

50-390



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

July 12, 1995

MEMORANDUM TO: Richard H. Wessman, Chief  
Mechanical Engineering Branch  
Division of Engineering

THRU: *flc* Terence L. Chan, Chief  
Components & Testing Section  
Mechanical Engineering Branch  
Division of Engineering

FROM: *TGS* Thomas G. Scarbrough  
Components & Testing Section  
Mechanical Engineering Branch  
Division of Engineering

SUBJECT: STATUS OF WATTS BAR MOTOR-OPERATED VALVE PROGRAM

In December 1989, the Tennessee Valley Authority (applicant) committed to develop and implement a motor-operated valve (MOV) program at the Watts Bar nuclear power plant in accordance with the recommendations and schedule of Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." This commitment requires that the applicant complete verification of the design-basis capability of MOVs within the scope of GL 89-10, and to establish long-term MOV periodic verification and trending programs, before startup of Watts Bar. Over the last several years, Region II with NRR staff and contractor assistance has conducted periodic inspections to evaluate the MOV program at Watts Bar.

On June 19, 1995, NRC management and staff from Region II and NRR held a meeting with applicant representatives at the Region II office in Atlanta to discuss the Watts Bar GL 89-10 program. The meeting focused on the schedule for the applicant to complete its GL 89-10 program. Applicant representatives committed to complete the GL 89-10 program for Watts Bar, including the technical issues raised by Region II in NRC Inspection Report (IR) No. 50-390/95-21, by August 14, 1995. A follow-up conference call was held on June 21 to discuss those technical issues.

From June 28 to 30, E. Girard (of Region II) and I met with applicant personnel at Watts Bar to review the progress being made by the applicant to resolve the technical MOV issues raised in IR 50-390/95-21. Attachment 1 is a handout provided by applicant personnel at the beginning of the meetings. Attachment 2 is a summary of the status of the MOV issues discussed with applicant personnel.

Licensee personnel from the Browns Ferry and Sequoyah nuclear power plants attended the meetings from June 28 to 30 to obtain information for use in

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completing the GL 89-10 programs at those facilities. No Browns Ferry or Sequoyah operability concerns were identified during the discussions. Region II is conducting a GL 89-10 inspection at Browns Ferry during the weeks of July 10 and 24, which will consider the applicability of the Watts Bar information to that facility.

At the conclusion of the Watts Bar meetings, Ed Girard and I provided our comments on the applicant's plans to complete its GL 89-10 program and to address the issues raised in IR 95-21. In addition to programmatic aspects, we had comments regarding the applicant's performance of the reconciliation calculations. The applicant personnel stated that they understood our comments and that they did not consider the comments to affect adversely the overall conclusions of the reconciliation calculations. Applicant personnel stated that they would consider our comments in their planned actions.

Significant work remains for the applicant to complete its GL 89-10 program at Watts Bar by the schedule commitment date of August 14, 1995. In addition to nine dynamic tests to be conducted and several programmatic aspects that must be addressed, the applicant must complete its reconciliation of the dynamic test data for the 119 GL 89-10 MOVs at Watts Bar. The NRC staff will need to evaluate a large amount of program documentation and calculations before determining the adequacy of the implementation of GL 89-10 at Watts Bar. Therefore, I consider it important for the staff to monitor the progress made by the applicant to complete the Watts Bar GL 89-10 program over the next several weeks.

To assist the staff in monitoring and evaluating the GL 89-10 program, Watts Bar personnel agreed to provide summaries of the reconciliation calculations to the staff as they are completed. The applicant personnel also agreed to hold teleconferences to discuss GL 89-10 program status and any staff comments on the reconciliation calculations on a biweekly basis until the program is complete. During our first such teleconference on July 10, we discussed the plans of the applicant personnel to address our previous comments on the Watts Bar GL 89-10 program, and provided comments on the reconciliation packages for particular MOVs. Also during the teleconference, the applicant personnel stated that significant resources were being placed on completing the GL 89-10 program and that reconciliation packages for 61 MOVs have been completed.

