Number of Channels" and "Minimum Channels Operable," TVA has proposed the following headings for the columns: "Total Number of Channels" and "Minimum Channels Required."

Based on the proposed minimum channels required in the proposed Table 3.3-10, all the instruments in the revised Table have proposed action statements which are at least the same as the current action statements and the same number of channels required to be operable except for the incore thermocouples. The following instruments have additional requirements in the proposed action statements which are beyond the current requirements: reactor coolant pressure, pressurizer level, and reactor coolant system subcooling margin monitor. The redundancy for the AFW flow is provided by the single AFW flow channel for each steam generator and the three AFW level control valve position indicators (i.e., a valve for each of the two motor-driven AFW flow paths and a valve for the turbine AFW flow path).

The incore thermocouples only have a requirement for the unit to go to hot shutdown if the number of operable channels is less than the minimum number required per core quadrant for 48 hours. They do not have a requirement that if the number of operable channels is one less than the total number of channels for seven days, the unit must go to hot shutdown. Because the minimum number of channels required is 1/core quadrant/train, or 8 per core, and there is a total of 65 incore thermocouple channels in the core, the staff concludes that the proposed changes for the incore thermocouples are acceptable.

For the subcooling margin monitor, the requirements in the current action statements for LCO 3.3.3.7 for an inoperable monitor were based on (1) the units each having only one monitor, (2) the monitors not meeting the requirements of TMI Action Plan Item II.F.2, and (3) the monitors not meeting

provisions of RG 1.97. TVA committed to have the subcooling margin monitors meet the requirements of Item II.F.2 and provisions of RG 1.97 by the Cycle 4 refueling outage for both units in its letter dated August 14, 1985. This included increasing the number of monitors for each unit to two. This was accepted in the staff's Safety Evaluation dated November 22, 1985.

With the total number of these monitors being increased to two for each unit and these monitors meeting RG 1.97 and II.F.2 in the Cycle 4 refueling outage for both units, the current action statements for these monitors are not appropriate in that they do not require an eventual unit shutdown for an inoperable monitor(s) and instead rely on an additional shift crew member dedicated to and capable of determining the subcooling margin during an accident for indefinite unit operation with an inoperable monitor(s).

The action statements should be in accordance with the guidance in Generic Letter (GL) 83-37, "NUREG-0737 Technical Specifications," dated November 1, 1983. The proposed action statements for these monitors are not consistent with GL 83-37 and TVA has not provided justification for this inconsistency. Therefore, the staff will request TVA to propose the action statements in GL 83-37 or provide justification that the action statements in GL 83-37 do not apply to Sequoyah. Because the proposed action statements are consistent with the current action statements for these monitors, the staff concludes that the proposed action statements with the requirements for an additional shift crew member dedicated to determining the subcooling margin during an accident are acceptable until TVA has resolved this issue.

Therefore, based on the above, that all the instruments in Table 3.3-10 have proposed minimum channels required and action statements that meet the requirements in the current action statements or are acceptable, including the incore thermocouples and the subcooling margin monitors as discussed above, the staff concludes that the proposed changes for the total number of channels, minimum channels required, and action statements in Table 3.3-10 are acceptable. For the subcooling margin monitors, the staff will request TVA to address the action statements in GL 83-37.

For proposed Actions 1, 2, and 5, there is a note given with the action statements. The notes refer to all or one of the following tables in the TSs: Table 3.3-1, "Reactor Trip System Instrumentation," Table 3.3-3, "Engineered Safety Features Actuation System Instrumentation," and Table 3.3-9, "Remote Shutdown Monitoring Instrumentation." TVA is stating in these notes that there are applicable action requirements in these tables for some of the instrumentation listed in Table 3.3-10 and these action requirements should be referred to if the equipment is inoperable to determine which action requirements are the most restrictive. For example, because the source range neutron flux instrumentation is listed in both Tables 3.3-1 and 3.3-10, the action statements in both tables would apply if this instrumentation is inoperable. The more restrictive action statement for the situation the reactor was in would be the one that applied to the inoperable instrumentation at that time. This is additional information for the control room operators. The staff agrees that some of the instruments listed in Table 3.3-10 are also listed in Table 3.3-1, 3.3-3, and 3.3-9. Therefore, the notes provide useful information to the control room operators and the staff concludes that this proposed change is acceptable. It should be pointed out that the action statements for

3.3-9 are, in fact, in LCO 3.3.3.5. The staff also concludes that proposed Actions 3, 4, and 6 do not need a similar note.

