INPO

Institute of
Nuclear Power
Operations

1820 Water Place
Atlanta, Georgia 30339
Telephone 404 953-3600

July 9, 1981

Mr. William J. Dircks
Executive Director
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Bill:

This letter will confirm the telephone conversations of July 6, 1981, and July 8, 1981, between Bob Haueter of our staff and Jack Heltemes of your AEOD staff.

There is increasing concern within the nuclear utility industry that NPRDS, which is a valuable safety and reliability tool, is not being fully utilized in supporting operational excellence. There is also a recognition that data reporting to NPRDS needs improvement.

Accordingly, the industry has requested INPO to take over management and funding of NPRDS. At the July 8, 1981, INPO Board Meeting, this concept was concurred in by the Board of Directors to become effective January 1, 1982. It is planned that partial funding through the current EEI and APPA methods continue through 1982 to allow for a smooth transition. It was decided, however, to not request further funding from the NRC beyond 1981.

INPO is committed to becoming an active user of NPRDS data and to enhancing reporting and usage by the industry through our analysis program and through our plant evaluation activities.

INPO is also committed to providing to all segments of the nuclear power industry, including the NRC, a user-oriented information system on the performance of safety-related components and systems in nuclear power plants.

We plan to establish an advisory committee on NPRDS which will include the same organizations currently represented on the ANS. 58-20 Subcommittee, which includes the NRC. For the near term, we would expect to ask the current ANS. 58-20 Subcommittee members to fulfill that role.

Data and reports from the NPRDS data base will continue to be made available to the NRC and we would recommend that coordination between NRC and INPO be accomplished under the Memorandum of Agreement and the planned periodic meetings with AEOD. We will be prepared to discuss this matter further at our next scheduled meeting here at INPO on July 21, 1981.

Enclosure 2

The meaningful use of plant event data to enhance overall safety and reliability of the nuclear power plants is a goal we all share. It is our hope that you will assist us in making NPRDS into the important tool that it was designed to be and is capable of becoming.

Sincerely,

Dennis

E. P. Wilkinson
President

adw

The Honorable George H. W. Bush
President of the Senate
Washington, D. C. 20510

Dear Mr. President:

Enclosed for your information are copies of an Advance Notice of Proposed Rulemaking to be published in the Federal Register.

This advance notice of proposed rulemaking is being issued to inform the public of and to seek comments concerning the Commission's intention to:

(1) defer rulemaking that would establish the Integrated Operational Experience Reporting System (IOERS);

(2) develop for Commission review and approval a proposed rule to modify and codify the existing Licensee Event Report (LER) reporting requirements and to assure consistency with 10 CFR 50.72 which covers the immediate reporting of significant events;

(3) endorse the Institute for Nuclear Power Operations (INPO) plan to assume responsibility for the management, funding, and technical direction of the Nuclear Plant Reliability Data System (NPRDS); and

(4) encourage INPO to assure that the NPRDS receives, processes, and disseminates the reliability data needed by industry and the NRC to support probabilistic risk and reliability assessment programs.

Enclosed also is a copy of the public announcement to be released by the Commission on this matter in the next few days.

Sincerely,

Nunzio J. Palladino
Chairman

Enclosures:
As stated

Enclosure 3

The Honorable Thomas P. O'Neill, Jr.
Speaker of the United States
House of Representatives
Washington, D. C. 20515

Dear Mr. Speaker:

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(3) endorse the Institute for Nuclear Power Operations (INPO) plan to assume responsibility for the management, funding, and technical direction of the Nuclear Plant Reliability Data System (NPRDS); and

(4) encourage INPO to assure that the NPRDS receives, processes, and disseminates the reliability data needed by industry and the NRC to support probabilistic risk and reliability assessment programs.

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Sincerely,

Nunzio J. Palladino
Chairman

Enclosures:
As stated

Enclosure 3

NRC DECIDES TO DEFER DEVELOPMENT
OF THE INTEGRATED OPERATIONAL EXPERIENCE REPORTING SYSTEMS

(TEXT TO BE PROVIDED)

Enclosure 4

(JCLEAR REGULATORY COMMISSI(
WASHINGTON, D. C. 20555

JUL 1 4 1981

MEMORANDUM FOR: Carlyle Michelson, Director
Office for Analysis and Evaluation
of Operational Data

FROM: Matthew Chiramal
Office for Analysis and Evaluation of
Operational Data

SUBJECT: TRIP REPORT TO NORTH ANNA-2 - FAILURE OF B PHASE MAIN TRANSFORMER AND SUBSEQUENT FIRE IN THE TRANSFORMER AREA

On July 9, 1981, I joined NRR staff members on a visit to North Anna-2 to view the extent of damage caused by the failure of B phase main transformer and subsequent fire. The failure of the transformer had occurred on July 3, 1981, while Unit 2 was at 17% power and Unit 1 was at full load (see enclosed memorandum from L. Engle to T. Novak for details of the event).

A fault in the transformer 500 KV bushing inside the transformer casing is suspected to be the cause of the failure (the manufacturer, Westinghouse, is investigating the failure). The short circuit in the transformer caused ruptures in the casing and the spilled oil (~9000 gallons) in the B phase transformer bay and the adjacent spare transformer bay caught on fire.

Observations

1. The 3 single phase transformers are located in a common bay separated from each other by concrete walls. The spare transformer bay is also part of the common bay. The spilled oil spread mainly in the B phase transformer bay and the spare transformer bay.

2. The B phase transformer suffered extensive damage. The casing was ruptured in several places and the shell was distorted. Most of the bushings, lightning arrestors, and auxiliaries were damaged.

3. The fire damage in the B phase transformer bay was not as severe as in the spare bay. This apparently is due to the fire protection sprinkler system actuation in the transformer bay.

4. No damage was apparent in the A and C phase transformer sections (again apparently due to the sprinkler systems there).

5. Severe fire damage was seen in the spare transformer bay (which was empty at the time of the event). The spare transformer bay is not fitted with a fire protection system.

6. The fire in the spare bay caused severe damage to the turbine building wall and to overhead alumnium buses of the C Reserve Station Service Transformer (RSST-C). The cables associated with these buses, that were mounted on vertical cable trays on the turbine building wall, were also burnt. (RSST-C provides part of offsite power from the 34.5 KV switchyard to the onsite distribution system - see enclosed single line diagram).

Conclusions

1. Transformer casings apparently are not designed to withstand severe electrical short circuits inside the transformer. Such short circuits can split the transformer casing and cause spillage of transformer fluid in the vicinity of the unit.