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GENERIC LETTER 89-10  
MOTOR-OPERATED-VALVE

- GL 89-10 PROGRAM TO BE FULLY IMPLEMENTED BEFORE FUEL LOAD
  
- CURRENT SCHEDULE FOR COMPLETION IS 8/15/95
  
- 9 VALVES REMAIN TO BE TESTED
  - 2 VALVES TO BE TESTED BEFORE HFT2
  - 7 VALVES TO BE TESTED DURING HFT2
  
- IMPLEMENTATION OF PROGRAM - SSP-8.51(DRAFT)
  - PERIODIC VERIFICATION
  - TRENDING OF MOV DEGRADATION
  - UPDATE SITE GL 89-10 PROGRAM
  - POST MAINTENANCE TESTING & POST MODIFICATION TESTING CRITERIA OF GL 89-10 VALVES
  
- OTHER ISSUES FROM INSPECTION REPORT
  - MAXIMUM THRUST VALUES NOT CLEAR IN MI-0.6 (COMPLETE)

GL 89-10 PROGRAM POPULATION  
prior to March 1994 = 151

Notified NRC - ltr 3/3/1994 (T04 940303 851) scope reduced by deleting 12 plug valves

also provided justification for not testing 18 Henry Pratt butterfly valves

3/3/94 valves = 139

system 67, power removed and U2 valves (5<sup>th</sup> Diesel)  
1-FCV-67-72 and 2-FCV-67-73. These valves were removed from the Unit 1 boundary  
by DCN W-26145-A.

1-FCV-67-66, -67, -223, -458, -478, and 2-FCV-67-66, -67, -223. These valves were  
locked in position with power removed by DCN M-34175-A.

4/26/94 valves = 129

system 26, valves locked open  
1-FCV-26-6, -13, -126, &-127 via by DCN W-35871-A.

6/7/95 valves = 125

system 26, power removed  
1-FCV-26-241, -242, -243, -244, -3, &-8 removed via DCN M-36871-A

projected issue 7/5/95 total = 119

population includes

gate valves	72	all will be differential pressure tested
globe valves	10	all will be differential pressure tested
butterfly valves	37	19 will be differential pressure tested (18 Henry Pratt are excluded)

NE Current Status  
June 28, 1995

There is a calculation for each valve in the program.

calculations, 100%, issued	21	copies provided
calculations, 90%, prepared and partial checking	20	
calculations, 50%, prepared	12	
	<u>53</u>	

$119 - 53 = 66$  remaining to be revised

On track to be completed by 14 August 1995

## Design Basis Review Calculation

An individual calculation for each valve in the GL 89-10 program.

Each calculation contains:

- design basis review and evaluations

- EOI/AOI evaluation.

- evaluation of the test data including:

  - VF

  - SF

  - reconciliation

each calculation captures the total basis for acceptability from the design to the differential pressure test on a valve

## PROMPT OPERABILITY EVALUATION

SSP-8.50 Rev 1 (draft) contains the instructions for support of testing during operations

each calculation will have a spread sheet used to evaluate the reconciliation. They will be maintained and on a portable computer.

the test data will be entered during the test at the valve.

the results can be evaluated immediately.

copy provided

## **Tripper Finger Issue**

PER 950295 written to address the two instances, in process for CAP approval

Limitorque has designed a new part to be installed in the gear cavity to provide a stop for the fingers

Limitorque confirms that electrical operation ensures that the actuator is operational