Add Information on Instrument Loops

TVA has proposed to add the numbers of the specific instrument loop for all instruments listed in Table 3.3-10, except the in-core thermocouples which have a total number of 65 channels. TVA provided the instrument loops for the following instruments that the staff did not agree could be deleted from Table 3.3-10 without further justification, as discussed in Section 2.4 below: wide range containment pressure and reactor vessel level indication system. This information is not used to decide if an instrument is operable or what action statement would apply if an instrument is inoperable. The numbers simply show the specific loops at Sequoyah for the accident monitoring instrumentation listed in the table. The number of instrument loops is equal to the total number of channels listed in Table 3.3-10 except for the reactor vessel level indication system which was three loops/channel. This change is administrative in nature. The staff concludes that the proposed change is acceptable.

2.4 Revise Instruments Listed in Table 3.3-10

TVA proposed to revise Table 3.3-10 to only list the Type A, Category 1 instruments of Regulatory Guide (RG) 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident." The Type A instrument variables in RG 1.97 provide primary information to the control room operators to permit them to take specified manually controlled actions for which no automatic action is provided and that are required for safety systems to accomplish their safety functions for design basis events. Category 1 instrument variables have design requirements for seismic and environmental qualification, application of single failure criteria, utilization of emergency standby power, control room display, continuous readout, and recording capability. TVA stated that the following instrumentation has been designated for Sequoyah as Type A, Category 1 instruments in accordance with the guidance given in RG 1.97 and a review of emergency procedures, functional restoration guidelines, and the Sequoyah Final Safety Analysis Report (FSAR), Chapter 15 (design basis accidents):

1. Reactor Coolant System (RCS) Hot Leg Water Temperature (Wide Range)
2. RCS Cold Leg Water Temperature (Wide Range)
3. Containment Pressure (Narrow Range)
4. Refueling Water Storage Tank Level
5. Reactor Coolant Pressure (Wide Range)
6. Pressurizer Level
7. Steam Line Pressure
8. Steam Generator (SG) Level (Wide Range)
9. SG Level (Narrow Range)

10. Auxiliary Feedwater (AFW) Flow Rate and Level Control Valve Position
11. RCS Subcooling Margin Monitor
12. Containment Sump Water Level (Wide Range)
13. Incore Thermocouples
14. Containment Area Radiation Monitors (Upper and Lower)
15. Containment Hydrogen Monitors
16. Neutron Flux Monitors (Source and Intermediate Range)

The proposed TS change incorporates the above instruments into the accident monitoring instrumentation Table 3.3-10 except for the containment hydrogen monitors which are listed in TS 3/4.6.4, Combustible Gas Control. Based on the existing instruments in Table 3.3-10, the proposed TS change means that (1) the position indication for the pressurizer power-operated relief and block valves, and the safety valves; the wide-range containment pressure instrumentation; the reactor vessel level instrumentation system; and the high-range and mid-range noble gas effluent monitors are being deleted from Table 3.3-10 and (2) the narrow-range containment pressure indication, the auxiliary feedwater level control valve position indication, and the source range and intermediate-range neutron flux instruments are being added to Table 3.3-10. There are also footnotes in Table 3.3-10, which are associated with the instruments being proposed to be deleted, that TVA has also proposed to delete.

TVA provided the following justifications to support the deletion of the six instruments from Table 3.3-10:

2.4.1 Pressurizer Power-Operated Relief Valve (PORV) Position Indication

PORV position indication is used by the operator to ensure that the reactor coolant system (RCS) pressure boundary is intact when RCS pressure is decreasing. However, RCS pressure has been included as a Type A variable and is considered to provide the primary information to the operator. If RCS pressure is decreasing, the operator can take conservative actions by attempting to close the pressurizer PORV or block valve even if the position indication is not available. Thus, the pressurizer PORV position does not meet the criteria of a Type A variable. The PORV position indication for Sequoyah is designated as a Type D, Category 2 variable which is consistent with the guidance in RG 1.97. In addition, the footnote in Table 3.3-10 associated with PORV position indication is no longer applicable.

