

TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT
EMPLOYEE CONCERNS TASK GROUP
OPERATIONS
CEG

Subcategory: Cable and Conduit

Element: Cable Problems in Manholes

Report Number: 304.03 - SQN, Revision 2
IN-85-945-001
BNP-QCP-10.35-8-13

Evaluator:	<u>P. L. Shepherd</u> P. L. Shepherd	<u>11-7-86</u> Date
Reviewed by:	<u>[Signature]</u> OPS CEG Member	<u>11-7-86</u> Date
Approved by:	<u>W. R. Lagergren</u> W. R. Lagergren	<u>11-7-86</u> Date

1722T

8612070643 861120
PDR ADOCK 05000327
P PDR

I. CABLE PROBLEM IN MANHOLES

This report evaluates the concern that electrical manholes (MH) are in a disorganized state and have water in them.

II. SPECIFIC EVALUATION METHODOLOGY

This element consists of two concerns identified at Watts Bar Nuclear (WBN) and Bellefonte Nuclear (BLN) and determined to be generic to Sequoyah (SQN). These concerns were expanded at SQN to include water in the manholes by the Category Evaluation Group Head (CEG-H) from a discussion with SQN QA.

IN-85-945-001 - "Electrical manholes are in a very disorganized state. Cables are laying out of trays with several feet of slack due to cables being spliced and not laced down properly. Examples may be found in the manhole next to the "Fab" shop or manholes in front of the Turbine Building and Auxiliary Building entrance. CI has no additional information. No follow-up required."

BNP QCP-10.35-8-13 - "CI expressed concern about condition of manholes in electrical cable trench to IPS."

The K-forms were reviewed to determine the specific areas of concern. Referenced documents were researched to determine the requirements, and other historical documents including an NSRS report were reviewed. Cognizant engineers and craft in electrical maintenance were interviewed and a sample of six manholes was inspected.

This report was completed in accordance with the "Evaluation Plan for the Operations Category Evaluation Group" (CEG).

III. FINDINGS

EVALUATION RESULTS

NSRS Report I-85-362-WBN, "Electrical Manholes," (Reference 1) documents the results of the investigation of concern IN-85-945-001 at WBN.

The SQN procedure that covers the installation of cables is M&AI-4 (Reference 2). No specific documents were found that control the housekeeping state in electrical manholes.

Cognizant DNE managers and engineers in the Electrical Engineering Branch and in the Sequoyah Engineering Project Electrical Unit E2 were interviewed with the following results. There do not appear to be any specific engineering requirements that prohibit electrical cables from being continuously submerged in water. DNE said that manholes that contain Class 1E cables, especially Voltage Level V (6900 volt), should have operational sump pumps. This "requirement" is indicated by sump pumps showing on design drawings. As experienced at BFN, Voltage Level V

III. Findings (continued)

cable with cross-linked polyethelene insulation (as installed at SQN) have increased potential for failure after being subjected to excessive moisture for several years due to "water treeing" (reference 3). Voltage Level V, Class 1E cables at SQN that are run through the manholes that were found to have water are Diesel Generator, Emergency Raw Cooling Water and the Fire Pumps. |R1

The following seven manholes were inspected by the evaluator:

<u>MH #</u>	<u>DRAWING</u>	<u>REVISION</u>	<u>DETAIL</u>	<u>USE</u>
MH 9B	15W810- 5	37	D5	to Diesel Gen. Building. (DGB)
MH10A	15N810- 5	37	D5	to DGB
MH 12	15N810-12	16	A12	to Condenser Cooling Water Intake Pumping Station (IPS)
MH 22	15N810-14	12	B14	to Cooling Tower Pumping Station
MH 44	15N810-40	5	A40	to Office and Power Stores (O&PS)
MH 43	15N810-40	5	A40	to Const. Whse. & O&PS
HH 81	15N810-41	5	C41	to 5th DGB

The results of these inspections are as follows:

MH9B - The cover was about a foot below the surrounding grade and had gravel washed across part of one cover. This manhole was not opened for internal inspection.

