Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

JUN 28 1991

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of the Application of	)	Docket Nos. 50-390
Tennessee Valley Authority	)	50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - IMPLEMENTATION DETAILS FOR CONDUIT; CABLE TRAY; AND HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) CORRECTIVE ACTION PROGRAMS

On April 24-25, 1991, an NRC team from Nuclear Reactor Regulation and Region II visited WBN to discuss with TVA the status and implementation approach for the Conduit, Cable Tray, and HVAC Support Corrective Action Programs (CAPs). During the discussion it became apparent that NRC representatives were concerned that the current Safety Evaluations written in late 1989 might no longer be applicable to these programs based on the current TVA implementation approach. On May 10, 1991, NRC sent a letter to TVA summarizing these concerns about the current TVA commodity CAP implementation methodology. The concerns were as follows: 1) the approach of using a procedure to walk through an initial population in order to determine critical attributes for the remaining population appears to deviate from the original CAP methodology, and 2) the current CAP implementation will result in a gap in the records since the "as-built" condition may not match the existing design record.

The purpose of this letter is to update and summarize certain TVA activities on the CAPs for conduit, cable tray, and HVAC supports, with some emphasis on the areas of NRC concern. The letter outlines the original TVA CAP commitments, summarizes changes and the basis for revisions in the implementing methodology, and addresses the NRC Quality Assurance records question raised in conjunction with the staff's review.

This letter contains six enclosures to assist your review. Enclosure 1 provides a historical overview of the CAPs and summarizes the technical basis for our current implementation methods. Enclosures 2, 3, and 4 are the basis for determining critical attributes for the conduit/conduit supports, cable tray supports, and HVAC supports, respectively. Enclosure 5 describes how the records of these design and analytical activities will be linked to the final as-built configuration data obtained in the walkdowns. Finally, Enclosure 6 is a summary of the technical products developed and available onsite which support this methodology.

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TVA has carefully considered the questions raised in the May 10, 1991 letter regarding conformance to the current CAPs and concludes that the actions summarized in this letter are consistent with the previous CAP commitments and, as summarized in the enclosures, represent a sound basis for the completion of WBN in these areas.

TVA and NRC have had considerable discussion on the implementing methodologies for these CAPs and would like to bring these issues to a close. TVA requests a meeting, if needed, the week of July 22, 1991, to resolve any final questions you may have.

If there are any questions, please telephone P. L. Pace at (615) 365-1824.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

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ENCLOSURE 1

OVERVIEW OF CORRECTIVE ACTION PROGRAM (CAP) PLANS
AND SUMMARY OF TECHNICAL BASIS FOR CURRENT APPROACH

The Conduit, Cable Tray, and Heating, Ventilation, and Air Conditioning (HVAC) CAP plans were submitted and docketed with the NRC on November 18, 1988. The key element of each of these programs was a critical case evaluation whereby an engineering walkthrough coupled with a review team analysis would determine a number of critical case installations which would envelop the entire population. The CAPs stated that the engineering walkthroughs would "focus on those attributes essential to (conduit, HVAC, cable tray) qualification."[1] The CAPs also stated that "field data will be gathered in accordance with approved engineering walkthrough procedures."[2]

The first CAP to be implemented was the Conduit Support CAP. A walkthrough procedure, WBEP-WP-51, was issued in April 1989. Extensive training was provided to personnel prior to beginning the walkthroughs in May 1989. In the summer of 1989, after similar procedures were issued and training conducted, the HVAC and cable tray support walkthroughs were initiated.

The NRC formally issued Safety Evaluations (SEs) for the Conduit and Cable Tray CAPs in September 1989 and for the HVAC CAP in October 1989. The SEs acknowledged that the walkthroughs would look at the entire population, using a walkthrough procedure to assess attributes critical to the hardware qualification. Specifically, the SE on the Conduit CAP stated that "since the program is based on a walkthrough procedure which requires all conduit runs and conduit supports to be examined, no special sampling methodology will be involved."[3]

The staff is now concerned that TVA's current approach determined critical cases based only on the initial phase walkthroughs instead of the entire plant population and thus may be considered a sampling methodology. In fact, as discussed in detail in the following paragraphs, the entire population will receive a procedurally controlled walkthrough which is based on the evaluation of the initial walkthrough population, and the final critical cases will therefore be representative of the entire population.

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1. WBN Corrective Action Program Plans for Conduit, HVAC, and Cable Tray; November 1988, Section 4.1.4, Definition of Critical Cases

2. WBN Corrective Action Program Plans for Conduit, HVAC, and Cable Tray; November 1988, Section 7.0

3. Safety Evaluation of the Watts Bar Unit 1 Corrective Action Program Plans for Electrical Conduit and Conduit Support, September 1, 1989, Section 4.0

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OVERVIEW OF CORRECTIVE ACTION PROGRAM (CAP) PLANS
AND SUMMARY OF TECHNICAL BASIS FOR CURRENT APPROACH

By March of 1990, a substantial number of walkthroughs and critical case evaluations had been completed for the three programs. Based on the results of these walkthroughs and evaluations, the areas of the plant walked through were determined to be representative of WBN Unit 1 as a whole. At this point TVA decided to temporarily stop the implementation and step back to assess what the data was indicating. This is referred to as the initial phase or initial population. For instance, for the conduit program, it was commonly referred to as the "20 percent point of implementation" since approximately 20 percent of the known scope of runs and supports had been walked through, grouped, and evaluated.