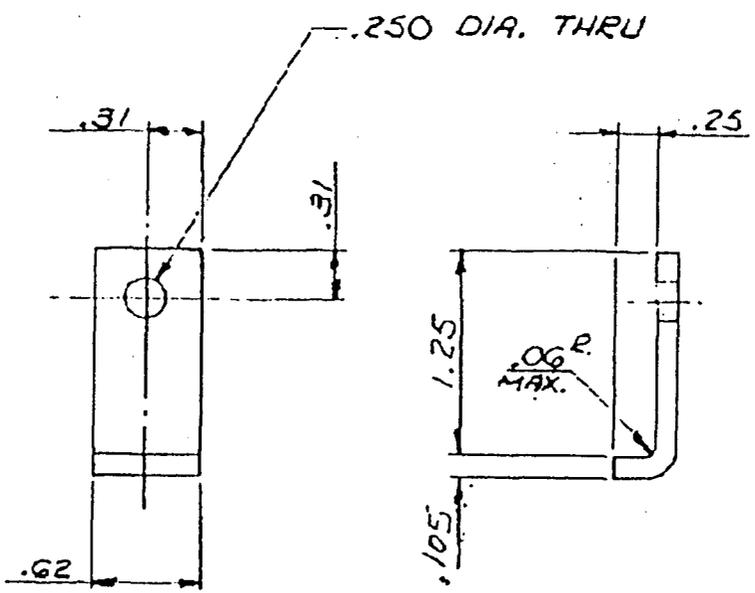
REV. 60-505-0057-1

UNLESS OTHERWISE SPECIFIED:  
DIMENSIONS ARE IN INCHES  
SURFACE FINISH: ✓ MICROINCHES.  
REMOVE ALL BURRS & SHARP CORNERS.  
TURN ALL FILLET RADII TO .020  
UNDER LOW LIMIT OF FINISH  
GRIND DIMENSIONS, FILLETS  
TO BE POLISHED.

- 1 THESE DIAMETERS TO BE CONCENTRIC WITHIN T.I.R.
- 2 THESE SURFACES TO BE SQUARE TO 1 DIAMETERS WITHIN T.I.R.

TOLERANCE LIMITS UNLESS OTHERWISE SPECIFIED

CAST DIM	± .040
CAST ANGLES	± 1°
MACH DIM:	
.X	± .040
.XX	± .010
.XXX	± .004
ANGULAR	± 1/2°



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E				1st ORDER NO.		LIMITORQUE CORPORATION	
D				STOCK SIZE	TRD.	NAME TRIPPER STOP	
C				RGH. WT.		SUPERSEDES:	UNIT. SIZE
B				FIN. WT.		SUPERSEDED BY:	SMB-00
A						DWG. NO. 60-505-0057-1 - 7	
NO.	DESCRIPTION	NAME	C/N NO.	HEAT TREAT			REV. 33
		DATE	APPRD.				

