

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

5N Lookout Place

FEB 04 1991

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

Gentlemen:

In the Matter of )  
Tennessee Valley Authority ) Docket Nos. 50-327  
50-328

SEQUOYAH NUCLEAR PLANT (SQN) - DEMONSTRATION OF ACOUSTIC EMISSION INSPECTION  
METHODOLOGY - NUREG-0612

Reference: TVA letter to NRC dated August 31, 1990, "Sequoyah Nuclear Plant  
(SQN) - NUREG-0612 - Alternative Testing of Reactor Vessel Head  
and Internals' Lifting Rigs"

This letter provides the methodology that TVA will be utilizing to demonstrate  
acoustic emission inspection techniques in an upcoming presentation for NRC at  
the SQN site. During discussions between TVA and NRC Project Management, NRC  
recommended that TVA submit this information for NRC review before the site  
demonstration visit. TVA's acoustic emission demonstration is currently  
scheduled for March 4, 1991.

Enclosure 1 provides the methodology and technique that will be used in the  
acoustic emission demonstration. Enclosure 2 provides a diagram of the  
acoustic test apparatus.

TVA requests that NRC notify us following review of the enclosed information  
to confirm the March 4, 1991, presentation date. TVA is prepared to answer  
questions the staff may have regarding the upcoming presentation.

Please direct questions concerning this issue to Don Goodin at (615) 843-7734.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

*Mark J. Buzynski for*  
E. G. Wallace, Manager  
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Regulatory Affairs

Enclosures  
cc: See page 2

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U.S. Nuclear Regulatory Commission

cc (Enclosures):

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## ENCLOSURE 1

### Introduction:

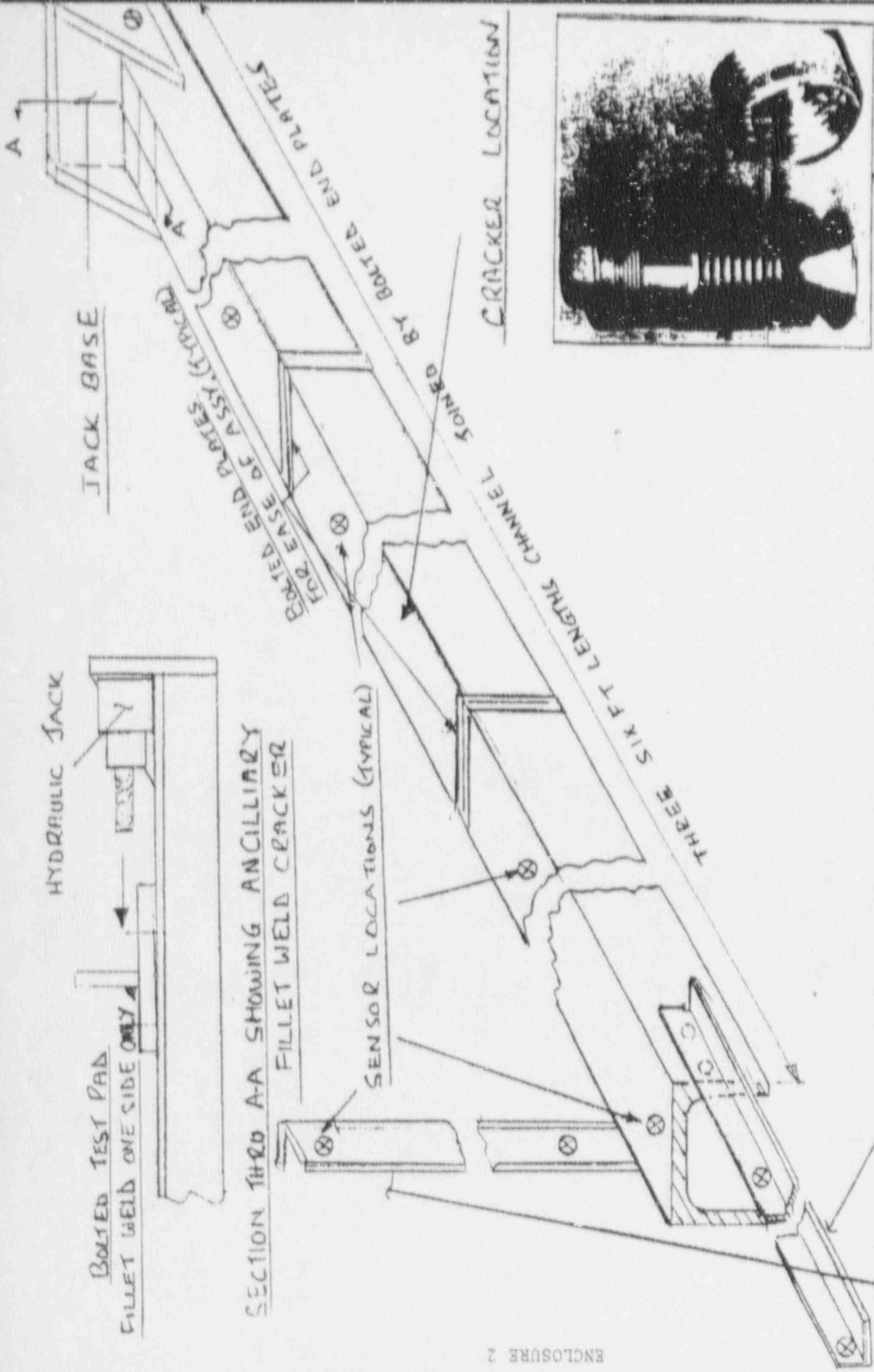
NRC has requested that TVA provide a demonstration of the acoustic emission (AE) examination proposed methodology for use on SQN's reactor vessel head and reactor vessel internals lifting devices. The methodology detects, locates, and assesses active defects under load. Since it is impractical to perform an examination on an actual lift rig with known active defects, TVA proposes to use commercially available hydrogen embrittled bolts attached to a short girder-type structure that simulates a segment of the reactor vessel head and reactor vessel internal beam structure. The test bolts, when strained, will crack and fail within a few minutes of loading. An additional structure will be attached to the test assembly in order to simulate continuous strain on a structural defect. This simulation will be comprised of fillet welded lugs that will be levered off under pneumatic or mechanical loading.

### Description of the Technique Utilized:

AE inspection is a volumetric examination method that monitors an elastic continuum under strain for elastic vibrations from active defects. The hardware of an AE system monitors the piezo electric effect of such vibration on a sensor giving an output in millivolts. The software establishes acceptance criteria based on time and millivolts.

### Methodology of AE Demonstration:

A rolled steel joist six feet in length will be inverted so that its six-inch base forms a test bed. Angle iron appurtenances will be attached to give extended sound AE paths. Bolts will be installed mid-span and strained while being monitored by AE equipment. The test piece will be loaded to failure by bracing a reinforced end-plate and hydraulic jack against the lugs so that the fillet welds fail by tearing. Each event will be monitored and recorded in order to demonstrate both defect location and active defect monitoring.



HYDRAULIC JACK

BOLTED TEST PAD  
FILLET WELD ONE SIDE ONLY

JACK BASE

SECTION THRU A-A SHOWING ANCILLIARY  
FILLET WELD CRACKER

SENSOR LOCATIONS (TYPICAL)

CRACKER LOCATION

JOINED BY BOLTED END PLATES

THREE SIX FT LENGTHS CHANNEL

ANGLE IRON EXTENSIONS  
TYPICAL EACH END

CRACKER DETAILS

TEST ASSY TWA