2. Fire protection deluge systems can effectively reduce damages due to oil fires.

3. At North Anna 1 and 2, the three reserve station transformers (RSST-A, B, and C) are located adjacent to each other away from the main and station service transformers. However, these transformers are not protected by deluge systems. An oil fire in the area could conceivably damage all three transformers and thus affect offsite power availability to both North Anna units.

4. Several operating nuclear plants have liquid filled transformers located inside the plant building (load center transformers for safety-related and nonsafety-related buses). These plants are not designed to contain or protect against ruptures of these transformers and consequent spillage and fires.

5. In view of the number of transformer failures at operating reactors, we should review the surveillance and preventive maintenance programs being practiced by the utilities to see how failures can be reduced and thus reduce challenges to the onsite power distribution systems.

G. In implementing GDC IV requirements regarding physical and electrical separation of the preferred power source connections to the plant onsite distribution system, effects of transformer oil fires should be considered.

/S/

Matthew Chiramal
Office for Analysis and Evaluation
of Operational Data

Enclosures:
As Stated

cc w/enclosures:
TNovak
RMattson
GLainas
EJordan
LEngle
VBenaroya
RFerguson
JOlshinski

Distribution:
Central File
AEOD Reading File
AEOD Chron. File
MChiramal, AEOD

OFFICE ▶	AEOD/Inc						
SURNAME ▶	MChiramal:gt						
DATE ▶	7/17/81						

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUL 06 1981

MEMORANDUM FOR: Thomas M. Novak, Assistant Director for Operating Reactors, DL

THRU: Robert A. Clark, Chief
Operating Reactors Branch #3, DL

50-339

FROM: Leon B. Engle, Project Manager
Operating Reactors Branch #3, DL

SUBJECT: UPDATE ON TRANSFORMER FIRE AT NORTH ANNA POWER STATION, JULY 3, 1981

At 7:22 AM, Friday (July 3, 1981) a fire in the main-phase B transformer which was carrying power from Unit No. 2 initiated an automatic shutdown of Unit 2.

The cause of the fire was an electrical fault in the B transformer. The fire ruptured the transformer and spread to cooling oil (~69,000 gal. rated capacity) which spilled through the rupture. Heat from the oil-fire caused nitrogen bottles serving the transformer to explode.

The loss of load (B transformer) initiated a turbine-reactor trip, at approximately 7:22 AM for Unit 2. As a precautionary measure, plant operators tripped two Reactor Coolant Pumps (Unit-2) to reduce hotel-load on Unit 2.

At about 7:40 AM, the fire melted open bus bars that receive power from the reserve C transformer. These open bus bars were physically located over B transformer in their connection from C transformer to the turbine building. These bus bars supply emergency power to both Units and the melting of the bus bars caused reserve transformer C to relay out and the initiation of diesel generator power.

Because of the already occured reactor trip at Unit 2 and cutoff of the two reactor coolant pumps, a low-low T_{AV} signal was locked in on the ESFAS. At the time reserve C transformer relayed out, a spurious high steam flow signal registered on the ESFAS logic which when combined with the already present low-low T_{AV} signal initiated Safety Injection. Safety Injection was terminated within 2 minutes by operator action.

Prior to initiation of these events, Unit No. 2 was at about 8% power and Unit No. 1 at 100% power. Unit No. 1 was reduced to 30% power as a precautionary measure and placed in a 72-hour Limiting-Condition-Of-Operation regarding two independent off site power sources. Unit No. 1 was later (about 3:00 PM) removed from the LCO and began increasing power for 100%.

PDR

Because this fire held the potential for degradation of station safety levels, the station emergency director declared a station alert in accordance with VEPCO's Corporate Emergency Response Plan. State and Federal agencies were notified by the station emergency director in accordance with the Emergency Response Plan. VEPCO's emergency response managers monitored the alert from VEPCO's emergency response center in the Richmond headquarters.

The fire was extinguished at about 8:25 AM and the station alert was terminated at about 9:20 AM. The fire was contained on-site by the station fire brigade and was extinguished with the help of fire crews from Louisa County, Spotsylvania County and the town of Mineral.

The event occured at a fortunate time since the day shift was just arriving to relieve the mid-shift still at stations. The Station Superintendent and Assisstant Superintendent were both on site during the event.

Two NRC inspectors from Surry and another two I&E inspectors (Region 2) arrived on site about noon and 3:00 PM, respectively.

Citizen concern was caused to a great extent by the copious, black smoke rising over the plant site. Numerous calls were received by VEPCO indicating concern.

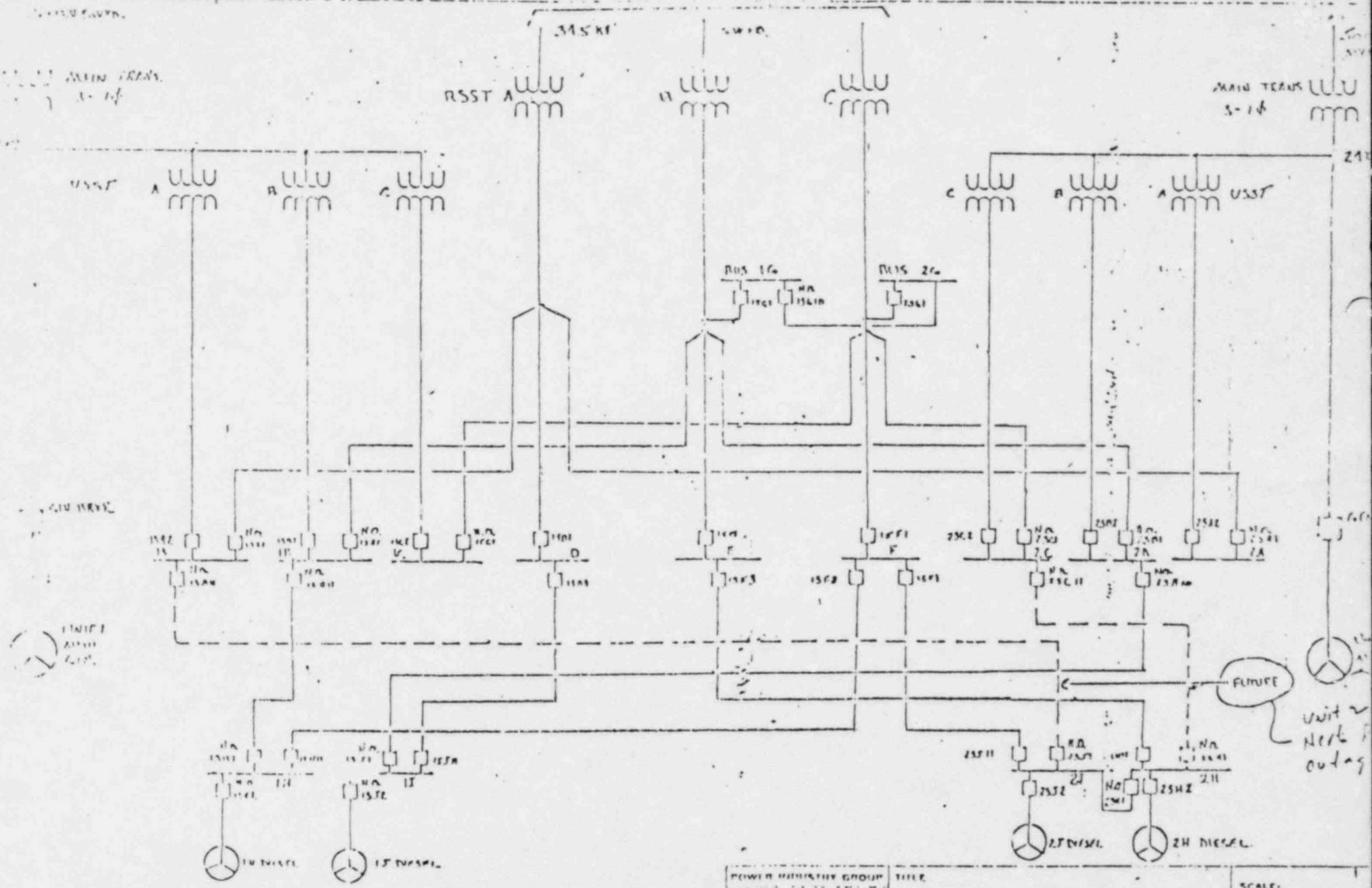
It is presently estimated Unit No. 2 will be shutdown for three weeks until a spare-modified transformer arrives from the Surry Station.