2-2 ORIGINAL DWG. NO. 60-505-0057-1

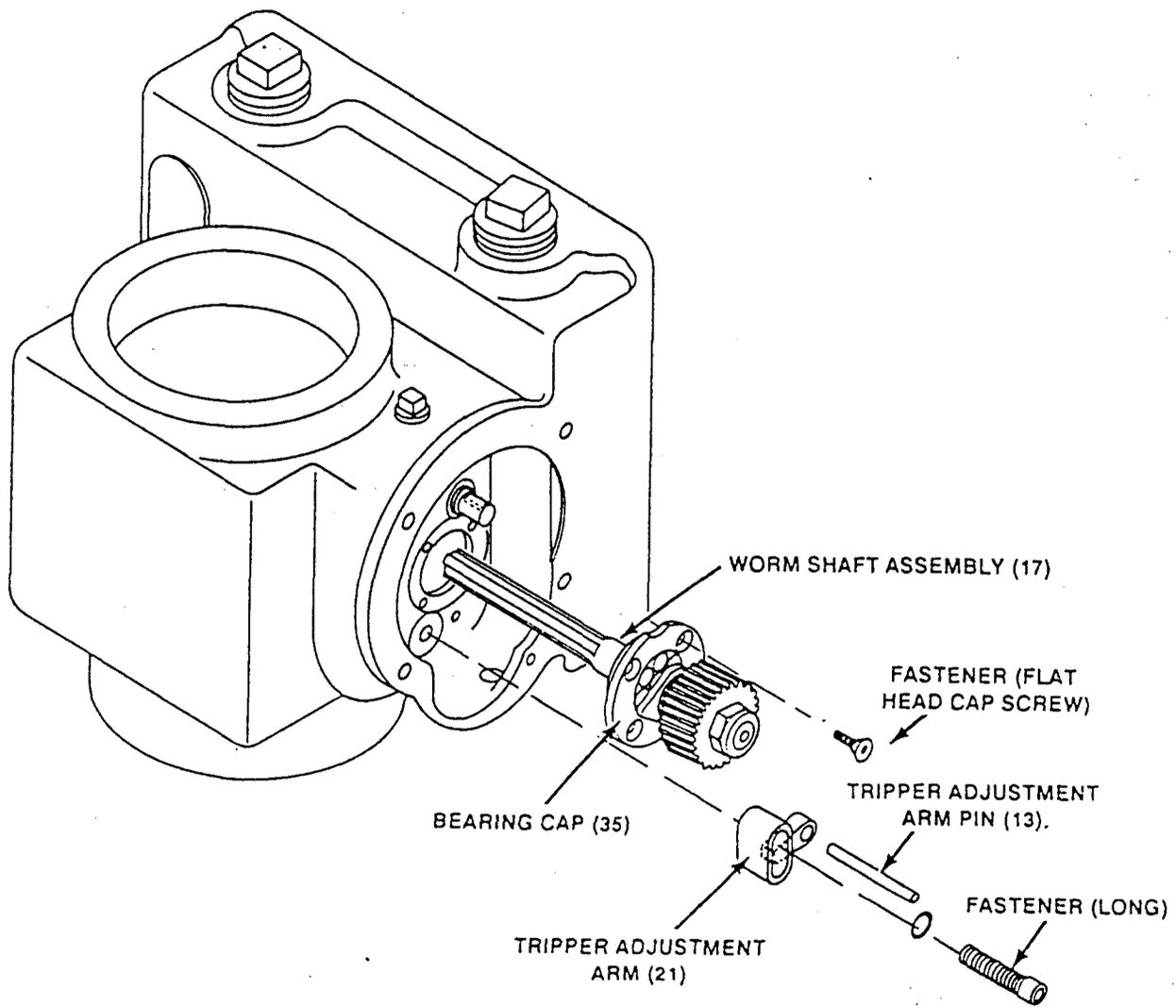


Figure 17-50  
Worm Shaft Assembly Installation

GENERIC LETTER 89-10  
MOTOR-OPERATED-VALVE

IFI 390/95-21-01 - PRESSURE LOCKING OF SUMP SUCTION VALVES

- DCN ISSUED TO MODIFY THE SUMP SUCTION VALVES
- MODIFICATION WILL BE A LEAKOFF LINE AROUND THE VALVE FROM BONNET TO VALVE BODY (OUTSIDE DISC AREA)

URI 390/95-21-02 - PRESSURE LOCKING AND THERMAL BINDING OF GATE VALVES

- PREVIOUSLY EVALUATED MOTOR-OPERATED-VALVES DETERMINED TO BE SUSCEPTIBLE TO PRESSURE LOCKING AND THERMAL BINDING VIA SOER 84-07
- CURRENTLY REEVALUATING MOVES FOR THERMAL BINDING AND ENSURING NO AIR-OPERATED GATE VALVES ARE UTILIZED AS ACTIVE VALVES
- NRC TO ISSUE THE FINAL GENERIC LETTER FOR FURTHER GUIDANCE AND EVALUATION

STATUS OF WATTS BAR MOTOR-OPERATED VALVE PROGRAM  
(as of June 30, 1995)

MOV issues raised in NRC Inspection Report (IR) No. 50-390/95-21

1. Periodic Verification

Watts Bar personnel are drafting Site Standard Practice SSP-8.51, "Generic Letter 89-10 Motor Operated Valve Testing and Surveillance Program," which includes plans for periodic verification of motor-operated valve (MOV) design-basis capability. The current plans of the Watts Bar personnel are to diagnostically test each MOV in the GL 89-10 program approximately every five years or three refueling outages. However, Watts Bar personnel stated that motor-current diagnostics might be used for some butterfly valves. Watts Bar personnel stated that, following static diagnostic testing, the MOV will be dynamically tested if 25% margin does not exist above the thrust requirement necessary to meet the sum of design-basis thrust and the thrust to compensate for other uncertainties. During the June 28-30 meetings at Watts Bar, the staff discussed the attributes that we consider to constitute an effective periodic verification program. Watts Bar personnel are considering staff comments in developing the periodic verification program. The applicant has committed to complete its periodic verification plans by August 14, 1995.

