

QA Record

TVA 10697 (DNE 6-86)

DNE CALCULATIONS

TITLE MODERATE ENERGY LINE BREAK FLOOD STUDY - STRUCTURAL FLOOD LOAD ASSESSMENT				PLANT/UNIT WATTS BAR / 1 & 2
PREPARING ORGANIZATION SARGENT & LUNDY		KEY NOUNS (Consult RIMS DESCRIPTORS LIST) CIVIL CALCULATIONS, FLOOD CONT, FLOODING, CONCRETE, STEEL		
BRANCH/PROJECT IDENTIFIERS WCG-1-277		Each time these calculations are issued, preparator must ensure that the original (RO) RIMS accession number is filled in. Rev (for RIMS' use) <b>527</b> RIMS accession number		
APPLICABLE DESIGN DOCUMENT(S) 10N320 & 31N221 series; 41N306 THRU 41N483 series; 41N704 THRU 41N726 series; 16W418 & 419 series; 46N401 THRU 405 series; 40N1257A (258) etc.		R -		
SAR SECTION(S)		R -		
UNID SYSTEM(S)		R -		
Revision 0	R1	R2	R3	Safety-related? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
ECN No. (or indicate Not Applicable) N/A				Statement of Problem  EVALUATION OF SAFETY RELATED STRUCTURES FOR THE EFFECTS OF FLOODING DUE TO MODERATE ENERGY LINE BREAKS.
Prepared <i>RJ Marshall</i>				
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Approved <i>R.H. Pratt</i>				
Date <i>8/21/87</i>				
Use form TVA 10534 if more space required.	List all pages added by this revision.			
	List all pages deleted by this revision.			
	List all pages changed by this revision.			

Abstract

These calculations contain an unverified assumption(s) that must be verified later. Yes  No

THESE CALCULATIONS CONSTITUTE THE STRUCTURAL ASSESSMENT OF THE WATTS BAR SAFETY-RELATED STRUCTURES FOR THE EFFECTS OF FLOOD LOADS DUE TO MODERATE ENERGY LINE BREAKS. A TOTAL OF <sup>247 MODIFIED</sup> 248 FLOOD ZONES WERE EVALUATED THROUGHOUT THE REACTOR, AUXILIARY, CONTROL, DIESEL GENERATOR BUILDINGS AND THE INTAKE PUMPING STATION. AREAS OF THE PLANT REQUIRING A REFINED STRUCTURAL ANALYSIS SHALL BE EVALUATED IN SARGENT & LUNDY CALCULATION SF-OP-02; TVA BRANCH/PROJECT IDENTIFIER NO. WCG-1-278. ATTACHED TO THIS SHEET IS SARGENT & LUNDY CALCULATION NUMBER SF-OP-01, REV. 1 AND CONSTITUTES THE REV. 0 ISSUE OF THIS CALCULATION FOR TVA.

Microfilm and store calculations in RIMS Service Center.

Microfilm and return calculations to: B.W. Whittier

Microfilm and destroy.

Address: SSFB, Watts Bar

cc: RIMS, SL 26 C-K

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PDR ADOCK 05000390  
A PDR

**SARGENT & LUNDY**  
ENGINEERSDESIGN CONTROL SUMMARY  
ASSUMPTIONS AND PROCEDURES  
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**I. Purpose and Scope**

The purpose of the structural flood load assessment is to ensure that the Watts Bar Plant safety related structures are adequate to support internal flood loads caused by moderate energy line breaks (M.E.L.B.) within the plant. The analysis of these structures shall conform to the appropriate Watts Bar Design Criteria and F.S.A.R. commitments.

The safety related structures to be included in this assessment are the:

- 1) Auxiliary Building,
- 2) Control Building,
- 3) Reactor Building,
- 4) Diesel Generator Building, and
- 5) Intake Pumping Station.

Each building is made up of internal compartments or areas at each elevation which can form a physical boundary where internal flood water can accumulate and be isolated from other areas of the plant. Each bounded area where internal floods can accumulate is designated as a flood zone. These zones shall be identified and furnished by Sargent & Lundy's Nuclear Safeguards & Licensing Division (N.S.L.D.). Also, N.S.L.D. shall provide the postulated M.E.L.B. flood levels in each zone.

A structural assessment of the floor slabs and walls of each flood zone and miscellaneous steel enclosures identified by T.V.A. (See T.V.A. drawings 48W1257-1 & 2 and 48W1258-1 & 2) shall be evaluated for structural adequacy to resist flood loading. The following procedure outlines in more detail the organization, load combinations, method of analysis, and allowable material strengths and limitations of the structural flood load assessment calculation.

**II. Organization of Calculations**

The structural flood load assessment calculation SF-OP-01 is divided into seven separate sections. The following paragraphs briefly describe the contents of each of these sections.

Section 1 contains the Design Control Summary (D.C.S.). This section includes the signatures of design and verification, calculation index, design assumptions and procedures, construction materials, loading combinations, and design input information. In short, this section summarizes the design basis of this calculation.

**SARGENT & LUNDY**

ENGINEERS

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Section 2 includes the calculations for the generic capacities of concrete and masonry walls. The results of this section are utilized in determining the adequacy of each wall tabulated per flood zone in Section 5.

Section 3, Design Input Documents, includes key reference documents utilized in the structural flood load assessment. The documents include design information transmittals (D.I.T.'s) from N.S.L.D. and any other reference document which is directly related to the structural flood load assessment.

Sections 4 and 5 provide the detailed analysis of slabs and walls, respectively. Each section contains a tabulation of each slab or wall allowable flood capacities per flood zone based on T.V.A. drawings (See Comment No. 3), details, and design input, and Sargent & Lundy generated wall capacities from Section 2. This information is required to determine the governing flood capacity of each zone by comparing the allowable flood levels to the applied flood levels in Section 7.

Section 6 contains the review of miscellaneous steel enclosures identified by T.V.A. as potentially being affected by flooding. The analysis of structural steel affected by flood is limited to these enclosures and does not include structural support steel. Where required, this section will include a structural analysis to determine the structural acceptability of an enclosure's steel members, connections, and anchorages to the supporting walls and slabs.

The last section, section 7, provides the summary and conclusion of the structural flood load assessment. This section includes the tabulated comparison of the allowable flood height per zone to the postulated flood height computed by N.S.L.D.. This section conglomerates information determined and documented in Sections 3, 4, 5, and 6 (if applicable) with the transmitted flood levels and revisions thereof.

### III. Loads and Load Combinations

The applicable abnormal load combination for the structural flood load assessment is

1.0 D.L. + 1.0 F

For reinforced concrete masonry, and steel applications. Where "D.L." = dead load of the structure, attachments, and equipment and "F" = hydrostatic M.E.L.B. flood load.

A M.E.L.B. flood event is considered not to be concurrent with an operating or safe-shutdown earthquake; however, it is still considered