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& REPORTS SERVICESUNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSIONBEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

HOUSTON LIGHTING & POWER COMPANY

(Allens Creek Nuclear Generating
Station, Unit No. 1)§
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Docket No. 50-466

TESTIMONY OF ROBERT C. IOTTI, ON BEHALF OF
HOUSTON LIGHTING & POWER COMPANY ON
BISHOP CONTENTION 17/TNT DETONATION

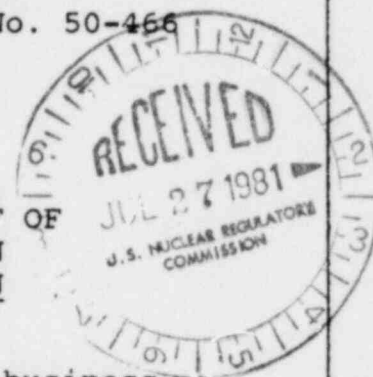
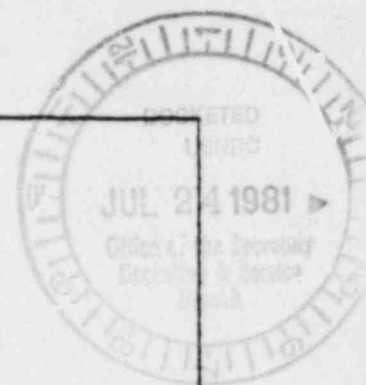
Q. Dr. Iotti, please state your name and business address and describe your educational and professional experience.

A. My name is Robert C. Iotti and my business address is Ebasco Services, Inc., 2 World Trade Center, New York, N. Y. I have previously described my position and background in connection with my testimony on Doherty Contention 47.

Q. Dr. Iotti, what is the purpose of your testimony?

A. The purpose of my testimony is to address Intervenor Bishop's Contention 17 regarding detonation of hazardous materials. The contention states:

The Applicant has estimated the effect on the plant of rupture and/or detonation to train car loads of TNT. I contend that these estimates are underestimated. I also contend that these

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2 estimates are not accurate for all cases and
3 that the Applicant should provide more design
4 protection. I further contend that the Applicant
5 has not fully considered the effects on the
6 plant of other hazardous materials that could
7 be carried by rail car.

8 Q. What criteria are used to determine that plant
9 structures are adequately protected from a TNT detonation?

10 A. NRC Regulatory Guide 1.91 indicates that plant
11 structures are adequately protected if they are at a
12 "safe" distance such that the peak positive incident
13 overpressure does not exceed 1 psi. The safe distance
14 is defined by the relationship

$$R = KW^{1/3}$$

15 where R = distance in feet from blast

16 W = pounds of TNT

17 K = 45

18 As specified in the Regulatory Guide, the maximum explosive
19 cargo in a single railroad box car is 132,000 pounds.
20 For this quantity, R must be greater than or equal to
21 2291 feet.

22 Q. What is the distance from the Atchison, Topeka
23 and Santa Fe (AT&SF) Railroad to the nearest Category I
24 plant structure?

A. The nearest Category I plant structure is
approximately 4230 feet from the AT&SF Railroad.

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2 Q Have any analyses been performed by the Applicant
3 with respect to the hazards to the plant from a postulated
4 TNT detonation?

5 A. Yes. As stated in PSAR Section 2.2.3.3.1, an
6 analysis which postulated the complete and instantaneous
7 detonation of 200,000 pounds of TNT was performed to
8 determine the blast loadings on critical plant structures.
9 The maximum loads on Category I structures was determined
10 to be on the order of 0.55 psi which is well below the
11 acceptance criteria stated in Regulatory Guide 1.91.

12 Q. The intervenor also contends that the effects
13 of a TNT detonation are underestimated. Is this possible?

14 A. No. The safety-related plant structures are
15 designed to withstand loads which are significantly
16 higher than the 1 psi criteria in Regulatory Guide 1.91.
17 Therefore, the effects of a detonation are not underestimated.

18 Q. Have the effects of a detonation of other
19 hazardous materials been considered?

20 A. Yes. The effective yields of high explosives as
21 listed in Table 2 of the Encyclopedia of Chemical Technology
22 have been considered. The yields in some cases could be
23 greater than that associated with TNT. However, the detona-
24 tion of these higher yield explosives has been considered and
results in overpressures well within the acceptance criteria.

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2 Q. During the special pre-hearing conference, the
3 intervenor expressed concern that the analysis in the
4 PSAR considered the detonation of only one (1) box car
5 of explosives. Has the Applicant analyzed the detonation
6 of multiple cars?

7 A. Yes. Such an analysis has been performed and
8 it has been determined that a maximum of three cars
9 could be successively detonated so that sequential
10 detonation would appear at a distance to be instantaneous.
11 Using the relationship in the referenced Regulatory
12 Guide, at a distance of 4230 feet, the plant is protected
13 against the complete and instantaneous detonation of
14 830,584 pounds of TNT which not only is equivalent to
15 six (6) carloads but also far exceeds the capacity of
16 any single box car used by the railroad.

17 Q. In your opinion, is the simultaneous detona-
18 tion of more than one box car a plausible event?

19 A. No. In the various documented cases I have
20 examined, no simultaneous detonation of more than one
21 carload has been recorded. In all such incidents the
22 explosion was either contained to one single car, or at
23 worst resulted in a chain reaction among multiple cars
24 on the train. In either case, such a detonation would
not result in a single peak overpressure but rather a

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2 series of overpressures which would be well below the
3 design parameters previously stated. For these reasons
4 the effects of a detonation are adequately accounted for
5 in the ACNGS design thereby assuring that plant structures
6 are protected.

7 Q. What are your conclusions?

8 A. The effects of a TNT detonation have been
9 evaluated and found to be well within the acceptance
10 criteria set forth in Regulatory Guide 1.91.
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