The results of this initial phase for these three programs were documented by Nuclear Engineering in interim reports (See Enclosure 6, References 1, 2, 3). These reports were written between January and May 1990. Based on the results of the initial phases, it was clear that certain attributes initially selected were not "critical" to qualification, while others clearly were more difficult to qualify and could result in modifications. The reports recommended refocusing the remaining walkthroughs to concentrate on these specific attributes and types of configurations.

The attribute/configuration type checklists from the walkthrough procedures were revised to focus on those attributes/configurations that were now clearly determined to be essential to qualification. Evaluation of these attributes assures adequacy of the installation. These new checklists will be used to assess the remaining population. Therefore, the entire population will still be subject to a procedurally controlled engineering walkthrough with the walkthrough procedure, including the checklists and data sheets, revised to focus on the attributes already determined to be most difficult to qualify and thus, requiring the most attention. The technical basis for these program adjustments is provided in Enclosures 2, 3, and 4. TVA considers these adjustments to be in compliance with the broad CAP commitments.

TVA implemented these adjustments close to a year ago and has since had several interfaces with NRC on the current approach.

On August 2, 1990, a formal presentation covering all civil engineering programs was given to NRC at Rockville, Maryland. TVA used this opportunity to highlight the implementation details for these three programs to NRC. Final Safety Analysis Report (FSAR) Amendment 64 was formally submitted shortly thereafter, and written methodologies (which included a description similar to the above paragraph) on all civil programs were made available to NRC in late August 1990. The presentation described the results of the initial phases and discussed the specific critical attributes/configurations which would be included in the walkthroughs of the remaining population. The specific slide used during the conduit presentation listed a total of eight final conduit attributes/configurations such as L-shaped cantilevers and

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OVERVIEW OF CORRECTIVE ACTION PROGRAM (CAP) PLANS
AND SUMMARY OF TECHNICAL BASIS FOR CURRENT APPROACH

conduit overspans. These are the critical attributes which will be focused on during the remaining walkthroughs. Similar logic was described during the HVAC and cable tray presentations.

The NRC monthly inspection report (50-390, 391/90-20) for August 1990 discussed the August 2, 1990 presentation on the civil programs. This report stated that for the conduit program, NRC approval of the CAP was based on the methods used in the initial phase (20 percent). It went on to state that "further reviews are required to determine the acceptance of the licensee proposal for the additional 80 percent of the inspections,"[4] thus indicating an NRC awareness of this issue. It also stated that further reviews are necessary in the HVAC and cable tray areas. TVA considered this statement to be related to the NRC review of CAP implementation and not a concern about the overall CAP approach.

NRC completed its review of FSAR Amendment 64 and issued the results in Safety Evaluation Report, Supplement No. 6 (SSER 6) on April 23, 1991. Section 3.7, page 15, of this SSER discussed the use of critical case evaluations. It stated that "the procedures used to perform the walkthrough as well as the basis for grouping the configurations and identifying critical attributes have not yet been reviewed." The SSER concluded the discussion by stating that the implementation of the critical case methodology will be reviewed and discussed in a future safety evaluation report supplement or in an NRC inspection report. Again, the overall approach was not questioned.

The original CAPs committed to using the critical case evaluation program to demonstrate the adequacy of the existing configurations without requiring documentation of all individual support discrepancies. Engineering acceptance of installed configurations is being documented in walkthrough packages and critical case calculations.

This CAP commitment was implemented during the initial phase walkthroughs, using a walkthrough procedure having a comprehensive checklist of support attributes. Discrepancies judged to be significant to the overall installation qualification were noted on the data sheets. For the remaining population walkthroughs, data sheets will be developed listing the critical attributes derived from the initial walkthroughs, and these sheets will indicate whether or not the attributes exist for each support. Walkthrough package evaluation sheets will reference a qualifying calculation. All walkthrough data sheets will be cross-tied to existing plant QA/quality control records by means of the QA records data base as outlined in site procedure AI-11.5. Enclosure 5 shows flow charts for the three programs demonstrating QA records coverage.

4. NRC Inspection Report 50-390, 391/90-20, September 25, 1990, Section 2.d

ENCLOSURE 2

BASIS FOR DETERMINING CRITICAL CONDUIT/AND CONDUIT SUPPORT ATTRIBUTES FOR CORRECTIVE ACTION PROGRAM (CAP) PLANS COMPLETION

The critical-case process is a bounding process that includes walkthroughs of conduit and conduit support installations by teams of trained personnel to identify deviations from the original installation criteria. The original installation was performed by field routing the conduits and constructing the supports according to typical support drawings. In April 1989, the critical-case program was begun with the issuance of an engineering walkthrough procedure, Watts Bar Engineering Procedure (WBEP) WP-51. This procedure included key attributes that influence structural support qualification.

