THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP

To Distribution	
From J.J. Kelly, Plant Integration	
Cust. Generic	**File No. or Ref.**
Subj. Customer Guidance On High Pressure Injection Operation	**Date** November 1, 1977

DISTRIBUTION

B.A. Karrasch
E.W. Swanson
R.J. Finnin
B.M. Dunn
D.W. LaBelle
N.S. Elliott
D.F. Hallman

Two recent events at the Toledo site have pointed out that perhaps we are not giving our customers enough guidance on the operation of the high pressure injection system. On September 24, 1977, after depressurizing due to a stuck open electromatic relief valve, high pressure injection was automatically initiated. The operator stopped HPI when pressurizer level began to recover, without regard to primary pressure. As a result, the transient continued on with boiling in the RCS, etc. In a similar occurrence on October 23, 1977, the operator bypassed high pressure injection to prevent initiation, even though reactor coolant system pressure went below the actuation point.

Since there are accidents which require the continuous operation of the high pressure injection system, I wonder what guidance, if any, we should be giving to our customers on when they can safely shut the system down following an accident? I recommend the following guidelines be sent:

a) Do not bypass or otherwise prevent the actuation of high/low pressure injection under any conditions except a normal, controlled plant shutdown.

b) Once high/low pressure injection is initiated, do not stop it unless: Tave is stable or decreasing and pressurizer level is increasing and primary pressure is at least 1600 PSIG and increasing

I would appreciate your thoughts on this subject.

JJK:JL

FIGURE 3.2 The Kelly Memorandum.

From: "Designing Technical Reports", J.C.Mathes, Dwight Stevenson, 1991, Macmillan Publishing

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To Jim Taylor, Manager, Licensing	
From Bert M. Dunn, Manager, ECCS Analysis(2138)	
Cust.	**File No. or Ref.**
Subj. Operator Interruption of High Pressure Injection	**Date** February 9, 1978

This memo addresses a serious concern within ECCS Analysis about the potential for operator action to terminate high pressure injection following the initial stage of a LOCA. Successful ECCS operation during small breaks depends on the accumulated reactor coolant system inventory as well as the ECCS injection rate. As such, it is mandatory that full injection flow be maintained from the point of emergency safety features actuation system (ESFAS) actuation until the high pressure injection rate can fully compensate for the reactor heat load. As the injection rate depends on the reactor coolant system pressure, the time at which a compensating match-up occurs is variable and cannot be specified as a fixed number. It is quite possible, for example, that the high pressure injection may successfully match up with all heat sources at time t and that due to system pressurization be inadequate at some later time t_2.

The direct concern here rose out of the recent incident at Toledo. During the accident the operator terminated high pressure injection due to an apparent system recovery indicated by high level within the pressurizer. This action would have been acceptable only after the primary system had been in a subcooled state. Analysis of the data from the transient currently indicates that the system was in a two-phase state and as such did not contain sufficient capacity to allow high pressure injection termination. This became evident at some 20 to 30 minutes following termination of injection when the pressurizer level again collapsed and injection had to be reinitiated. During the 20 to 30 minutes of noninjection flow they were continuously losing important fluid inventory even though the pressurizer indicated high level. I believe it fortunate that Toledo was at an extremely low power and extremely low burnup. Had this event occurred in a reactor at full power with other than insignificant burnup it is quite possible, perhaps probable, that core uncovery and possible fuel damage would have resulted.

The incident points out that we have not supplied sufficient information to reactor operators in the area of recovery from LOCA. The following rule is based on an attempt to allow termination of high pressure injection only at a time when the

FIGURE 2.3 The First Dunn Memorandum (2 pages).

reactor coolant system is in a subcooled state and the pressurizer is indicating at least a normal level for small breaks. Such conditions guarantee full system capacity and thus assure that during any follow on transient would be no worse than the initial accident. I, therefore, recommend that operating procedures be written to allow for termination of high pressure injection under the following two conditions only:

1. Low pressure injection has been actuated and is flowing at a rate in excess of the high pressure injection capability and that situation has been stable for a period of time (10 minutes).