I&E (Reg. 2) is presently preparing a Preliminary Notification of these events.

Note: The description of this event as decribed above may change as further information is received.

Leon B. Engle, Project Manager
Operating Reactors Branch #3, DL

cc: H. Denton
J. Carter
D. Eisenhut
R. Purple
G. Lainas
R. Tedesco
S. Hanauer
R. Vollmer
R. Mattson
T. Murley
J. Sniezek
J. Olshinski
E. Case
R. Clark



NORTH ANNA 1,2 - SIMPLIFIED SINGLE LINE DIAGRAM

POWER INDUSTRY GROUP	TITLE		SCALE:
CHECKED			DATE
CORRECT			SKETCH NUMBER
APPROVED			
REVISIONS	2	1	

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AEOD/E117

JUL 16 1981

This is an internal, pre-decisional document not necessarily representing a position of AEOD or NRC.

MEMORANDUM FOR: File

FROM: Harold L. Ornstein
Office for Analysis and Evaluation
of Operational Data

SUBJECT: EVENTS AT TMI-2 DURING PREOPERATIONAL TESTING (SEPTEMBER 5-12, 1977)

With John Pellet's assistance, I have reviewed the TMI-2 logbook entries of September 5-12, 1977. Unfortunately, the data available is sparse, but nonetheless many important pieces of information can be gleaned from that document.

1. The polisher malfunction resulted in the introduction of resins into the demineralized water system. The polisher system interfaces with the demineralized water system so that polisher water can be diverted to the demineralized water system, and demineralized water can be directed to the polisher inlet. It is not clear from the log sheets exactly how the alignment or alignments were such that the resins migrated from the polisher to the demineralized water system, but they did.

2. The logbook indicated (9/7/77, 1st shift) that resin (from the polishers) was found in the demineralized water system in the turbine and auxiliary buildings. The resin clogged the pump suction strainers of all the Nuclear Service Closed Cooling Water (NSCCW) pumps. Figure 1 is a simplified piping diagram of the demineralized water system (based upon TMI FSAR figures 9.2-9 and 10.4-1). As shown in Figure 1, some of the important systems and components in the auxiliary and turbine buildings which connect to the demineralized water system are:

   Diesel generator jacket cooling water
   Borated water storage tank
   Boric acid makeup tank
   Reactor building normal cooling water
   Core flood makeup tank
   Nuclear services closed cooling water
   Intermediate closed cooling water
   Decay heat closed cooling water
   Reactor building spray pumps suction header
   Makeup pump suction
   Seal return coolers
   Spent fuel cooling system

A74

It is interesting to note that the demineralized water system also feeds into the "emergency steam generator feed pumps" which are located in the control building area.

It is not possible to tell from the logbook or the FSAR data which of the aforementioned components have strainers to catch resins in the demineralized water, which actually did have such strainers in place during the event, or which specific components in the auxiliary or turbine buildings were found to contain resins during the event.

3. The logbook did not pinpoint the times that the following events took place:

   a. Loss of reactor coolant pumps (due to loss of NSCCW which cools the RCP seals and motors).

   b. Formation of bubble(s) in the hot leg(s) with the resultant loss of natural circulation cooling.

   c. Loss of makeup (HPI) pumps (due to loss of NSCCW which cools the makeup pump motors).

   It is conceivable that, under other circumstances, these events (a, b, and c) could occur concurrently, thereby losing all convective "core cooling" and eventually uncovering the core. The time it took to establish nuclear service river water cooling to the makeup pumps (and thereby reestablish makeup pump flow) during the subject event is not known; however, if the reactor was fueled and at power at the time of the event, the time required to reestablish makeup pump flow (initiate feed and bleed) would be crucial. It is estimated that for a B&W 205 FA plant, failure to do so within about 30 minutes of event initiation would result in core uncovery.

In conclusion, the subject logbook entries can be envisioned to be similar to that of a fair maiden in a bikini - very revealing - very interesting - but still keeping important parts under wraps, possibly never to be known.

In addition to the obvious recommendations about looking into systems interactions, polishers, demineralized water systems, etc., in retrospect it might be worthwhile to pursue installation of a "reactimeter" in all plants prior to startup testing so that important operational data (potential precursors) may not be lost.