By early December 1989, approximately 1750 conduit runs and 5100 supports had been evaluated. This represented about 20 percent of the known plant population at that time. The walkthrough teams field documented about 55 percent of the installations as acceptable. The remaining cases, or potential critical cases, were sent to a review group known as the Critical Case Review Team (CCRT) for further evaluations. The CCRT accepted a number of these cases with the remainder grouped for selecting the final critical cases for evaluation. A total of 322 critical cases were identified and evaluated. These evaluations showed that over 99.7 percent of the conduit installations met the design criteria.

At this point, a large amount of data was available regarding the effect of various discrepancies on the overall qualification of the conduit and supports. An interim report (Reference 3) was developed in January 1990 summarizing the effects of individual discrepant conditions on the various support types and recommending that certain attributes no longer be explicitly assessed by the walkthrough teams. For each attribute with this recommendation, tables are provided in the interim report showing the stress level in the conduit and/or support due to the discrepant conditions as evaluated in the critical-case calculations.

The attached Table 1 provides a listing of these attributes along with their significant discrepant conditions. Other discrepant conditions found on those same supports were considered for support qualification and these are also provided in Table 1.

There are several conservative considerations built into the critical-case evaluation process for any particular installation. The critical-case analysis for a particular support consisted of using as-built data for the discrepant attributes, and conservatively used the maximum parameters allowed according to typical drawing for the remaining nondiscrepant attributes. If support qualification proved difficult to demonstrate using these conservative parameters, then as-built data was collected and used for the nondiscrepant attributes. Critical case evaluations typically used conservative analysis methods, in lieu of more exact dynamic analysis methods. The final critical-case evaluations determined that for the attributes shown in Table 1, design criteria allowable stresses were not exceeded.

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A specific example of the process used to eliminate an attribute from further consideration is conduit No. AB-C50-005, with the discrepant attribute being excessive concentrated weight on a conduit span. There were three T-fittings on this conduit span, whereas, the design output specifications allow only one fitting. This conduit is located in a higher seismic zone (peak horizontal seismic acceleration is 2.75g) and has additional discrepant attributes. One additional discrepancy involves the span being 116 inches versus only 66 inches allowed per the drawings. Also, the adjacent span has a conduit cantilever length of 89 inches versus only 30 inches allowed per the drawings. These factors combine to put additional stress on the conduit and adjacent clamps. For the remaining nondiscrepant attributes, as-built data was collected and used in the evaluation. The critical-case analysis determined that the resultant stresses in the conduit and conduit supports were less than those allowed by the design criteria. A number of other critical cases involving the concentrated weight attribute were similarly evaluated and found to meet the design criteria. On this basis, the concentrated weight attribute was eliminated from the scope of the remaining population walkthroughs.

For the other attributes listed in Table 1, the same process as described in the preceding paragraphs was used to determine their acceptability for the entire population. The interim report and the critical-case calculations, which are available for review, provide the detailed basis for acceptability of these attributes.

In this initial phase of the program, a few installations failed to meet design criteria allowable stresses. Modifications were issued to fix those specific installations, and these attributes/configurations will continue to be field reviewed as part of the remaining population walkthrough.

The following conclusions were drawn from an overview of this program at the end of the initial implementation phase. For lower plant elevations, i.e., elevations with less than 1.58g peak horizontal operational basis earthquake accelerations, the attributes which needed further review are "L" shaped cantilevers, unique supports, attachments to cable tray supports without use of flex conduit, and significant conduit cantilever length with multiple fittings and flex conduits. For the higher acceleration seismic zones, the following attributes needed further review:

- Conduit "L" shaped cantilever configurations
- Conduit overspans
- Significant conduit cantilever length with multiple fittings and flex conduits
- Support Detail 55 attached to anchor plate assembly and Detail 66 Options A and B
- Outliers, i.e., unique conduit support configurations
- Supports with missing members
- Attachments to cable tray supports without use of flex conduit

ENCLOSURE 2

BASIS FOR DETERMINING CRITICAL CONDUIT/AND CONDUIT SUPPORT ATTRIBUTES FOR CORRECTIVE ACTION PROGRAM (CAP) PLANS COMPLETION

Certain plant areas or attributes not described above are being uniquely reviewed. These areas include the steel containment vessel, yard area, conduits attached to cranes, supports attached to reactor coolant loop supports, and seismic shakespace. The review of conduit and conduit supports in the control room has also been completed. Additionally, TVA has undertaken a rework/repair effort for loose, missing, and damaged components. This rework/repair effort will give added assurance to the structural adequacy of the conduit and conduit support installations. A separate walkthrough and repair program is also planned to review conduit installations supported by one-hole straps.