2. Trending

Watts Bar personnel are incorporating guidance for trending into draft SSP-8.51. The draft practice describes the trending of diagnostic parameters. During the June 28-30 meetings, the staff noted that the draft practice did not describe trending of MOV problems or qualitative anomalies. Also, the staff noted that the draft practice did not discuss trending of postmaintenance testing results. Watts Bar personnel are considering staff comments in developing the trending program. The applicant has committed to complete its trending plans by August 14.

3. Update of MOV Program Document

Watts Bar personnel are updating the MOV program guidelines in draft SSP-8.51. During the June 28-30 meetings, the staff found that the draft practice appears to address the concerns raised in the previous inspection. The staff will complete its review of the practice when finalized. The applicant has committed to complete the update of its MOV program guidelines by August 14.

4. Emergency and Abnormal Operating Procedure Review

On June 30, Watts Bar personnel stated that they had completed the review of emergency and abnormal operating procedures to verify that

worst-case design-basis differential pressure and flow had been determined for GL 89-10 MOVs. Watts Bar personnel stated that the review had found the differential pressure and flow assumed in the MOV calculations to bound the differential pressure and flow conditions that the MOVs might experience under emergency and abnormal operating events. Watts Bar personnel stated that the documentation of this review will be prepared by August 14. The staff will review this documentation when available.

5. Postmaintenance and Postmodification Testing

Watts Bar personnel are including guidelines for postmaintenance testing (PMT) in draft SSP-8.51. During the June 28-30 meetings, the staff noted that the draft practice did not clearly indicate that the MOV thrust/torque requirements need to be verified as part of PMT following valve packing adjustment or replacement. Further, the draft practice did not indicate that the need for dynamic testing will be considered following valve internal repair. The staff reviewed the guidelines for postmodification testing and considered them inadequate because they failed to reference the applicant's GL 89-10 commitments. Watts Bar personnel are considering the staff's comments. Watts Bar personnel stated that the draft guidelines for PMT and postmodification testing will be completed by August 14.

6. Torque Switch Repeatability

During the June 28-30 meetings, the staff reviewed Revision 7 (dated June 1, 1995) of TVA Mechanical Design Standard DS-M18.2.21, "Motor Operated Valve Thrust and Torque Calculations," which included torque switch repeatability in the determination of margin during the dynamic tests of GL 89-10 MOVs. The consideration of torque switch repeatability raised in IR 95-21 has been addressed. During the June 28-30 meetings, the staff noted that Watts Bar personnel are determining margin for the specific completed dynamic tests. The need for the applicant to establish guidelines for the setup margin of GL 89-10 MOVs under other conditions (such as static conditions) will be addressed under issue 9 of IR 95-21.

7. Maximum Allowable Thrust

Watts Bar personnel modified Revision 7 of Maintenance Instruction MI-006, "MOVATS Testing of Motor Operated Valves," with Change Number CN-5 on May 17, 1995, to include guidance on selection of the worst-case weak link for the maximum allowable thrust. This resolves the issue on maximum allowable thrust raised in IR 95-21. The staff will review the thrust target window as part of issue 9 of IR 95-21.

8. Operability

Watts Bar personnel are preparing draft Site Standard Practice SSP-8.50, "Motor Operated Valve (MOV) Reconciliation Program," to require that the design-basis operability of the MOV be determined prior to returning a

tested MOV to the Watts Bar operations staff. During the June 28-30 meetings, the staff noted that the guidelines attached to the draft practice did not include margin for torque switch repeatability and, for static testing, load sensitive behavior. Watts Bar personnel agreed that the guidelines need to be updated. The applicant has committed to resolve this issue by August 14.