H L Ornstein

Harold L. Ornstein
Office for Analysis and Evaluation
of Operational Data

Enclosures:
1. Figure 1 - Simplified Piping Diagram - Demineralized Water System

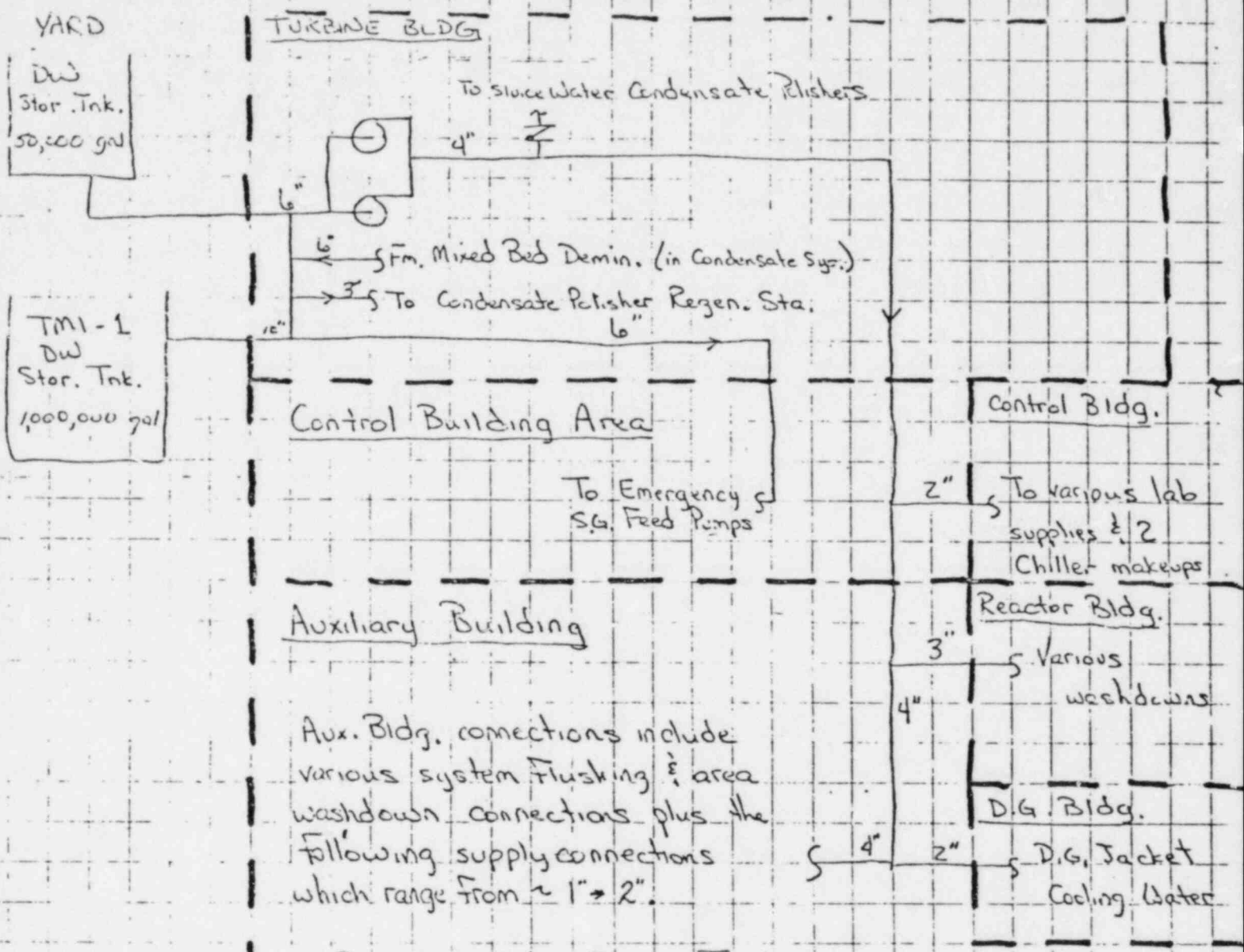
2. TMI-2 Logsheets (September 9-12, 1977)
3. J. Pellet's Overview of TMI-2 Logsheets (September 5-12, 1977)

cc w/enclosures:
C. Michelson
J. Heltemes
T. Rehm
J. Pellet

FIGURE 1 ENCLOSURE 1 S.P. 7/16/81

Simplified Piping Diagram for the Demineralized Water System*

*From FSAR Fig 9.2-9 & 10.4-1



Aux. Bldg. connections include various system flushing & area washdown connections plus the following supply connections which range from ~ 1" → 2".

Borated Water Storage Tank
Boric Acid MU Tank
RB Normal Cooling Water
Core Flood MU Tank
Nuclear Services Closed Cooling Water
Intermediate Closed Cooling Water
Decay Heat Closed Cooling Water

These are as above but have a normally removed spool piece

RB Spray Pumps Suction Header
M.U. Pump Suction
Seal Return Coolers
Spent Fuel Cooling System

Note that piping which does not directly relate to polishers or loads have been deleted. Much of the DW system in the turbine bldg. is essentially part of the condensate polishing system

ENCLOSURE: 2
TMI 2 Logsheets (9/9-12/77)

It appears booster pump low suction pressure was caused by high ΔP across condensate polishers. CO-P-1B did not trip. Polisher by-pass was opened and CO-P-2A and FW-P-1A were restarted. Polisher outlet valves were checked wide open and hot-well level control was put in normal. Closed polisher by-pass (CO-V-12) ~~and booster pump suction pressure dropped to ... psig~~. Hot-well level was put back in ~~manual~~ auto. Problem will be further investigated on next shift. Relieved by [illegible] Dominguez.

1st SHIFT 9-5

Craig M McMullen 9-5-77

Relieved Craig M McMullen, RCS at 532F, 2155 PSIG pressurizer level at 215". RC-P-1A/2A/1B/2B running with MU-P-~~1A~~ 1B/P 1C supplying seals. Restored Condensate system to normal with CO-P-1B/2A & FW-P-1A running. FW-V16A is in auto & CO-V35A is failed open. VA-P-1B/1C maintaining 27" vacuum. Valve stem leak offs of RC-V1 & 2 were passing steam into "A" D-ring thru the line that should be connected to RC-V122. Also check valve WDL-V1122 was leaking at ... tank. Installed temporary plug in line from RC-V122 & stopped check valve leaks by tightening bonnet. Replaced seal injection filters but ΔP still indicates 21.5 PSIG. Ran EF-P-1 after packing on outboard ~~bearing~~ of pump was inspected. At 2300 RPM packing gland temp. read 161F. Flow ~~thru packing gland~~ was checked when packing was

2nd SHIFT 9-5

2

inspected and it was good. Hill Wright to work job tomorrow. "EF-V16B is manually shut since it was passing ≈ 20 GPM after it was "shut" from Control Room. Conducted Class "C" Verifying for TP 600/38.