2. System pressure has recovered to normal operating pressure (2200 or 2250 psig) and system temperature within the hot leg is less than or equal to the normal operating condition (605 F or 630 F).

I believe this is a very serious matter and deserves our prompt attention and correction.

BMD/lc

cc: E.W. Swanson
D.H. Roy
B.A. Karrasch
H.A. Bailey
J. Kelly
E.R. Kane
J.D. Agar
R.L. Pittman

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To B.A. Karrasch, Manager, Plant Integration	
From D.F. Hallman, Manager, Plant Performance Services Section (1149)	
Cust.	**File No. or Ref.**
Subj. Operator Interruption of High Pressure Injection (HPI)	**Date** August 3, 1978

References: (1) B.M. Dunn to J. Taylor, same subject, Feb.9, 1978
(2) B.M. Dunn to J. Taylor, same subject, Feb.10,1978

References 1 and 2 (attached) recommend a change in B&W's philosophy for HPI system use during low-pressure transients. Basically, they recommend leaving the HPI pumps on, once HPI has been initiated, until it can be determined that the hot leg temperature is more than 50 F below Tsat for the RCS pressure.

Nuclear Service believes this mode can cause the RCS (including the pressurizer) to go solid. The pressurizer reliefs will lift, with a water surge through the discharge piping into the quench tank.

We believe the following incidents should be evaluated:

1. If the pressurizer goes solid with one or more HPI pumps continuing to operate, would there be a pressure spike before the reliefs open which could cause damage to the RCS?

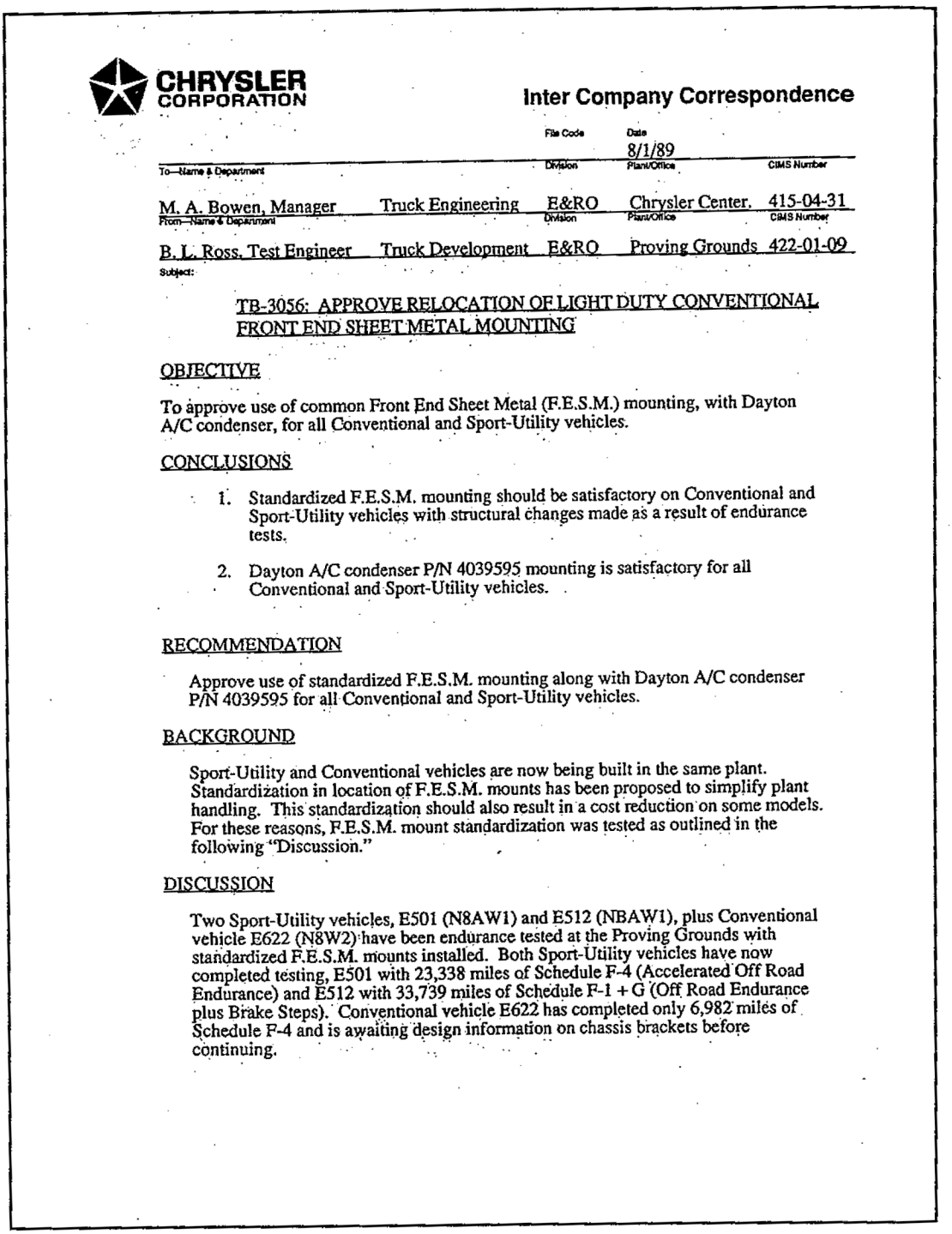
2. What damage would the water surge through the relief valve discharge piping and quench tanks cause?