2.4.2 Pressurizer PORV Block Valve Position Indication

The PORV block valve position indication provides a backup to the PORV for ensuring the RCS pressure boundary is intact when RCS pressure is decreasing. RCS pressure has been included as a Type A variable and is considered to provide the primary information to the operator. If RCS pressure is decreasing, the operator can take conservative actions by attempting to close the pressurizer PORV or block valve even if the position indication is not

available. Thus, the block valve position does not meet the criteria of a Type A variable. The PORV block valve position indication for Sequoyah is designated as a Type D, Category 2 variable which is consistent with the guidance in RG 1.97. In addition, the footnote in Table 3.3-10 associated with PORV block valve indication is no longer applicable.

2.4.3 Pressurizer Safety Valve Position Indication

Safety valve position indication can be used by the operator to determine if the RCS pressure boundary is intact when RCS pressure is decreasing; however, these valves are just three of several RCS valves that could be open and breaching the pressure boundary. RCS pressure has been included as a Type A variable and is considered to provide the primary information to the operator that RCS pressure is decreasing. Thus, safety valve position indication does not meet the criteria of a Type A variable. The safety valve position indication for Sequoyah is designated as a Type D, Category 2 variable which is consistent with the guidance in RG 1.97.

2.4.4 Wide Range Containment Pressure

TVA is proposing to replace the wide range containment pressure instruments in Table 3.3-10 by the narrow range containment pressure instruments. These instruments are direct indication of containment pressure but the wide range containment pressure is designated for Sequoyah as Type B, Category 1 in accordance with the guidance in RG 1.97 and the narrow-range containment pressure is designated for Sequoyah as Type A, Category 1.

2.4.5 Reactor Vessel Level Indication System (RVLIS)

RVLIS is considered to be a direct indication of core cooling and is designated for Sequoyah as Type B, Category 1 in accordance with the guidance in RG 1.97, Table 2. In addition, the footnote associated with RVLIS is no longer applicable.

2.4.6 Shield Building Exhaust Vent (High-Range/Mid-Range Noble Gas)

The shield building exhaust vent serves as a nonisolable primary release point for detection of airborne radioactive material following an accident. In accordance with the guidance in RG 1.97, the noble gas monitors for Sequoyah have been designated as Category 2. In addition to being Type E variable, TVA also designated this vent (noble gas) as a Type C variable because it provides information that would indicate a breach in containment integrity. The high-range/mid-range noble gas monitors for the shield building exhaust vent do not meet the criteria of a Type A variable.

2.4.7 Condenser Vacuum Exhaust Vent (High-Range/Mid-Range Noble Gas)

The function of the condenser vacuum exhaust during an accident is the detection of secondary-side radioactivity from the primary RCS side. Main steam line radiation levels, steam generator (SG) blowdown radiation levels, and SG sampling provide similar information for detecting secondary-side radiation. The Sequoyah emergency instructions direct the operator to use secondary-side radiation levels to diagnose a SG tube rupture event. Identification of this

event and the subsequent required manual actions are taken based on increasing SG level with no AFW flow. The SG level (narrow-range) and AFW flow are both classified as Type A, Category 1 variables. Consequently, the condenser vacuum exhaust vent (high-range/mid-range) noble gas monitors have been designated as a Type E, Category 2 variable for Sequoyah. In addition to being Type E, TVA also designated the condenser vacuum exhaust (noble gas) as a Type C variable because it provides information that would indicate a breach in the RCS pressure boundary.

2.4.8 RG 1.97 Type A, Category 1 Instrumentation

For the instrumentation listed above which TVA proposed to be deleted from Table 3.3-10, the instruments are not associated with RG 1.97 Type A, Category 1 variables for Sequoyah. The RG 1.97 type and category of the instruments for Sequoyah are listed in Attachment 1 to TVA's submittal on RG 1.97, dated May 7, 1990. The entire list of RG 1.97 Type A, Category 1 variables for Sequoyah are associated with the 16 instruments listed above. Therefore, all of the RG 1.97 Type A, Category 1 variable instrumentation are being proposed for Table 3.3-10 with the exception of the containment hydrogen monitors which are given in TS 3/4.6.4.1.