TABLE 1

BASIS FOR ACCEPTANCE OF ATTRIBUTES UPON COMPLETION OF INITIAL PHASE OF CONDUIT PROGRAM

ATTRIBUTE	SIGNIFICANT DISCREPANT CONDITION NOTED	ADDITIONAL DISCREPANT ATTRIBUTES ON PARTICULAR INSTALLATION	REMARKS
Conduit Span (greater than 2" dia.)	Span was 19'-5" vs. 10'-6" as specified on DWG		Installation satisfies Design Criteria allowable stress limits
Excessive Conduit Cantilever Length Past the Last Support	Cantilever was 7'-5" vs. 2'-6" per specification	Span has 3 T-fittings vs. 1 fitting allowed; conduit span was 116" vs. 66" allowed	Installation satisfies Design Criteria allowable stress limits
Excessive Concentrated Weight Supported by Conduit	Span has 3 T-fittings vs. 1 fitting allowed per spec.	Conduit cantilever length was 89" vs. 30" allowed; conduit span was 116" vs. 66" allowed	Installation satisfies Design Criteria allowable stress limits
Excessive Quantity of Conduits attached to Conduit support	4-4", 7-3", 1-1.5" and 1-1" dia. conduits attached vs. 1-3" dia. conduit allowed per typical drawing	Conduit cantilever length was 53" vs. 22" allowed	Installation satisfies Design Criteria allowable stress limits
Expansion Anchor Size And Spacing	1/2" diameter anchors used vs. 5/8" diameter anchors specified per typical dwg	Conduit cantilever length was 54" vs. 24" allowed; tube steel member length was 85" vs. 48" allowed	Installation satisfies Design Criteria allowable stress limits
Support Dimensions (e.g., member length)	Tube steel member length is approx. 85" vs. max of 48" per typical drawing	1/2" diameter anchors used vs. 5/8" diameter anchors specified; conduit cantilever length was 54" 24" allowed	Installation satisfies Design Criteria allowable stress limits
Number of Supports Per Conduit Run	Conduit run has only 1 support where dwgs specify minimum of 2		Installation satisfies Design Criteria allowable stress limits
Excessive Load on Support Due to Conduit Overspan	2" diameter conduit with 150" span vs. 126" span allowed		Installation satisfies Design Criteria allowable stress limits
Excessive Load on Support Due to Excessive Conduit Cantilever	Conduit cantilevers were 74.5" and 64.5" vs. 22" allowed on drawing	2-3" diameter conduits were attached whereas dwg did not allow attachment of 3" diameter conduits	Installation satisfies Design Criteria allowable stress limits

ENCLOSURE 3

BASIS FOR DETERMINING CRITICAL CABLE TRAY SUPPORT
ATTRIBUTES FOR CORRECTIVE ACTION PROGRAM (CAP) PLANS COMPLETION

The Cable Tray and Cable Tray Support CAP plan outlines a comprehensive corrective action program for WBN. One part of this program involves a critical-case evaluation of approximately 1700 cable tray supports which were not reviewed in 1984 as part of the broad cable tray support reinspection program for Nonconformance Report (NCR) 5737, Revision 1. The critical-case process is a bounding process that includes walkthroughs of cable tray supports by teams of trained personnel to identify deviations from the original design drawings and specifications. The original installation of supports was performed to design drawings which detailed the individual supports. In June 1989, the critical-case program for cable tray supports was begun with the issuance of Engineering Walkthrough Procedure TI-2004. This procedure included the key attributes that influence structural support qualification.

By February 1990, a total of 407 supports, or about 24 percent of the population, had been evaluated. The walkthrough teams found 134 of these supports installed in accordance with the design drawings and acceptance criteria. The remaining cases, referred to as potential critical cases, were sent to the CCRT for further evaluation. The CCRT selected approximately 75 critical cases for evaluation. All the critical cases were evaluated and found to be within allowable stress limits, and thus met the design criteria.

At this point, a large amount of data was available on the effect of various discrepancies on the overall qualification of cable tray supports. The most significant discrepancies identified during these walkthroughs were additional miscellaneous attachments not accounted for on design drawings.

An interim report (Reference 1) was developed in May 1990 summarizing the findings and recommending that many of the cable tray support attributes no longer be explicitly assessed by walkthrough teams. The basis for this recommendation was that all the critical cases, upon evaluation for discrepant attributes, met the design criteria allowable stress limits. In Table 2 these attributes are listed. The walkthroughs found the discrepancies to be relatively minor compared to those found in the conduit program. This is to be expected since the cable tray supports were built to unique configurations shown on design drawings.

A parallel activity to the critical-case evaluation for the 1700 supports was a sample over-inspection by Nuclear Engineering of the remaining 3000 supports. These supports were reinspected in 1984 as part of the broad reinspection program for NCR 5737, Revision 1. The CAP specified that a random statistical sample of 58 supports be selected to demonstrate with a 95 percent confidence level that at least 95 percent of the population meets the design criteria. The most significant discrepancies identified during these over-inspection walkthroughs were missing/added members, missing hold-down clips/bolt/welds, and additional miscellaneous attachments not accounted for on design drawings. These 3 discrepant attributes did not reduce design margins enough to violate design criteria; however, based on the number of occurrences and potential to impact the support qualification, walkthroughs were continued for the total cable tray support population to identify and evaluate missing/added members and additional miscellaneous attachments. Missing hold-down clips/bolts/welds are being corrected as part of the damaged, loose, and missing hardware special program.