MH10A - This is a double manhole with a common sump and pump, which was in the north section. There was about a foot of water standing in the bottom of both sections which was apparently as low as the sump pump would clear the water. This pump appeared to be functional. There were no cable trays under water. Cables in the south section were relatively neat and orderly.

The cables in the north section were loose in some trays and the ends of several abandoned cables were evident in this section.

MH12 - There are four independent manholes side by side that have this number. Two are in a roadway and two are in the adjacent grass. The manhole in the roadway closest to the curb was inspected. The manhole floor was dry and there was a small amount of water dripping out of a conduit into a small sump. There was no sump pump installed. Individual 3, said during an interview, that at least one of these manholes had recently been pumped out. The cable arrangement in this manhole was neat and the manhole was clean.

III. Findings (continued)

- MH22 - The top of this manhole was below the surrounding grade level and water had been draining under the cover into the manhole. There was only about a foot of water in this manhole so the water must have been draining down to the next manhole. There was no permanent access ladder and no sump pump. The cables were neat and the bottom tray was just above the water. There was scaffolding and ropes in the floor of the manhole.
- MH43 - The top of the manhole was initially found under about three inches of water. After this water was removed and the manhole was opened the water inside was about six feet deep (about three feet below the MH cover). After removing the water inside the manhole the cable arrangement was inspected. None of the cables appeared to be tied down in the cable trays and there were scaffold boards laying across the track. This was a non-CSSC manhole.
- MH44 - This manhole is adjacent to MH43, but it only had about two feet of water in it. No further inspections were made in this manhole.
- HH81 - This manhole was about six feet square and about five feet deep. It had about two feet of water in it with a sump pump that was out of service. Not only did the sump pump not run but the discharge piping had been disconnected. There were only a couple of cables running through this manhole. This manhole also had some debris lying on the floor.

The cables in all manholes are coated with mud/dirt. There are several locations where sump pump controls/junction boxes are located below sump level. These controls have been flooded due to power failures or sump pump failures. If the controls flooded during a power failure, the sump pump would fail to restart when the power was restored. Examples of these are the electrical manholes/sumps in the Essential Raw Cooling Water (ERCW) Pumping Station; and the valve vault at the Cooling Tower Pumping Station. The controls for the sump pumps in the second example have been relocated above the flood area according to cognizant craft personnel.

There is no preventative maintenance (PM) or housekeeping program at SQN on electrical manholes and their associated sump pumps.

Craft personnel interviewed, were asked why someone had not initiated corrective action on the water problems in electrical manholes. The amount of paperwork (i.e. DCRs/FCRs etc.) involved and the length of time required to effect a change was given as discouragement from taking the initiative to request corrective actions.

CONCLUSIONS

Only six manholes and one ERCW pumping station electrical sump were inspected. Based on the findings from these sample inspections and interviews with cognizant Electrical Maintenance personnel, there is a wide-spread problem at SQN with water in electrical manholes and cable sumps.

Cable arrangement in manholes inspected was generally good with isolated areas that could be improved. Several manholes need to be cleaned and debris removed.

Based on the findings, these concerns were determined to be valid at SQN and requires corrective actions. Raising selected manhole covers above ground level and establishing a PM and housekeeping program for electrical manholes and sump pumps should resolve this concern. This concern has potential safety-related implications at SQN.

IV. ROOT CAUSE

The lack of procedures governing housekeeping and preventative maintenance on sump pumps in electrical manholes has led to the validity of this concern.

Corporate and site procedures failed to incorporate requirements to specify and maintain the environment for Class 1E cables in manholes. Management inattentiveness to trends of having to pump water out of manholes prior to performing work has prevented these conditions from being reported earlier.

V. GENERIC APPLICABILITY

This concern was specific to WBN and could apply to other nuclear plants. These concerns were substantiated at SQN and WBN. Both concerns have generic applicability to all TVA plants.