To date, Nuclear Service has not notified our operating plants to change HPI policy consistent with References 1 and 2 because of our above-stated questions. Yet, the references suggest the possibility of uncovering the core if present HPI policy is continued.

We request that Integration resolve the issue of how the HPI system should be used. We are available to help as needed.

D F Hallman
D.F. Hallman

FIGURE 2.4 The Hallman Memorandum.



CHRYSLER CORPORATION

Inter Company Correspondence

To—Name & Department		File Code / Division	Date / Plant/Office	CIMS Number
			8/1/89	
M. A. Bowen, Manager	Truck Engineering	E&RO	Chrysler Center.	415-04-31
From—Name & Department		Division	Plant/Office	CIMS Number
B. L. Ross, Test Engineer	Truck Development	E&RO	Proving Grounds	422-01-09

Subject:

TB-3056: APPROVE RELOCATION OF LIGHT DUTY CONVENTIONAL FRONT END SHEET METAL MOUNTING

OBJECTIVE

To approve use of common Front End Sheet Metal (F.E.S.M.) mounting, with Dayton A/C condenser, for all Conventional and Sport-Utility vehicles.

CONCLUSIONS

1. Standardized F.E.S.M. mounting should be satisfactory on Conventional and Sport-Utility vehicles with structural changes made as a result of endurance tests.
2. Dayton A/C condenser P/N 4039595 mounting is satisfactory for all Conventional and Sport-Utility vehicles.

RECOMMENDATION

Approve use of standardized F.E.S.M. mounting along with Dayton A/C condenser P/N 4039595 for all Conventional and Sport-Utility vehicles.

BACKGROUND

Sport-Utility and Conventional vehicles are now being built in the same plant. Standardization in location of F.E.S.M. mounts has been proposed to simplify plant handling. This standardization should also result in a cost reduction on some models. For these reasons, F.E.S.M. mount standardization was tested as outlined in the following "Discussion."

DISCUSSION

Two Sport-Utility vehicles, E501 (N8AW1) and E512 (NBAW1), plus Conventional vehicle E622 (N8W2) have been endurance tested at the Proving Grounds with standardized F.E.S.M. mounts installed. Both Sport-Utility vehicles have now completed testing, E501 with 23,338 miles of Schedule F-4 (Accelerated Off Road Endurance) and E512 with 33,739 miles of Schedule F-1 + G (Off Road Endurance plus Brake Steps). Conventional vehicle E622 has completed only 6,982 miles of Schedule F-4 and is awaiting design information on chassis brackets before continuing.

FIGURE 3.3 Test Report with Direct Statement of Purpose.