TABLE 2

BASIS FOR ACCEPTANCE OF ATTRIBUTES UPON COMPLETION
OF INITIAL PHASE OF CABLE TRAY SUPPORT CRITICAL CASE

ATTRIBUTE	SIGNIFICANT DISCREPANT CONDITION NOTED	REMARKS
Supports Dimensions	Cantilever member length was 57 1/2" vs. 54" as specified on DWG	Installation satisfies Design Criteria allowable stress limits
Member Sizes	Member size was TS4x4x3/16 vs. TS4x4x1/4 as specified on DWG	Installation satisfies Design Criteria allowable stress limits
Support Location	Tray span was 3'-6" vs. 3'-3" specified on DWG	Installation satisfies Design Criteria allowable stress limits
Expansion Anchors/ Plates	1" off centerline of CEA plate (one direction only)	Installation satisfies Design Criteria allowable stress limits
Thread Engagement	1/8" recessed thread engagement.	Installation satisfies Design Criteria allowable stress limits

ENCLOSURE 4

BASIS FOR DETERMINING CRITICAL HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) DUCT AND SUPPORT ATTRIBUTES FOR CORRECTIVE ACTION PROGRAM (CAP) PLANS COMPLETION

The ducts were fabricated according to SMACNA requirements and routed based on design drawings, and supports were installed according to typical support drawings.

The basis for determining critical HVAC duct and support attributes was an initial evaluation process between November 1989 and April 1990. This evaluation process was implemented as follows:

The duct and support drawings were reviewed for significant design attributes to select 20 duct critical cases and 30 support critical cases. These 50 critical cases were walked down and evaluated based on their as-installed condition.

Based on the evaluation of 30 critical supports, it was concluded that many supports could be accepted if the adequacy of axial load transfer was established and support configurations were confirmed by a walkthrough. However, many other supports could not be qualified based on the evaluations performed. Based on this conclusion, a critical-case evaluation program including a 100 percent walkthrough of all supports is being implemented. As can be seen from attached Table 3, presented to the NRC reviewers in meetings on April 24-25, 1991, the attributes for this walkthrough are essentially the same as used for previous walkthroughs. Based on the results of this walkthrough and a review of the loading on the supports, critical cases are being selected. These critical cases will be walked down and evaluated. Any required modifications will be installed.

Except for large ducts and ducts in high thermal environments (temperature higher than 140°F), the evaluations showed the 20 duct critical cases to be acceptable, with consideration of realistic system duct pressures. Also, the horizontal Category I(L) ductwork supported on a mixture of rod-type and rigid supports was found to be unacceptable in some cases. Based on evaluation of 20 critical cases, it was determined that the following attributes were significant for duct qualification:

- stiffener spacing
- tie rods
- rigid to rod support interface
- rivet spacing
- surface-mounted attachments
- large duct size and high thermal environment

ENCLOSURE 4

BASIS FOR DETERMINING CRITICAL HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) DUCT AND SUPPORT ATTRIBUTES FOR CORRECTIVE ACTION PROGRAM (CAP) PLANS COMPLETION

The following actions have been or are being taken to address these attributes:

- A generic design change notice (DCN) has been issued to address the cut stiffeners and stiffener spacing at openings and elbows. For straight ducts, the maximum extent of stiffener spacing observed in walkdowns and walkthroughs performed was evaluated and found to be acceptable when realistic duct pressures were considered.

- A generic DCN has been issued to address the missing tie rods.

- A generic DCN has been issued to address the mixed mode of support by rod and rigid supports for horizontal Category I(L) duct.

- Rivet spacing is an open issue and will be addressed in the critical-case evaluation.

- 100 percent of the ductwork, except when not accessible due to insulation, was walked through to identify miscellaneous attachments. These miscellaneous attachments were evaluated and found acceptable. An acceptance criteria was prepared to address future miscellaneous attachments.

- Large ducts and ducts in a high temperature environment are being evaluated as part of the critical-case evaluation process.

Data obtained from the initial walkthrough performed on approximately 10 percent of the duct population and walkdowns performed on critical duct spans will be used as the basis for evaluations in the critical-case evaluation process. Any follow-up actions, including modifications, will be performed based on results of the critical-case evaluation process.

