

## FINAL REPORT

### SAFETY INJECTION SYSTEM PIPING DEFICIENCY

May 30, 1980

#### I. SUMMARY

During a routine design review, a design deficiency was discovered in a Safety Injection System (SIS)/Containment Spray System (CSS) containment emergency sump piping design. The weld between the sump liner and the process pipe was not sufficient to carry the design loads. If left uncorrected, a failure of the weld joint would create stresses in the associated recirculation valve that would exceed the design criteria. Failure of this valve to open would prevent the SIS/CSS from performing its intended function of mitigating the consequences of an accident. The deficiency will be corrected by anchoring the SIS/CSS process pipe to the guard pipe outside of the containment building and the addition of an expansion joint to the process pipe inside the emergency sumps. Engineering procedures will be revised to require all design not previously subject to the present design verification program to be re-design verified consistent with current Engineering procedures.

#### II. DESCRIPTION OF THE INCIDENT

During a routine review, a design deficiency was discovered which, if left uncorrected, could have adversely affected the safety of operations. The joint between the 16 inch Safety Injection System piping and the emergency sump liner was shown on the construction drawing to be a one-quarter inch seal weld, which does not meet the design load criteria.

The piping is part of the SIS and CSS and leads from the containment emergency sump through the containment sump isolation valve to the safety injection and containment spray pumps. Following a LOCA, water will automatically be recirculated from the emergency sumps to the reactor by the Safety Injection System. Operation of the containment emergency sump isolation valve is required for recirculation mode operations. The seal weld in question attaches the process pipe to the sump liner.

#### III. CORRECTIVE ACTION

When this deficiency was discovered, the Engineer who identified the problem reported it on an Engineering Design Deficiency Report (EDD 79-39) as required by Engineering procedures.

This deficiency will be corrected by anchoring the process pipe to the guard pipe outside the containment building and adding an expansion joint to the process pipe inside the emergency sumps (see Figure 1).

## Attachment

In determining that this installation is acceptable, the following factors and limitations were checked and verified as satisfactory:

- Pipe Stresses
- Recirculation Valve End Loads
- Safety Injection Pump Load Limits
- Sump Liner Load Limits
- Containment Penetration Sleeve Load Limits
- Differential Settlement Criteria
- Containment Pressure Boundary Continuity
- Process Pipe and Guard Pipe Should Not Impact During a Seismic Event
- Constructability.

### IV. RECURRENCE CONTROL

Early in the STPEGS program, any engineer could perform verification on a design so long as he was qualified and met the independence requirements. As the result of an error found in the design of structural steel members (as documented in ST-HL-AE-346 dated June 5, 1979), it was found that the quality of the design verification program was being compromised by the pressures of meeting schedules. This program was then substantially revised. Each discipline was required to appoint individuals whose primary duties were that of the performance of design verification. By procedure, each design verifier was to be given as much time as he needed to perform the verification task and each individual assigned to the verification function was made responsible to the Project Quality Engineer for the quality of this work. This program was placed into effect in January, 1979. This error occurred prior to the implementation of this procedural change. This deficiency indicates, however, that the adequacy of verification of designs issued prior to January, 1979 may require further evaluation. Therefore, designs issued prior to January, 1979 will be re-design verified consistent with current Engineering procedures. This requirement will be added to the procedures before June 30, 1980. Reverification will be completed on a routine basis as documents are revised but, as a minimum prior to records turn-over and prior to fuel load.

### V. SAFETY ANALYSIS

If this deficiency were to have been left uncorrected, the weld at sump liner/process pipe interface could fail. The process pipe would then be free of restraint and would impose a load on the recirculation valve which exceeds the allowable end loads. It could not then be guaranteed that the valve would operate as required. Because this problem affects all three trains, this is a common mode failure which could cause loss of safety system functions.

