50-320

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP

To	R. B. Davis, Manager, Control Analysis Unit
From	R. W. Winks, Control Analysis RWW
Cust.	Met. Ed. (TMI-2)
Subj.	Report of Trip to TMI-2 Following March 28, 1979 Incident (Travel Authorization #48)

BDS 663-5

File No. or Ref. NSS-6/T3.4

Date April 9, 1979

This letter to cover one customer and one subject only.

After receiving information of the accident at TMI-2 about 8:00 a.m. on March 28, 1979, Messrs. Bob Twilley, Joe Kelly and I left Lynchburg by chartered flight about 10:30 a.m. of the same day. We remained at Greg Schaedel's home until after supper time and listened as the Resident Engineer, Lee Rogers, periodically called us to update us as to the status of the plant. From about 6:30 a.m. until about 7:00 p.m. that day all RC pumps were shut down and both hot legs were full of steam. Finally, one RC pump, A-1 was started after considerable effort to collapse or shift the steam bubble was successful and the pump was covered with liquid again. We were relieved and decided to go out to dinner then.

The next morning Greg Shaedel called me at 6:00 a.m. and said that Jon Putnam had delogged the first part of the reactimeter data and that I should meet him at the Observation Center at 6:30 a.m. I was badged and given clearance to enter TMI-1 before 8:30 a.m. Jon Putnam and I spent all day making graphs of key primary and secondary loop parameters to tell Met Ed/GPU, B&W, and the NRC what happened in the initial few minutes of this accident.

At 8:00 p.m. I was relieved by Messrs. Joe Kelly and Bob Twilley. By the end of their first twelve hour shift we had prepared twenty graphs which described the transient for the first 17 hours after the main feedwater pumps tripped.

In summary, the transient can be described as a total loss of feedwater with the plant operating at 98% power level. Three auxiliary feedwater pumps were up and running in 30 seconds but motorized block valves were closed preventing auxiliary feedwater from entering into the boiled dry steam generators.

RC pressure quickly exceeded the high RC pressure reactor trip setpoint and by 9 seconds the reactor was tripped. The electromatic relief valve on the pressurizer opened to relieve the excess pressure but failed to close, thereby allowing the RC system to depressurize rapidly.

After six minutes RC pressure was equal to the saturation pressure of the reactor coolant and boiling occurred in the RC system. After 8 minutes, the control room operator finally noticed that the motorized block valves were closed and opened them. Then water was admitted into both steam generators.

After 51/2 minutes the pressurizer was completely full of water and water flowed through the stuck open electromatic relief valve into the quench tank. Eventually, the quench tank rupture disc ruptured and steam and water discharged into the reactor building. The control room operators decided to shut down

all the RC pumps between 1 and 2 hours after the transient started. Then hot leg temperatures went off scale high (above 620F) and were measured at 700 to 710F while the cold leg temperateures dropped down below 300F. When both hot legs were full of steam we had a 500F ΔT (hot leg to cold leg difference) and no natural circulation flowrate.

After many hours of effort the Loop A hot leg steam volume collapsed and fluid temperature dropped below 620F. The A-1 RC pump was finally restarted about 15 hours after the start of the accident.

I remained at TMI-2 for eight days and only the first two days were spent analyzing and describing the accident. The remaining days I answered questions from B&W-Lynchburg and supplied plant status data regularly back to Lynchburg. I was asked to join a "think tank" group on how to use existing working auxiliary systems and requested that others more qualified than I assume that task. (B&W meanwhile had sent Messrs. Fred Faist, Bobby Day, Ken Ellison and Al Jenkins to participate in this kind of effort.)

I would like to offer some comments as to the effectiveness of the multitudinous representativeness of the NRC in and around TMI-2.

On the first day a few NRC guys arrived and tried to set up their communications link from the plant to the Observation Center. They eagerly received our graphs of the accident. On the second day NRC had set up their "base" in the control room complete with radio communication to the Observation Center. One "base" was in the shift supervisor's office and the other "base" was a large conference table in one corner of the control room.

On the third day there were even more NRC personnel in the Control Room. One could not move without bumping into an NRC guy. All they did was drink coffee, stand around, ask questions, and interfere with usual control operations. NRC can do one thing very well: they all ask copious questions!

About the fifth day some semblance of organization seemed to exist. Met Ed and B&W were trying to get procedures written and approved. GPU and B&W-Lynchburg were trying to figure out what the next operating phases should be for TMI-2. A "super think tank" was established and operating in nearby Middletown. Meanwhile the NRC was absorbing facts and information in TMI-2 and relaying it to either the Observation Center or Washington D.C. and this was the "precise, well understood" information that NRC gave to the press each day.