TABLE 3

COMPARISON OF TI-2010 REV. 0 VS REV. 1 WALKTHROUGH PROCEDURE SUPPORT ATTRIBUTES CHECKLIST

Detailed Duct Support Checklist - Comparison		
Revision 0	**Revision 1**	**Comments**
Presence of support is judged acceptable.	Support typical is per drawing.	Equivalent
Support configuration is judged acceptable.	General configuration of installed support is per the typical drawing and conforms with dimensional limits. INDICATE rough length, width, and axial depth (if applicable) dimensions of support. (REFER TO Appendix D1 figures for examples.) Length, L, is ≤ _____ Width, W, is ≤ _____ Axial Depth, D, is ≤ _____	Rev. 1-is enhanced over Rev. 0 to obtain more specific information.
Presence of support anchorage is judged acceptable.	Support anchorage is entirely by surface mounted plates. If No, check the following as applicable: ☐ Anchorage is entirely to embeds. ☐ Mixed anchorage - partially embeds, partially concrete expansion anchors	Rev. 1 effectively combined two Rev. 0 checklist items into the one.
Anchorage type mixture is judged acceptable.		
Baseplate size, thickness, and number of anchors present is judged acceptable.	Generally, baseplate configuration and number of anchors appears consistent with typical drawings.	Equivalent
Anchor spacings with adjacent baseplates are judged acceptable.	(Deleted check in Rev. 1)	Adjacent support anchor spacing issues (G-32 violations) are not unique to HVAC supports and are to be resolved generically by another program. Critical case walkdowns per TI-2012 do record such violations.
Support bracing is judged acceptable.	Support bracing is per drawing.	Equivalent
(No specific check in Rev. 0)	If axial support brace is present, no cut or missing duct stiffener due to interference with axial brace.	This check was specifically added in Rev. 1.
Support member type and size is judged acceptable.	Support member type is per typical drawing. Indicate member type if other than drawing _____	Effectively equivalent, but additionally Rev. 1 requests specific indication of member type if other than typical.
Support member connection type is judged acceptable.	(No specific check in Rev. 1)	In Rev. 1, this check is considered covered by the assessment of whether the support configuration is per the typical.
Rod length and diameter for Cat. I(L) supports are judged acceptable.	Rod length and diameter for Cat. I(L) supports are judged acceptable.	Equivalent
No non-HVAC attachments to support exist.	No non-HVAC attachments to support exist.	Identical

ENCLOSURE 6

List of Available Technical Products

Document Title		Document Number
Interim Report of the Category I Cable Tray and Cable Tray Support Walkthrough and Critical-Case Evaluation Program, Revision 4	(Reference 1)	B26910614758
Cable Tray and Support Walkthrough Procedure		TI-2004 R/0, TI-2004 w/IC No. 90-061
Cable Tray Support Walkthrough Procedure		TI-2016
Cable Tray Support Critical-Case Calculations		WB-CT-00 Series
HVAC Walkthrough Procedure		TI-2010 R/0, R/1
HVAC Walkdowns of Critical Cases		TI-2012 R/0
Interim Report for HVAC Duct and Support Critical-Case Evaluations	(Reference 2)	B26910614103
HVAC Control Room Typical Support and 6 Duct Critical-Case Calculations		WCG-1-412 R/1, WCG-1-403 R/0
HVAC Critical-Case Calculations outside of Control Room		Calculation list available
Interim Report Based on an Assessment of 20% of the Installations-Conduit and Conduit Support Program	(Reference 3)	B26910627100
Conduit and Support Walkthrough Procedure, Initial Phase		WP-51
Conduit and Support Walkthrough Procedure, Remaining installations		TI-2006
Documentation of Conduit Critical-Case Review		WP-51/CCRT (2 Volumes)
Conduit and Support Critical-Case Calculations		Calculation list available

ENCLOSURE 5

QUALITY ASSURANCE (QA) RECORDS COVERAGE

Attached are three figures which describe QA records coverage and retrievability for each of the three commodities. The cable tray support flow chart is the most straightforward since each support is uniquely designed and, thus, uniquely identified. Information for a given support can be obtained, using the unique support identifier, through a QA records database. The data base leads to a supplemental calculation package related to CAP activities which includes or references all relevant information, including the original calculation.

