

DR Central File

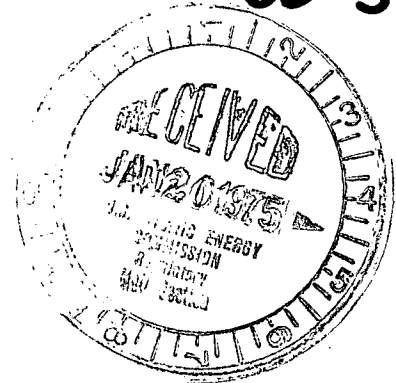
TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

January 15, 1975

50-390
50-391

REGULATORY DOCKET FILE COPY



Mr. Donald F. Knuth, Director
Directorate of Regulatory Operations
U.S. Atomic Energy Commission
Washington, DC 20545

Dear Mr. Knuth:

WATTS BAR NUCLEAR PLANT - CONCRETE FORM FAILURE ON ROOF SLAB
OF CONTROL BUILDING

Initial report of the subject incident was made on November 6,
1974. An interim report was submitted on December 6, 1974.
In compliance with paragraph 50.55(e) of 10 CFR Part 50,
we submit the enclosed final report of this incident.

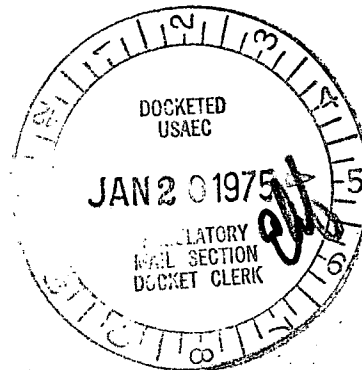
Very truly yours

J. E. Gilleland
Assistant to the Manager of Power

Enclosure

CC (Enclosure):

Mr. Norman C. Moseley, Director
Directorate of Regulatory Operations
U.S. Atomic Energy Commission
Region II - Suite 818
230 Peachtree Street, NW.
Atlanta, Georgia 30303



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ENCLOSURE
WATTS BAR NUCLEAR PLANT
CONCRETE FORM FAILURE ON ROOF SLAB
OF CONTROL BUILDING

FINAL REPORT

On November 6, 1974, an initial report was made regarding the subject incident at Watts Bar Nuclear Plant to L. E. Foster of AEC-DRO via telephone in compliance with 10CFR50.55(e). Those in attendance at the time of the call were J. J. Wilder, D. W. Wilson, R. D. Bradley, W. D. DeFord, and T. W. Abbaticello. The interim report was transmitted on December 6, 1974.

Description of Occurrence

On the evening of November 5, 1974, a section of the elevation 775 roof fell during concrete placement. Approximately 112 cubic yards of concrete had been placed of the estimated total requirement of 328 cubic yards. This section is between the north and south walls of the control building, column lines n and q, and in the east-west direction between column lines C8 and C10. An inspection was performed to assess possible damage done to the class I structure. The specific areas of interest were the concrete floor at elevation 729 including its underside, the walls just below the roof, concrete brackets on the wall, and the structural steel framing at elevations 741 and 755.

Cause of Incident

The cause of the incident was the failure of the bar joists used for support of the concrete roof forms. Specifically, the form failure described was precipitated by the failure of a butt weld splice in a bottom chord angle of one of the 40 LH14 bar joists.

Safety Implications and Damage Assessment

Structural damage to the control building which is a class I structure could compromise the integrity of that building. A detailed inspection for concrete damage revealed that the affected area of the floor at elevation 729 is supported on the exterior walls, on concrete columns with small drop panels at C8-p and C9-p, and on a concrete beam at line C10. If the floor had been overloaded, top surface cracks should be evident around the columns and drop panels and adjacent to the beam and walls. There are gouged places in the floor surface, presumably resulting from the edges of steel members striking the surface; but there is no pattern of cracking. It is concluded that the floor, which was designed for 400-psf live load, has not been overloaded.

Steel columns extending upward from the floor at C9-p and C10-p have been displaced or loaded such that the dry-pack mortar under the bearing plates shows evidence of damage. The mortar will be replaced.

Both vertical reinforcing bars for a parapet and bent bars for negative moment reinforcing in the roof slab extend from the construction joint at elevation 772.75. Only one of the vertical bars is displaced. The negative moment reinforcing appears to have somewhat more downward deflection than would occur under its own weight. If forces had existed on the steel sufficient to induce splitting in the wall, much more displacement should be evident. Some minor spalling did occur along the inside edge of the g-line wall. Concrete will be removed and replaced in the spall areas in conformance with General Construction Specification G-34.