SP 600/38. Relieved by Jon Green (GPU)

Andre J. Dominguez 9-5-77

Relieved Andre Dominguez. RCS at 532 PZR 655 °F. PZR level 220", FW P-1A running. Attempted to run EF-P-1 again but packing gland reached 168°F in five minutes. Requested UE&C to replace packing in outboard bearing. #4 Polisher back on line. Filling CW tank. Aux operator noticed water coming from overflow line flange on "C" bleed tank. Investigated and found tank full even though level instrumentation indicated 4 ft. Found that reference leg had filled with water (due to high level) and caused false indication. Aligned letdown to "B" bleed tank. Recirc'ing "C" bleed tank for lab analysis. Briefed C. Adams for TP 600-13 spray flow test. Bringing RCS pressure to 1400 for TP 600-13. Swapped from "A" seal return cooler to "B" cooler as required in TP 600-4. Relieved by Craig McMullen

3RD SHIFT 9-5

TP 600-13

TP 600-4

C E Satter

[illegible] 9-5-77

Sept. 6, 1977

TP 6[illegible]

TLE[illegible]

PR [illegible]

D

TP[illegible]

1st SHIFT 9-6 Relieved for Greene and Carl Gatto. RCS at 1400 psig and 532°F. Pressurizer level at 220". VA-P-1B/1C maintaining 27" vacuum. CO-P-1B/2A running with FW-P-1A. CO-V-35A is failed open and FW-V-16A is maintaining 1000 gpm. Started VA-P-1A and stopped VA-P-1B so instrumentation could be calibrated on VA-P-1B.

TP 600/28 Conducted class C briefing for TP 600/28.

TP 600/13 Conducted class C briefing for TP 600/13 and issued

PR 5090 PR 5090, due

D-15 to additional heater output to 170 gpm exceeded total pressurizer heater output. (D-15)

TP 600/17 Conducted class C briefing for TP 600/17 and cycled all CRD's in groups 1-8. Tagged out regeneration tk. on polishers so indication gauges can be fixed. Tank has been drained and resin is in storage tank from #1 polisher. Increased RCS to 2155 psig. Relieved by Andre Dominguez. ~~Craig McMullin 9-6-77~~

Relieved Craig McMullin. RCS at 532F, 2170 PSIG, pressurizer level at 230", all 4 RC-P's running with MU-P-1C supplying seals. Seal injection filters should be changed when ΔP as read on local gauges across the filters reads 20 + 25 = 40 PSI

2ND SHIFT 9-6 due to clean filters showing 20 PSI ΔP. Placed a clean filter in SF-F-1A. Manually closed AH-E-11C's suction damper to stop bypass flow from windmilling it. Shut RR-V7C to put map

flow these other 4 running fans. Tested one HS relief valve. It did not meet its acceptance criteria. Valve to be retested. Conducted a class "C" briefing for TP [illegible]. Relieved by John Wied. Andre J. Dominguez 9-6-77 PR 5

Reviewed Log 9-6-77 following comments:

1. JCU on 8-30 - no WR on CO-P-2B that wouldn't start. Same date no PR issued on ~~[illegible]~~ on RC-RV-2. Continuation of PR 5073 for RC-RV-2

2. JCU on 9-2-77 EF-P-2A tripped twice no PR. Problem was identified to T.M. Hawkins

3. CMM - 9-5 entry the trip bells are not to be used on MDCT.

RJ Toole 9-6-77

3RD SHIFT 9-6

Relieved Andre Dominguez. RCS [illegible] 2155 psig and 532 °F. Pressurizer level at 220" and temperature at 655 °F. MU-P-1C running supplying RC pump seals. All 4 RC pumps running. CO-P-1A/2B and FW-P-1A running through COV55A (bubbling) and FW-V16A and feeding OTSG's. VA-P-1A/1C 1B (2-31A) running maintaining 27" vacuum. Secured VA-P-1B. Conducted a class-C briefing for TP 260/3 and 600/2-8 sat. Rich Ordes conducted a class C briefing for TP 271/4 sat. The oil pressure switch for VA-P-1B doesn't allow the pump to start. T.M. Hawkins was notified of the problem. Installed a 100# gauge on MU-U-PS for special test on the block orifice per

~~TP 260/16~~ TP 250/16. Completed testing tonight of 2 MS relief valves. The testing will continue tomorrow. DH-LS-7795 was calibrated in preparation for TP 204/3 (TCN-2). Ran part of sections 9.1 and 9.2 for TP 204/3. These sections will be completed tomorrow when more instrument support is available. MU-V-105 repair was completed. Relieved by Craig McMullin. John G. Ulrich 9-6-77

Sept. 7, 1977

SHIFT 9-7

Relieved John Ulrich. RCS at 2155 psig and 532°F. Pressurizer level at 220" and temperature at 655°F. MU-P-1C supplying RCP seals. CO-P-1B/2A and FW-P-1A running thru CO-V-35A (failed open) and ~~FW-P-1C, VA-P-1A/1B (on 2A?) maintaining 27"~~ vacuum. Completed rejection tk. repair and cleaned tanks. NS-P-1A/1B tripped on low cooling H_2O flow to motors. Tried to start NS-P-1C, it tripped within 1 minute. Called suction strainers on all 3 pumps and found resin packed in them. Resin has come from condensate polishers thru demin. H_2O sys to NSCCW sys. thru auto make-up valve. Cleaned and reblowed all 3 suction strainers 2-4 times and failed to keep a NS pump running for more than 20 minutes. Started flushing demin. H_2O sys. and found resin in turbine and aux. buildings.

Flushing will continue thru next shift. Notified
TP 600/4 T. Hawkins of problem. Completed section 7.1 for
T.P 600/4. Secured NSCCW-P-1C, RB-P-1A/1C and
all 4 RCP's. Shifted cooling water flow to NSCCW
pumps to NSRW sup. and started NSCCW-P-1B.
Established seal injection and return to RCP's.
When RCP's were tripped RC-P-2B aux. oil
pump did not start. T. Hawkins notified of
problem. Relieved by John Ulrich.

Craig McMullen 8-7-77

Relieved Craig McMullen. RCS pressure at 2100 psig
and decreasing. RCS temperature at 390°F and
decreasing. Pressurizer level at 190" and temperature
at 645°F. All RC pumps secured. MU-P-1B
supplying RC pump seals. CO-P-1B/2A and FW-P-1A
running on cleanup recirc. through FW-V16A and
CO-V55A. VA-P-1A/1B (Z-31A) maintaining 27" vacuum.
Started VA-P-1C and stopped VA-P-1B. Cleaned
NSCCW strainers again several times trying to
flush resins out of pipes. Flushed DW upstream
of level control valve on NSCCW. Replaced
the internals of DW-V173. There was a fire
at the temporary outhouse behind the
trailer complex. Some heat tracing caught on fire
No one was hurt and damage was minimal.
TP 204/3 Conducted a class & briefing for TP 204/3 at
The DH level switches which interlock with

DH-V6A/6B were recalibrated with proper lead corrections inserted. RC-V5 and RC-V108 were closed to work on APL-V1. Jack Knox worked on C-F-P-2B heater problem with no resolution of problem. Relieved by Jack Garrison. John C Ulrich 9-7-77

Relieved John Ulrich. RCS at ≈ 1400 psig 330°F with no RCP's running. MU-P-1B running. RCS pressure and temp are decreasing. Continuously filling and draining pressure in attempt to reduce plant pressure.