It is the staff's position that Table 3.3-10 should list all RG 1.97 Category 1 instrumentation and not just the Type A, Category 1 instrumentation. Category 1 applies to the key safety instrumentation for the units. It does not apply to instrumentation designated as indicating the status of operating systems (i.e., Category 2) or as backup and diagnostic (i.e., Category 3). Therefore, because of their implied safety significance, all the Category 1 instrumentation should be listed in Table 3.3-10 of the TSs unless the licensee can justify that the safety significance of the instrumentation is not sufficient to warrant including the instrumentation in the TSs.

In its application, TVA has not proposed to have the following RG 1.97 Category 1 instrumentation in the TSs: wide-range containment pressure instrumentation, reactor vessel level instrumentation, containment isolation valve position, and the essential raw cooling water system to auxiliary feedwater pump valve position indication. These four instruments are identified as RG 1.97 Category 1 instrumentation for Sequoyah in the TVA response to RG 1.97 dated May 7, 1990. The first two instruments are currently in Table 3.3-10 and TVA has proposed to delete them because they are not RG 1.97 Type A, Category 1 instrumentation for Sequoyah. The latter two instruments are not currently in Table 3.3-10 and TVA has not proposed to add them to the TSs because they are also not RG 1.97 Type A, Category 1 instrumentation for Sequoyah.

For these four instruments, TVA has not provided justification that the safety significance of these instruments is not sufficient to warrant having them included in the TSs. TVA's justification for deleting the wide-range containment pressure and reactor vessel level instrumentation was only that they were not RG 1.97 Type A, Category 1 instruments for Sequoyah. This justification is not sufficient for the staff to conclude that the proposed change to delete these instruments is acceptable.

The staff does not agree that the wide-range containment pressure and reactor vessel level instrumentation should be deleted from Table 3.3-10. However, the other changes to revise Table 3.3-10 by (1) deleting the pressurizer PORV and block valve position indication, pressurizer safety valve position indication, shield building exhaust vent high-range and mid-range noble gas monitor, and condenser vacuum exhaust high-range and mid-range noble gas monitor, and (2) adding the source-range and intermediate-range neutron flux monitors and the narrow-range containment pressure instrumentation are acceptable. These changes are acceptable because TVA is proposing to delete instrumentation which are not RG 1.97 Category 1 and add instrumentation which are RG 1.97 Category 1, for Sequoyah.

The staff will request TVA to (1) withdraw its request to delete the wide-range containment pressure and reactor vessel level instrumentation and (2) add the containment isolation valve position indication and the essential raw cooling water system to auxiliary feedwater pump valve position indication.

The proposed Table 3.3-10 is in a different format than the current Table 3.3-10. Therefore, in keeping the wide-range containment pressure and reactor vessel level instrumentation, as discussed above, in Table 3.3-10 means that the format of the data and action statements for these instruments must be revised. This was discussed with TVA and agreed upon during the visit of the NRC Sequoyah Project Manager to the Sequoyah site on August 16, 1990. The format of the data and action statements for the wide range containment pressure and reactor vessel level instrumentation were revised from that in TS 3/4.3.3.7 of the current TSs but the requirements on the instruments in the TSs are not being changed. Therefore, the revision to the format of the data and action statements for these instruments in TS 3/4.3.3.7 does not change the substance of the proposed action in the Federal Register Notice (55 FR 6118) which was published on February 21, 1990 for the proposed amendments and does not affect the staff's initial determination of no significant hazards consideration in that notice.

The footnotes associated with the instruments being proposed to be deleted from Table 3.3-10, including the reactor vessel level instruments, are also proposed by TVA to be deleted because they are no longer applicable. The staff agrees with this conclusion and concludes that the proposed changes to delete the footnotes are acceptable.