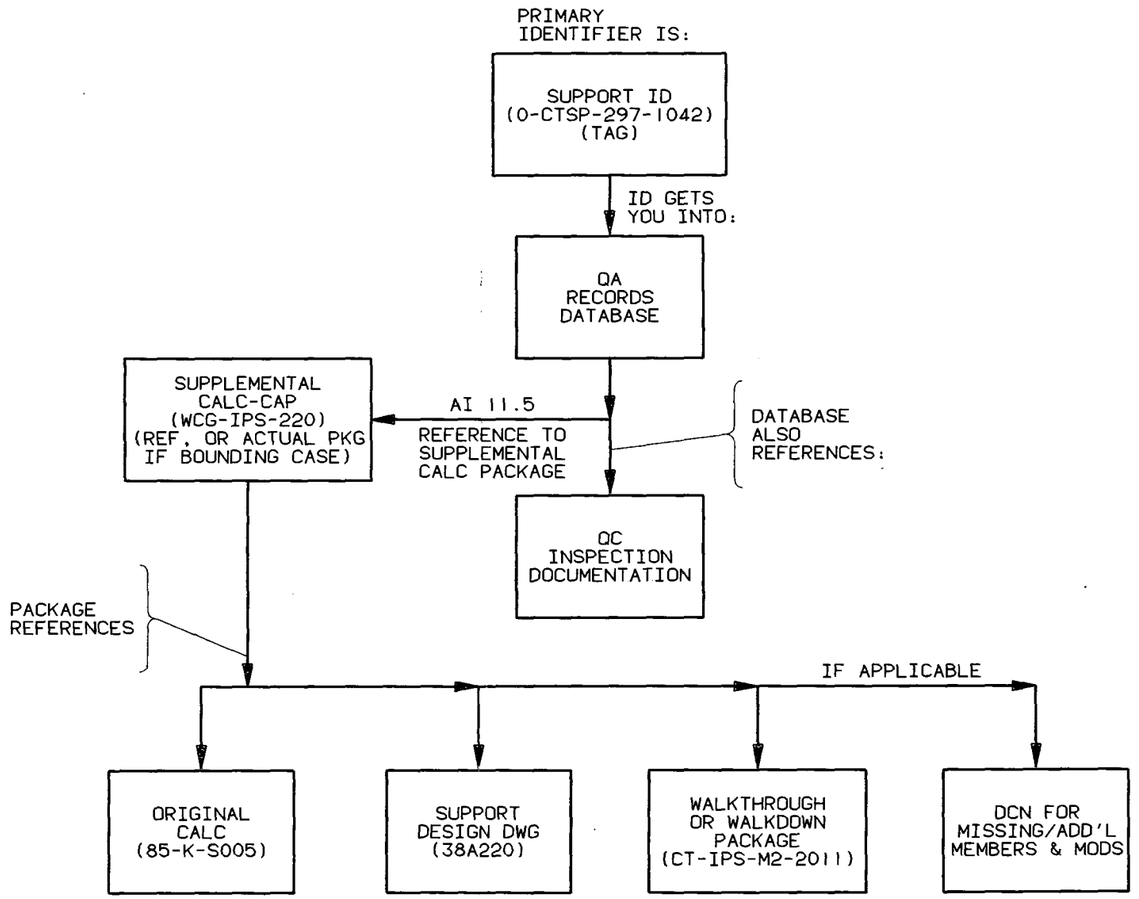
Heating, Ventilation, and Air Conditioning (HVAC) supports are not designed uniquely. Routing drawings can be used with support identification to identify typical support drawings which, in turn reference qualification calculations. The calculations reference the associated walkthrough and walkdown packages. Although the construction of the information is a little more complex for a given support identification, a QA records data base references back to the walkdown/walkthrough packages through the qualification calculations. The data base also links to the Quality Control (QC) inspection records. The updated data for the CAPs has also been fed back to the QC records and is available to the user through the data base.

Conduit coverage is handled in much the same way as HVAC, with some differences that are shown on the flow chart.

ENCLOSURE 5

CABLE TRAY SUPPORTS

(QA RECORDS EXAMPLE)



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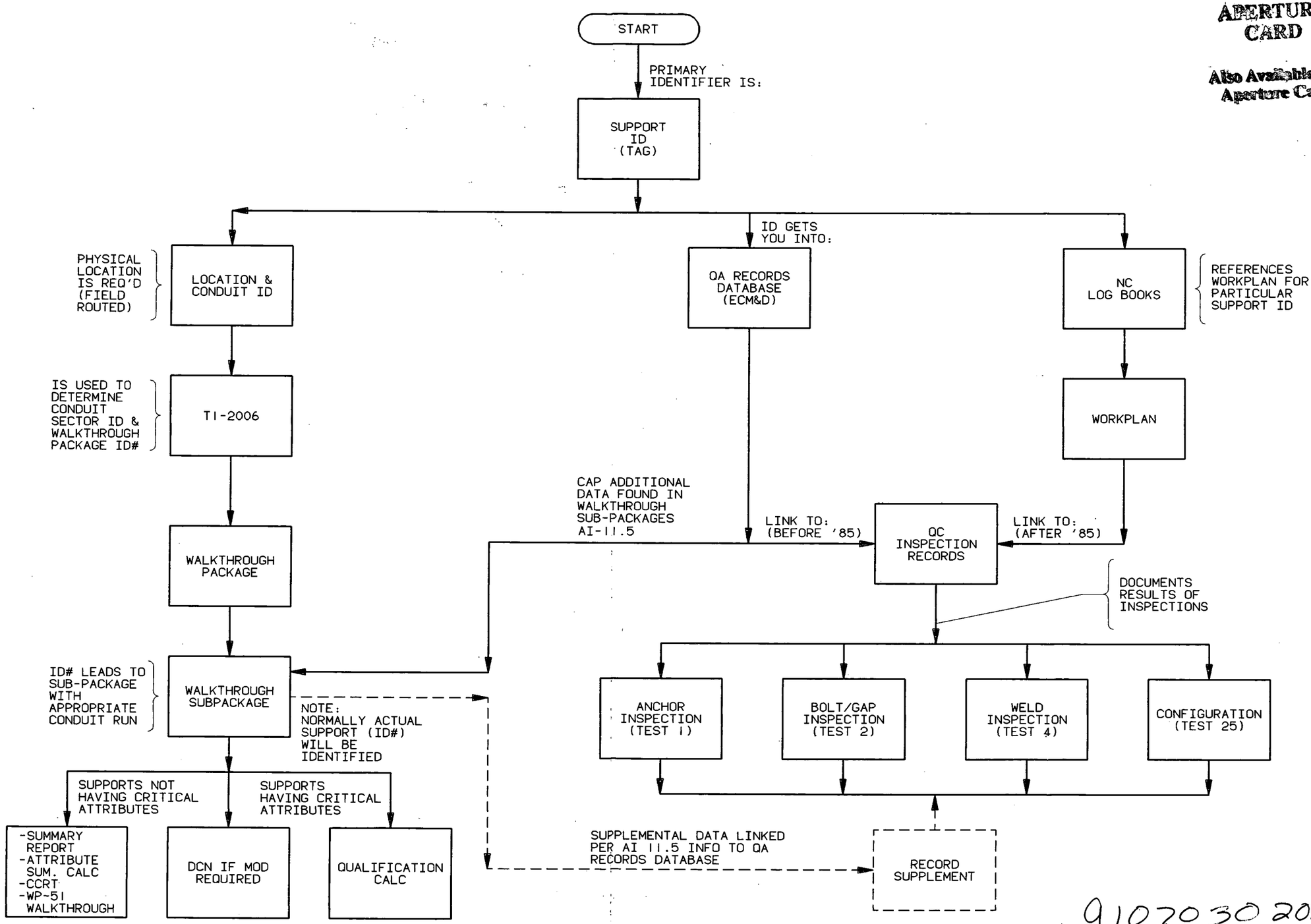
ENCLOSURE 5