2ND SHIFT 9-7

Secondary plant @ 27" vacuum with CO-P-1B/2A & FW-P-1A running via FW-V16A & CO-V35A. Flushing of DW & NSCCW system still in progress. Started VA-P-1C and secured VA P-1A when was discovered no water level in reservoir. When VA-P-1A was secured a water level returned to reservoir. Secured CO-P-2A and FW-P-1A due to plant cooldown. Conducted class C testing for TP 204/3 section 9.4 with S/P actuations. Testing of DH-V6A/6B except for section 9.4.9 which failed. DH-V66 could be closed from CR with level interlock in effect. Issued PR 5092. Level actuation points were not correct. Resolution and resetting of switches is being worked by Met Ed inst dept. Relieved by John Ulrich.

ED SHIFT 9-7

TP 204/3 PR 5092

Jack Garrison 9/7/77

Sept 8, 1977:

Relieved Jack Garrison. RCS at 1100 psig and temperature at ≈ 290°F. Surging pressure

6

1ST SHIFT
Q-8

PZR pressurizer level is constantly changing. CO-P-1B running through FW-V16A and CO-V55A on cleanup recirc. VA-P-1B/1C maintaining 27" vacuum. MU-P-1B running and supplying RC pump seals and level makeup. Flushing of NSCW in progress. Started CO-P-1A and secured CO-P-4B due to packing leakage. MEC wrote WR to adjust packing. Obtained data needed to reset level switches for DH-V6A/6B interlocks and instrument department is resetting the setpoint to appropriate value. Re-established NS flow to the Reactor Bldg. Re-established NS flow to MU pumps and shut off NR to MU pumps. Tried to start MU-P-1A and both MU-P-1A and -1B tripped on low suction pressure. The problem was identified to T.M. Hawkins. Isolated MU-P-1A suction pressure switch long enough to get MU-P-1A running. Reestablished RC pump seal injection. Placed BAST on cleanup recirc. using SF-P-2. Opened RC-V155 and -V137 and started venting the pressurizer to the RC drain tank. Started venting the main generator. Completed recalibration of DH-V6A/6B interlock level switches. Placed RR-P-1A and -1C back into service to RB cooling coils. Relieved by Andre' Domingue.

John C. Ulrich 9-8-77

Relieved John Ulrich. RCS at 200F & 460PSIG, pressurizer being restored to normal level. CO-P-1A running thru FW-V16A & CO-V35A. VA-P-1B/1C maintaining 27" vacuum. HV-P-1A running supplying RC pump seals. Adjusted the packing on MS-P-1C and started it satisfactorily. MEL mechanical maintainence started cleaning VA-P-1A. water recesses. HV-P-1B, NS flow switches are now installed and calibrated. Lined up flow thru FW-P-1B to clean level switch in FW-T-1A but could not isolate it from condensor because turbine exhaust valve MS-V45 was leaking. Ran DG-P-1A & 1B for ten minutes to check suction strainers, they read 1" & 3" respectively. HV-P-1A auxiliary gear oil pump was noted running. Press on speed increaser was 7# but no visible oil level. Lit off HV-P-1C and secured HV-P-1A. Pressurizer level unexpectedly increased when venting the pressurizer and decreased pressure from 500psig to 100psig. Pressurizer level increased ≈ 150" during this evolution. Pressurizer temp was ≈ 340F. Apparently the reference legs have flashed and there was no steam in pressurizer to fill the reference legs. One reference leg is going full to verify the correct level. HV-P-1A oil level is going to be restored to normal & Aux oil pump locked

SHIFT 9-8

out on next shift. Relieved by Jack Garrison.
Andre J. Domingue

Relieved Andre Domingue. RCS at ≈340 psig and ≈250° indicated. Plant cooling down naturally. No RCPs running. MUPIC running supplying seals. Preparations being made to place plant on DH. cooldown and drain RCS for RCP seal injection. Secondary plant at 26" vacuum with VAP-1B/C and CO-P-1A on recirc via CO-V35A & FW-V16B. BWST taken off cleanup recirc in preparation for DH removal operations. Pressurizer level transmitter RC-LT3 was backfilled at reference leg. Comparison was made between LT1-LT2-and LT3. All three were reading same. Pressurizer level indication as shown in control room is believed to be correct. Started DH-P-1B and commenced plant cooldown. Plant temperature at start 160°F. Plant cooled down to 100°F. Whenever RC-V137 was opened to vent pressurizer, level would indicate an increase. Closed DH-V4B and put maximum auxiliary spray flow to pressurizer in attempt to cool down pressurizer. Fed both OTSG's up to 400" in preparation for wet layup. Shifted RR-P-1A to off and started RR-P-1B for RR flush being conducted by UE&C startup engineers. Discovered oil level in MU-P-1A speed changer was actually high and not low as previously reported. Drained oil down to visible level. Secured seal injection and seal

SHIFT
9-8

return on RLP's. Closed MU-V18. Changed IC-F-1B due to high DP. Found IC-V5 closed for no apparent reason. Reopened it & restabilized RCDM flow. Relieved by John Ulrich
Jack Garrison 9/8/77

Sept. 9, 1977
1ST SHIFT
9-9
Relieved Jack Garrison. RCS pressure at 150 psig and decreasing. MU-P-1C running on recirc. DH-P-1B on recirc to the Rx. Vessel. CO-P-1A on recirc through CO-V35A and FW-V16B. Closed RC-V137 and applied nitrogen to the pressurizer. The pressurizer level came down proving that there was a steam bubble in each of the hot legs. Left Nz on until pressure started to slightly increase and secured Nz. Opened cold leg drains and lined up to the 'A' RCBT and drained RC system until level was not decreasing on pressurizer level recorder and then closed cold leg drains. Previous to draining the hot legs and the pressurizer were equalized in pressure through the nitrogen system piping. Continued to decrease RCS pressure by venting the hot legs to atmosphere and the pressurizer to the RC drain tank. Stopped VA-P-1B and started VA-P-1A. Secured DH-P-1B and secured LCS cooldown at approx. 160°F. Regulated sealing steam to FW-P-1A turbine and

12

opened MS-V45 to the condenser. Secured auxiliary spray lineup to the pressurizer. Started transfer of RCBT 'A' to RCBT 'C'. Connected tygon tubing to RC-V110 and V111 for RCS level indication when pressure is sufficiently decreased. Secured IC system due to the requirement for the system cooling on letdown coolers and CRDs. Relieved by Andre Domingue. John C. Ulrich 9-9-77