The negative-moment steel will be carefully returned to its correct location to prevent the formation of low radius bends. Some positive measure, such as rigid blocking, will be used at the wall construction joint.

Initial inspection of the elevation 775 wall brackets revealed some edge spalling, but damage appeared to be slight. Had the brackets been overloaded, cracks should be evident along the formed sides. A close visual inspection was made of the brackets. Since no cracks are present in excess of 0.015 inch width, it may be concluded that no structural damage has occurred.

The inspection of the structural steel members resulted in the following findings:

1. Columns C-9 and C-10

Column C-9 was measured to be about one inch out of plumb with slight local web and flange buckling at the elevation 741.0 connection. Columns C-9 and C-10 will be replaced with new material.

2. Anchor bolts

All damaged anchor bolts will be ground or burned flush to the concrete. Since there is no calculated stress in these bolts, they will be replaced with threaded bolt anchors welded to the existing a-bolts. Drawing 48N753 will be revised to show an alternate base detail for these beam seats.

3. Embedded plates

The excess weld metal will be ground smooth with the face of each embedded plate. Following normal Quality Assurance Procedures, dye penetrate or magnetic particle inspection will be performed on all damaged areas.

4. Floor beams

The following floor beams are beyond repair and must be replaced with new ASTM A 36 beams:

E1 755.0

	<u>Beam No.</u>	<u>Size</u>	<u>Length</u>	<u>Beam Weight, Lb</u>
(1)	10 B4 R	W 18 x 45	20'-9-3/4"	936.5625
(2)	10 B4 R	W 18 x 45	20'-9-3/4"	936.5625
(3)	10 B4 L	W 18 x 45	20'-9-3/4"	936.5625
(4)	10 B4 L	W 18 x 45	20'-9-3/4"	936.5625
(5)	10 B9 R	W 21 x 62	20'-3"	1225.5
(6)	10 B9 L	W 21 x 62	20'-3"	1225.5
(7)	11 B2 L	W 24 x 68	20'-9-3/4"	1415.25

Total Weight 755 = 7612.5

E1 741

	<u>Beam No.</u>	<u>Size</u>	<u>Length</u>	<u>Beam Weight, Lb</u>
(8)	17 B2 R	W 14 x 74	20'-10"	1541.67
(9)	17 B9	W 24 x 130	27'-10"	3618.33

Total Weight for all 9 Beams = 12,772.5

New replacement steel is available at Siskin under the IQT Quality Assurance contract.

5. Floor beams (repairable)

The following floor beams suffered minor local damage, mainly at the ends and at connections where the stresses are very low in the webs and flanges:

- E1 755.0: 9 B7 R
- 9 B7 L
- 11 B2 R (3)
- 11 B2 R (2)
- 11 B7
- 12 B1

A total of 9 beams at 755

E1 741: 16 B3 L
17 B2 R (2)
17 B2 L (3)
17 B5 R
17 B5 L

A total of 8 beams at 741

These beams will be straightened by heating and pressing. Torn edges of webs at end connections will be removed and replaced using full penetration welds.

After repair, the tolerances required are those of ASTM A 6. All repaired members that do not meet these tolerance requirements will be replaced.

Description of Corrective Action

Those repairs listed in the previous section will be carried out in accordance with documented procedures. The inspection of the elevation 755 wall brackets will be completed and the results documented. The reinforcing steel will be straightened per standard quality control procedures and documented. The structural steel members will be repaired or replaced.

Means Taken to Prevent a Recurrence

1. That future requisitions for special supporting construction system materials and heavy materials handling equipment be more specifically definitive (i.e., spell out what TVA interprets a standard to mean); include requests for manufacturer's drawings for approval by TVA before acceptance of the finished product; and finally, include requests for I&T to make inplant inspections of the systems and equipment at various stages of production.
2. That onsite receipt of the systems and equipment mentioned in Item No. 1 receive a thorough inspection by responsible personnel before the items are accepted and placed in storage for immediate or future use.
3. That project inspection personnel strive for more frequent and thorough checks on supporting systems and heavy materials handling equipment before, during, and after various uses of these items and not rely on past practice or performance entirely.
4. The shored method of form support will be used to complete the forms on the control building roof structure.