VI. References

1. NSRS Report I-85-362-WBN
2. M&AI-4, Installation of Control, Power, and Signal Cable, Revision 9. August 13, 1986.
3. Memorandum from J. A. Teague to H. B. Bounds, subject: Class 1E Cables Susceptible to Electro Chemical Treeing, July 26, 1982 (L23 820727 829). |
|R1
|

VII. IMMEDIATE OR LONG-TERM CORRECTIVE ACTION

Corrective Action Tracking Document (CATD) 30403-SQN-02 response: |R2

Electrical Maintenance will assign an engineer to: |
|

- (1) Identify manholes to be PM ed, |R1
- (2) Prioritize manhole list, CSSC first, |
- (3) Develop a PM program to address problems, and |
- (4) Schedule and perform PMs (initiate corrective action as necessary). |

Corrective Action Tracking Document (CATD) 30403-SQN-01: |R2

SQN should consider additional corrective actions regarding voltage level V cables that would involve the design organization and consider issuing a CAQ document. CATD 30403-SQN-01 was issued to track this additional requested response. |
|R2
|

REFERENCE - ECPS120J-ECPS121C
 FREQUENCY - REQUEST
 ONP - ISSS - RWM

TENNESSEE VALLEY AUTHORITY
 OFFICE OF NUCLEAR POWER
 EMPLOYEE CONCERN PROGRAM SYSTEM (ECPS)
 LIST OF EMPLOYEE CONCERN INFORMATION

PAGE -
 RUN TIME - 11.
 RUN DATE - 10/

CATEGORY: OP PLANT OPER. SUPPORT

SUBCATEGORY: 30403 CABLE PROBLEM IN MANHOLES

CONCERN NUMBER	CAT	SUB CAT	R D	PLT LOC	GENERIC APPL B B S W F L Q B	QTC/NSRS INVESTIGATION REPORT	P S R	CONCERN DESCRIPTION
IN -85-945-001 T50100	OP	30403	N	WBN	Y Y Y Y REPORT	I-85-362-WBN	NS	ELECTRICAL MANHOLES ARE IN A VERY DISORGANIZED STATE. CABLES ARE LAYING OUT OF TRAYS WITH SEVERAL FEET OF SLACK DUE TO CABLES BEING SPLICED AND NOT LACED DOWN PROPERLY. EXAMPLES MAY BE FOUND IN THE MANHOLE NEXT TO THE "FAB" SHOP OR MANHOLES IN FRONT OF THE TURBINE BUILDING AND AUX. BUILDING ENTRANCE. CI HAS NO ADDITIONAL INFORMATION. NO FOLLOW UP REQUIRED.
QCP10.35-8-13	OP	30403	N	BLN	Y Y Y Y REPORT			CI EXPRESSED CONCERN ABOUT CONDITION OF MANHOLES IN ELECTRICAL CABLE TRENCH TO IPS.

KEYWORD A
 KEYWORD B
 KEYWORD C
 KEYWORD D

NONCONFORMANCE
 CONST PROCESS
 ELECTRICAL
 CABLE

2 CONCERNS FOR CATEGORY OP SUBCATEGORY 30403

TVA EMPLOYEE CONCERNS
SPECIAL PROGRAM

REPORT NUMBER: 304.03-SQN

REPORT TYPE: Sequoyah Nuclear Plant - Element

REVISION NUMBER: 2

TITLE: Cable Problems in Manholes

REASON FOR REVISION:

To incorporate SRP comments and TAS comments
To incorporate SQN Corrective Action Plan Response to
CATD 30403-SQN-02 and incorporate SQN CATD 30403-SQN-01,
open items

Revision 1
Revision 2

PREPARATION

PREPARED BY:

P. L. Shepard
SIGNATURE

11-7-86
DATE

REVIEWS

PEER:

W. W. Murphy
SIGNATURE

11-7-86
DATE

TAS:

RAH D. S. Stewart
SIGNATURE

11/8/86
DATE

CONCURRENCES

SIGNATURE DATE

CEG-H: *W. P. Dwyer* 11-7-86
SRP: *James R. Russell* 11-15-86
SIGNATURE* DATE

APPROVED BY:

M. V. Russell 11-15-86
ECSP MANAGER DATE

N/A
MANAGER OF NUCLEAR POWER DATE
CONCURRENCE (FINAL REPORT ONLY)

*SRP Secretary's signature denotes SRP concurrences are in files.

1722T