2nd SHIFT 9-9 Relieved John Ulrich. RCS Vented with 92" in Tygon tube connected to RC-V110 & 111. HV-P-1C running on recirc to HV-T-1. CO-P-1A running thru CO-V35B & FW-V16B. Started VA-P-1B & secured VA-P-1C for reservoir cleaning. Drained the RC system to 22" in tygon tube connected to RC-V110 & 111. Conducted a class "C" briefing for TP 204/3 and completed section 9.4.8 (DH-V6A/B auto open) satisfactorily and cleared D-23. Placed the "A" OTSG on recirc and added 3.5 gal. of hydrazine at 19:40. Relieved by Jack Garrison

Andre J. Domingue 9-9-77

3rd SHIFT 9-9 Relieved Andre Domingue RCS vented and drained. Secondary plant at 27" vacuum with CO-P-1A running. Secured MU-P-1C when it was discovered Tygon Loss reading of 139". Opened hot leg vents and pressurizer vents to atmosphere. Drained RCS to 16" as indicated on tygon hose at RC-V110 & 111. Conducted class C briefing for TP 310/3 satisfactorily and tested ES actuation of

TP 204/3 TP 310/3 5093

1C-V3, 4, & 5 with noted deficiency and issuance of PR 5093 against not being able to open valves after ES reset using "TEST RESET" switch at pnl 13 when DC power circuit was deenergized. OTSG A on recirc with hydrazine added. Relieved by Craig McMullin

Jack Garrison 9/9/77

Sept. 10, 1977

1ST SHIFT Q-10

Relieved Jack Garrison. RCS vented and drained. Secondary plant at 27" vacuum with CO-P-1A running. Conducted a class C briefing for TP 202/3. Tried to start MU-P-1B from 2-1E from C.R. Pump would not start. Notified T. Hawkins of problem. Turned PR. 5094 after MU-P-1B (2-2E) tripped on low cooling water flow and MU-P-1C did not start automatically. (D-51). Tried to transfer bus 2A-1E-2 to 2B-1E-2, 2A-1E-2 opened but 2B-1E-2 did not close. Closed tie breakers on 2-3E-2 and 2-4E-2. Notified T. Hawkins of problem. Relieved by Eddie Dominguez.

TP 202/3

PR 5094

D-51

Craig McMullin 9-10-77

2ND SHIFT Q-10

Relieved Craig McMullin. RCS vented with 14" in lgth Tygon tube connected to RC-V 110 & 111. CO-P-1A running Thru CO-V35A & FW-V-16B, VA-P-1A & 1C running maintaining 27" vacuum RC system & Secondary side of OTSG's have N2 blankets. Added 2 gal. of hydrazine to "A" OTSG making a total of 5.5 gals. added. Conducted a class "C" briefing and satisfactorily

9.4.12.1

3:0/3 completed sections 9.4.12.1 thru 9.7.12.4 satisfactorily TP 256/4 a
NH-V142 has blown apart, this is the 5th regulato
in reactor building. MEC has submitted WR.
3rd FW-V-1A is isolated for suction strainer leak
repair. Structural steel is being removed from
above RC-P-2B and a clean room is being built
around RC-P-1A seal area. Relieved by Jack Harrison
André Domingez 9-10-77
Relieved Andre Domingez. RCS vented and drained
with ≈14" in Tygon hose (RC-V110, 111) Secondary
plant at 27" vacuum with condensate on recirc
cleanup. Conducted check of auto-start features IP 235/1
3rd SHIFT 9-10 of EFW pumps. EF-P-2A was not checked because
2-1E was deenergized. 2-1E is deenergized due to PR 5097
fault in 2A-1E2 and 2B-1E2 breakers not being
able to be reclosed after surveillance test. EF-P-2B PR 5098
did not auto start. T. Hawkins notified of problem.
Relieved by Craig McMullin Jack Harrison 9/10/77
Sept. 11, 1977
Relieved Jack Carrison. RCS vented and drained.
1st SHIFT 9-11 Secondary plant at 27" vacuum with condensate
273/3 to recirc clean-up. Tygon tube on RC-V110 & 111
is ≈ 13". Conducted class C lifting for TP 273/3.
Ran EF-P-2B and verified 3rd point on head/flow
curve by lining pump up to "B" OTSG. MS-V-20
would not open from C.R. T. Hawkins notified of
problem. Added 3 gal. of hydrazine to "B" OTSG

at 0600.

TP 256/4 and put on recirc. Conducted class C briefing for TP 256/4 and satisfactory tested MS-V-3A/B on loss of inst. air. EF-P-1 could not maintain 4250 rpm when discharge valve was open to fill "B" OTSG. Pump was line-up to Aux Steam which was at 160 psig. T. Hankins notified of problem. Relieved by André Domingues.

Craig McMullin 9-11-77

Relieved Craig McMullin. RCS vented & drained. Secondary plant at 27" vacuum with condinsate on clean-up recirc. Tygon tube on RC-V110 & 111 is 14", Conducted Class C briefing for TP 235/1 and completed the TP with the following Deficiencies:

2ND SHIFT 9-11

TP 235/1

PR 5097 D-4 Rx Building Sump. Level Hi - worker in reverse issued PR to resolve

PR 5098 D-5 WDL-P-2A&B did not meet flow capacity. Issued PR to resolve.

MS-V10 is shut and MS-V207 does not open fully. ~~Construction~~ I&C Start ups Instrument shop will repair MS-V207 tomorrow Relieved by Jack Harrison

Andre J. Domingues 9-11-77

Relieved Andre Domingues. RCS drained for RCP work. Secondary plant at 27" vacuum. Sampled B OTSG. Results 255 ppb SO_4. Drained B OTSG To 30". Shifted condensate lineup up thru FW-V 12A & 12B. Closed FW-V16B. Found out that flow

3RD SHIFT 9-11

yesterday due to tag out of CO-P-2A and closing of its respective suction valve. All condensate flow was going thru FW-V16B. By log review it was ≈ 2100 gpm. (800 gpm via #2 polisher 1300 via #4 polisher). Sampled FW at 55-V7 local sample point (55-V117). Results 25 ppb PO4. Resampled 3 hours later Results 120 ppb. FW continuing to clean up & 55-V117 open constantly. Made preparations for TP 160/3 Emerg Rx Bldg Cooling. Met-Ed ran DH-P-1B on recirc of Rx vessel for surveillance leak rate test DH-P-1B in secured. Relieved by Craig McMullin Jack Garrison 9/11/77.