2.5 TS Bases Change

TVA stated that the bases for TS 3/4.3.3.7, Accident Monitoring Instrumentation, have been revised to do the following: (1) provide TVA's licensing position for the inclusion of RG 1.97 Type A, Category 1 instrumentation in the TSs; (2) update the reference to RG 1.97 to reflect TVA's commitments for Revision 2 of RG 1.97, dated December 1990; (3) delete portions of the bases involving the use of acoustic monitors are one of the two required channels for determining pressurizer safety valve position; (4) describe the redundant channel capability for AFW flow instrumentation and AFW valve position indication; and (5) reference TS 3.6.4.1 to specify operability requirements for containment hydrogen monitors. The TS bases for TS 3/4.6.4, Combustible Gas Control, have also been modified to reference the containment hydrogen monitors as RG 1.97 accident monitoring instrumentation.

TVA proposed entirely new text for the bases of TS 3/4.3.3.7. The text is considered accurate and correct and consistent with the above accepted TS changes, except for TVA's licensing position that only RG 1.97 Type A, Category 1 instrumentation should be in the TSs. It is the staff's position that all RG 1.97 Category 1 instrumentation should be listed in the TSs unless the licensee can justify that the safety significance of the specific instrumentation is not sufficient to warrant having the instrumentation in the TSs. Therefore, the staff concludes that the proposed changes to the basis of TS 3/4.3.3.7 are acceptable except for the statements concerning TVA's position on RG 1.97 Type A, Category 1 instrumentation. TVA will be requested to withdraw or revise this proposed change to the basis of TS 3/4.3.3.7.

TVA also proposed to state in the bases for TS Section 3/4.6.4, Combustible Gas Control, that the hydrogen monitors of TS 3.6.4.1 are part of the accident monitoring instrumentation that are RG 1.97 Type A, Category 1 variables for Sequoyah. This is correct and, therefore, the staff concludes that this proposed change is acceptable.

2.6 Modifications To Meet RG 1.97

TVA stated that the instrument modifications to meet RG 1.97 were scheduled for the Cycle 4 refueling outage on each unit. Unit 1 is the lead unit with the Unit 1 Cycle 4 refueling outage completed in May 1990 and the Unit 2 Cycle 4 refueling outage having been completed in November 1990. The majority of the RG 1.97 modifications involved instrumentation that can only be installed or modified during a plant shutdown. TVA submitted the proposed TS change to coincide with the Unit 1 modification schedule which was completed by the Unit 1 restart in May 1990 from its Cycle 4 refueling outage.

2.7 Evaluation of RG 1.97

TVA has submitted its response to RG 1.97 for Sequoyah in letters dated December 28, 1988, September 14, 1989, and May 7, 1990. This is being reviewed by the staff and will be the subject of a separate evaluation. The staff is in agreement with TVA's submittal dated May 7, 1990 as to the RG 1.97 Category 1 instrumentation for Sequoyah.

2.8 Conclusion

Based on Sections 2.1 to 2.5 above, the staff concludes that the proposed changes in TVA's TS Change Request 89-30 are acceptable except for the proposed changes discussed in Sections 2.4.8 and 2.5 above. The staff concludes that all RG 1.97 Category 1 instrumentation should be listed in the TSs. Therefore, the staff will request TVA to (1) withdraw its request to delete the wide-range containment pressure instrumentation and the reactor vessel instrumentation from Table 3.3-10, (2) propose the addition of the containment isolation valve position indication and the essential raw cooling water system to auxiliary feedwater pump valve position indication to Table 3.3-10, and (3) withdraw or revise its request to have the basis for TS 3/4.3.3.7 be only the RG 1.97 Type A, Category 1 instrumentation.

The staff concludes in Section 2.2 that the action statements for inoperable subcooling margin monitors in Table 3.3-10 should be consistent with the

guidance in GL 83-37. Therefore, the staff will request TVA to propose appropriate action statements for these monitors consistent with the GL or provide a justification that the action statements do not apply to Sequoyah.

3.0 ENVIRONMENTAL CONSIDERATION

These amendments involve a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance requirements. The staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement nor environmental assessment need be prepared in connection with the issuance of these amendments.

4.0 CONCLUSION

The Commission made a proposed determination that the amendments involve no significant hazards consideration which was published in the Federal Register (55 FR 6118) on February 21, 1990 and consulted with the State of Tennessee. No public comments were received and the State of Tennessee did not have any comments.

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security nor to the health and safety of the public.

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