9. MOV Design-Basis Capability Verification

During the June 28-30 meetings, the staff reviewed the Watts Bar guidelines for reconciliation of MOV dynamic test data with the assumptions in DS-M18.2.21. The staff noted that the guidelines for extrapolation of dynamic thrust from test conditions to design-basis conditions were not clear regarding dynamic and unwedging loads. The staff also noted that the guidelines for determination of packing load used in the extrapolation of test data were not clear. Watts Bar personnel agreed that the guidelines need to be clarified, but believe that the actual calculations are adequate. On June 30, Watts Bar personnel provided the staff with a hand-calculation example of the computer spreadsheet calculations. The staff will review the hand-calculation example and discuss the guidelines with Watts Bar personnel.

During the June 28-30 meetings, Watts Bar personnel provided the staff with completed packages for the design-basis capability verification of 21 MOVs. The staff reviewed several packages and provided comments to Watts Bar personnel. For example, some MOV packages indicated very low valve factors which raised questions regarding the reliability of the test data. Also, the greater static or dynamic unwedging load was not always used to determine available margin. The staff noted that several MOVs had been tested under hydrostatic conditions and that some butterfly valves had not been dynamically tested. The staff did not identify any operability concerns in our summary review of the MOV packages. Watts Bar personnel agreed to provide the staff with spreadsheet summaries of the verification of MOV design-basis capability as they are completed. The staff will provide comments to Watts Bar personnel on the summaries to allow the applicant to address concerns in advance of the GL 89-10 close-out inspection.

During the June 28-30 meetings, the staff noted that Watts Bar personnel had not prepared guidelines establishing margin under static test conditions. For torque-controlled MOVs, this margin should consist of the difference between thrust at torque switch trip minus diagnostic error, torque switch repeatability, load sensitive behavior, and lubrication degradation; and thrust predicted to overcome design-basis differential pressure and flow conditions. Margin for dynamic performance degradation should also be addressed. Watts Bar personnel agreed that guidelines need to be prepared for MOV future setup.

The applicant has agreed to complete this issue by August 14.

## 10. Pressure Locking and Thermal Binding

During the June 28-30 meetings, the staff discussed the consideration of pressure locking and thermal binding of gate valves with Watts Bar personnel. The applicant has modified 17 of the 76 active gate valves in its GL 89-10 program to prevent pressure locking. Watts Bar personnel described the function of the remaining active gate valves. The staff noted that the gate valves identified in NUREG-1275 had been modified or were not susceptible to pressure locking. The staff did not consider the remaining active gate valves to have a high likelihood of pressure locking. However, the staff noted that the applicant might re-consider some valves for pressure locking as part of the new generic letter, such as normally open MOVs that are closed to allow hot-leg recirculation but may need to open much later. The staff considered that, based on the information provided, the applicant had made sufficient progress on pressure locking for the staff to close its GL 89-10 review in this area.

With respect to thermal binding, the applicant had not completed its evaluation of the PORV block valves and possible procedure modifications. Watts Bar personnel stated that plans for the PORV block valves will be complete by August 14. The staff indicated that the applicant's criterion of 100°F temperature gradient for susceptibility of thermal binding will need to be justified as part of its response to the new generic letter.

### Additional MOV issues discussed during June 28-30 meetings

#### 1. Bulletin 88-08

The applicant has modified RHR valves 1-FCV-74-1, 2, 8 and 9 identified in the applicant's response to Bulletin 88-08 to prevent pressure locking by drilling holes in one disk of each valve. The staff will review the capability of these MOVs to open under design-basis differential pressure and flow as part of the GL 89-10 review.

#### 2. Manual Clutch Tripper Fingers

The applicant has identified a potential problem with the automatic return of certain Limatorque SMB-00 actuators from manual operation to motor operation. In these actuators, the tripper fingers of the manual clutch can catch on the internal edge of the actuator housing. Watts Bar personnel stated that, following the identification of the problem, they learned from Limatorque that this problem could occur on SMB-00 actuators manufactured prior to 1979. Watts Bar personnel stated that Limatorque had indicated that, since 1979, it has performed grinding in the affected area of the SMB-00 actuators to prevent this problem. Watts Bar personnel stated that Limatorque is evaluating the need for a Part 21 notice. The applicant has modified Generic Equipment Operating Guidelines GOI-7 and Maintenance Instruction MI-0.16.02 to require that each MOV be placed in the motor operation mode following any manual operation prior to being returned to service.

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