Sept 12, 1977

Relieved Jack Garrison. RCS drained and vented. Secondary plant at 27" vacuum. Put N2 on both OTSG. Found MS-V-293A/B, 294A/B, 295A/B and 296A/B closed. Drained "A" OTSG to 30" due to PO4. Filled both "A" & "B" OTSG to ≈ 400" after FW came in spec. Conducted class C briefing for TP 160/3. Verified head/flow curves for RR-P-1A/1B/1C. Issued PR for D-3; "A" pump at 3000 gpm did not meet acceptance criteria. Lined up RR-P-1A/1C to Rx. Bldg. Fans. Relieved by Andre Domingues.

Craig McMullin 9-12-77

1ST SHIFT 9-12

TP 160/3

R 5096

2ND SHIFT 9-12 Relieved Craig McMullin. RCS vented & drained. Secondary plant at 27" vacuum. Added 3" to tilt

to [illegible] after bypassing polishers & securing sending water to Unit 2. Secured steam to [illegible]

Reviewed log with following comments

1. JCU 9-6 entry valve number MU-V-405? is not clear. MU-V405A valve disc had fallen off stem. Now one was put[illegible]

2. CAM – 9-7 entry when RC-P-2B didn't start a PR should have been issued.

3. JCU Fire was under B&R piping trailer toilet. (9-7-77)

4. JWG – no entry as to what was done on Vac Pumps.

5. Generally this week we had a major unusual occurrence and numberous things were not entered in the log that should have been – for example a. Vacuum Pumps were all cleaned of resin. b. Did Condensate Pump 1B on JCU 9-8 entry have resin in it? c. No one logged the fact that we did a complete flush of the Demin Water System.

6. There is no reason given for how we got into problem on Pressurizer Level. A change to cooldown procedure could be made if we knew what to do.

RJ Toole 9-12-77

For [illegible]. Broke vacuum at [illegible]. Secured G.S. and secured [illegible]. Isolated CO & Fire systems. [illegible] 5 gal. of hydra[illegible]

Volgnell and CC-T-113 to the yard drain. Relieved by Jack Harrison. André J. Domingues 9-12-77 TP 266/4

Relieved Andre Domingues. RCS drained & RCP work in progress on seals. Secondary plant shutdown. Turbine on turning gear. Lined up EFW system for auto start checks of all three pumps. EF-P-2A & 2B started satisfactorily however neither amp meter in control showed any current. The AS-V207 value is blowing fuses and was not ~~checked~~ checked. T. Hawkins notified of problems. Removed MU-F-4B filter cartridge in preparation for ΔP check of cartridge housing. CO-P-1C was put on recirc for EFW checks. It is presently secured.

Relieved by Craig McMullen Jack Harrison 9/14/77

Sept. 13, 1977

Relieved Jack Garrison. RCS drained and RCP work in progess on seals. Secondary plant shutdown. Turbine on turning gear. Started CO-P-1C and ran EF-P-1 on recirc. Auk. steam presure was 180 psig and max. rpm that ~~the~~ was obtained was 4700 rpm. T. Hawkins notified of problem. Secured EF-P-1 and CO-P-1C. Ran MU-P-1B on recirc for seal injection filter ΔP verification. Opened MU-V 32 and MU-V-275 and established 40 gpm. ΔP thru MU-F-4B with filter removed

Overview of TMI-2 Log, September 5 - 12, 1977

1. 9-5-77 shift 1 — High differential pressure across condensate polishers causes condensate booster pump trip on low suction pressu so polisher bypass opened and polisher repair started.

2. 9-5-77 shift 3 — Polisher back on line, filling demineralized water tank (from condensate system).

3. 9-7-77 shift 1 — All Nuclear Service Closed Cooling Water (NSCCW) pumps tripped due to clogged pump suction strainers. Clogging resin came from condensate polishers thru demin. water system. Resin found in demin. water system in turbine an auxiliary buildings. Loss of NSCCW produced a loss of RC seal and motor cooling. Also loss of cooling to makeup (MU) pump motors occurred and makeup was secured. All RCP's were immediately secured on loss of both seal injection and seal cooling. Nuclear Service River Water cooling to MU pumps was established and MU restored

4. 9-7-77 shift 2 — Isolated normal pressurizer spray line to work on liquid waste system valving (note: spray lost when RCP's secured)

5. 9-7-77 shift 3 — RCS on natural circulation with makeup via MU-P-1B. RCS temperature and pressure decreasing. Continuously filling and draining pressurizer to reduce RCS pressure. Secured condensate booster and main feedwater pumps due to plant cooldown (1 CBP on).

6. 9-8-77 shift 1 — Pressurizer level constantly surging. Started venting pressurizer to reactor drain tank.

7. 9-8-77 shift 2 — RCS at 200°F and 400 psig. Pressurizer level being resto to normal level. Pressurizer level increased 150" while

venting RCS from 500 psig to 460 psig. Pressurizer temperature about 340° F. From the log, "Apparently the reference legs have flashed and there was no steam in the pressurizer to fill the reference legs." (note that at 460 psig Tsat > 450°F).

8. 9-8-77 shift 3

RCS at 250°F and 340 psig. Pressurizer level transmitter LT-3 backfilled. LT-1, LT-2, and LT-3 all read the same in the control room and are believed to be correct. DHR started with B pump with RCS at 160°F and cooled to 100°F. Whenever the pressurizer was vented pressurizer level increased. DHR to vessel isolated and maximum auxiliary pressurizer spray established to try to cool the pressuri Secured seal injection and return on all RCP's.

9. 9-9-77 shift 1

RCS at 150 psig (Tsat ≅ 360°F). Closed pressurizer vent and, "...applied nitrogen to the pressurizer. The pressurizer level came down proving that there was a stea bubble in each of the hot legs." Left nitrogen on until pressure started to increase then secured. Opened cold leg drains to Reactor Coolant Bleed Tank and drained RCS until pressurizer level recorder was not decreasing. The hot legs and pressurizer were equalized in pressure thru the nitrogen piping. RCS pressure decrease continue by venting hot legs to atmosphere and pressurizer to Reactor Drain Tank. Secured cooldown with RCS at about 100°F. Connected Tygon tubing to RCS to measure RCS level when pressure decreased sufficiently.

10. 9-9-77 shift 2 — RCS vented and drained such that level in tubing decreased from 92" to 22".

11. 9-9-77 shift 3 — Secured makeup when tubing indicated a level of 139". Opened hot leg and pressurizer vents to atmosphere and drained RCS to an indicated 16".

12. 9-10-77 shift 2 — Inside containment mitrogen regulator (5#) found "blown apart" (NM-V142).

13. 9-12-77 Review — "There is no reason given for how we got into a problem on pressurizer level. A change to cooldown procedure could be made if we knew what to do."