CONDUIT SUPPORTS
QA RECORDS
(EXPANDED)



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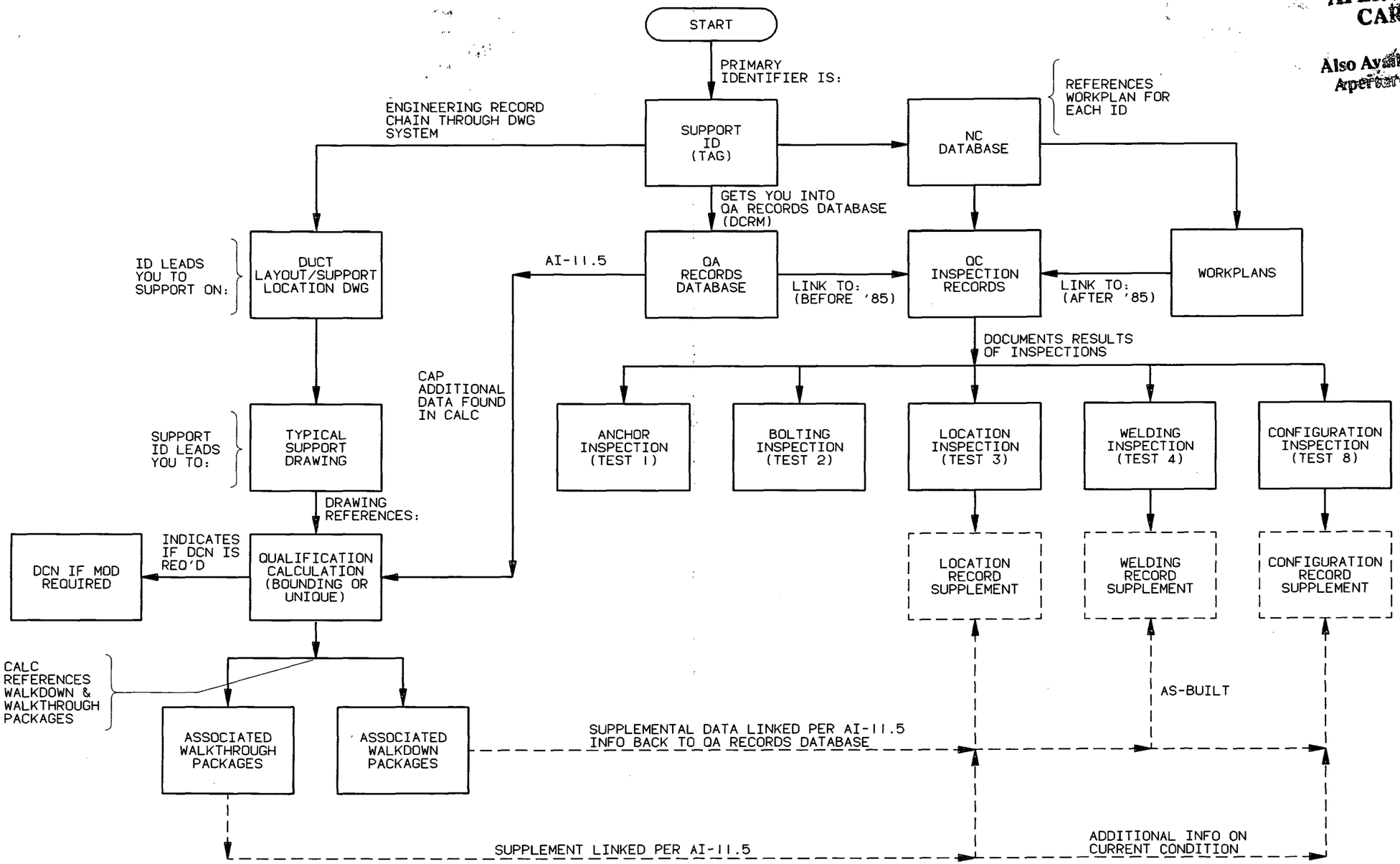
ENCLOSURE 5

HVAC DUCT SUPPORTS
QA RECORDS
(EXPANDED)



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