TRAINS "A" & "C"

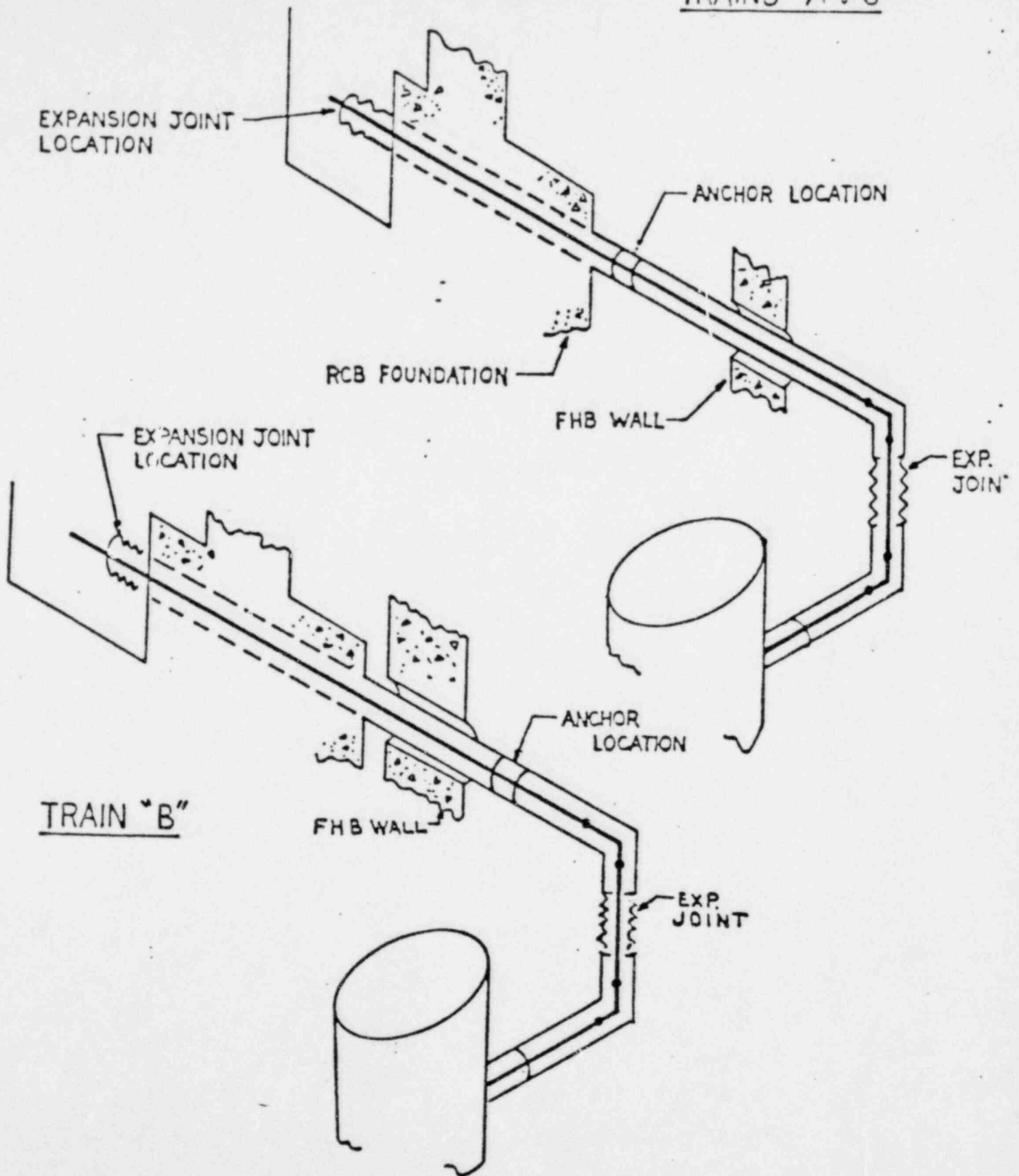


FIGURE - 1