On the fifth or sixth day, the Met Ed shift supervisor ordered all NRC personnel out of the control room and cordoned off the operating area from all personnel. Finally, the control room began to operate normally. NRC moved their big conference room table "base" out onto the turbine desk, and operated their information gathering task from there.

In conclusion, I arrived at the following opinion of the NRC: (1) They do not know any specific details of a typical B&W plant, hence the infinite numbers of questions they asked just to "get up to speed". (2) They are ineffective

in an operating plant since most of them never visit one. Utility or vendor personnel have to get most of the plant data for them. (3) Most home office NRC personnel needed this exercise just to re-acquaint themselves with a real operating plant. They have little or no understanding of all the normal operations that must get done on an operating plant. (4) After a plan has been developed, and a procedure written, and approval granted, by the industry personnel, then it takes much too long for NRC to make a decision about executing it. (It is incorrect to let NRC take the lead in situations which they do not understand. Rather, industry should proceed and then let NRC review the action after the fact.) (5) It was unnecessary to have an overwhelmingly large number of NRC representatives on site. I am convinced that they don't have enough to do at home and so this was a very interesting training exercise paid for by all U.S. taxpayers.

I have not lost complete respect for the NRC, but rather I recognize that in their home office they have the ability to ask very probing questions on plant design and safety. It is a shame that they are not hardware or plant operations oriented however.

RWW/hv
cc: E. A. Womack
J. D. Carlton
W. S. Spangler
B. A. Karrasch
J. D. Phinney
D. F. Hallman
Control Analysis (Circulate)
L. C. Rogers
J. E. Galford

1700 from D. Roy per telecon with Bob Arnold — Arnold —:

- Requested call to him or Herbein
  before B+W recommends to Site
  that they go to Decay Heat Pump ops
  vice remaining on RC Pump/Condenser cooling mode

- Requested a copy of description of
  Davis Besse Sept incident on depressurization
  (to compare with this one since NRC has
  been doing it)

sent up telecopy
- Requested copy of description of Oconee
  RCP seal blowdown incident
  (1974)

20^00 Novak called Taylor — Taylor having
? questions concerned estimated quantity
of non condensibles/Radiolytic Decomposition
products that may be in Vessel.
i.e. if we reduce pres. could RV head
contain the gas.
Taylor to call back!

Note: Lee Rodgers conveyed request of Site Operation
that he be kept informed of info/ ?'s ~~[illegible]~~
received on separate circuit — to help pick up errors
example 1. — NRC calls
2 — management contacts/Arnold

-0:11 1700 – agreed with site – if RCP is lost – stops or must be turned off – we concur to start one of others – taking care to satisfy conditions defined for start i.e. per 3/28 condition for 1A.

-2:15 — G. Kulynych talked to Ted Engelbur ~ "brainstorm how hi coolant activity could be cleaned up."

3/30/79

03:10

Bill Lowe of Pickard + Lowe
Joe Logan + Jim Floyd of Met Ed
Jim Moore GPU
Tom Crims Jersey Central
} R E Kosiba
D Ballan
J Taylor
Mobi (late)
R Carlton

? Non condensing gas in RV
left it in per 1200 – 1568 ft^3 of gas
B+W confirmed RV above nozzle = 1129 ft^3
Hence gas may be going into solution / spilling
Operators plan to $\Delta p \approx 100$ psi check gas bubble size

with – B+W try to calculate H_2, He fr fuel, metal water reaction

~0:30 NRC call to Taylor – Ross
+ Fuleckco

Key summary – extensive core damage
could surge to local melting
hi temp could be pellets in cup
Continue studies
present cooling mode as good as we know

Requested we + the plans to ask I + C physics people to look for intelligen

~0600 NRC Call to Taylor

DTO TK 0400 — 640 } 40/hr. 7
0500 — 680

—0630— Call Chuck Barsch to come in "Consult" Boom in ½ hr!
D Koy alert
C Caldwell LRC (out of Town) — Ted Eigelter will call with alternate in office first thing. GE — many of his experts on travel

R E Kosik

3/31

10:00 Call to Gary Brunton
- Inform him of our operations center
- following through on logic for successive cooling configuration
- Sending B+R instrumentation elevation data (Bill Shepard)
- confirmed MU tank vented to waste gas tank and did not work
- B generator probably OK – not planning further confirmation – plan

T. Gerusky
Bureau of Radiological
Protection
Commonwealth of PA

50-320

Trip @ 4:00 am

0839

3/28/79 0730 Unit II site emergency
steam generator - primary to
secondary leak
isolated

744-7254

General emergency
TRIP UNIT - FAILED TO FIRE

800 R/hr in containment dome

on-site teams

wind out of 30° on Southeasterly
direction

high pressure injection initiated twice

lost some core coolant

fuel failed

high radiation area

10 R/hr predicted - noble gas on
West Shore at Fiddlers Island
on dome vals

.2%/day leakage in building