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Writer's Direct Dial Number

September 4, 1981
L1L-243

Office of Nuclear Reactor Regulation
Attn: John F. Stolz, Chief
Operating Reactor Branch #4
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating Licensing No. DPR-50
Docket No. 50-289
ECCS Outage Times (II.K.3.17)

The enclosed document was prepared in response to TMI Action Plan Requirement II.K.3.17 "Report of Outages of ECC Systems." A review of Licensee Event Reports (LER) and ECCS surveillances was performed to obtain outage durations for the 5 year period January 1976 through December 1980 for Three Mile Island Unit 1. Cumulative outage times given are, in general, conservative since detailed records of ECCS outage times were not an integral part of the Unit record. ECCS system and general scope was addressed in our submittal of April 9, 1981 (L1L-087). Enclosure 1 provides outage times for those components which directly affect system operability (which were repaired within 72 hours). Enclosure 2 provides outage time for systems in which redundant components were available, components were out of service during outages when they were not required or components were operable but contained deficiencies requiring repair. Further information concerning the description and the corrective action is contained in the referenced LER's.

Sincerely,

H. D. Hukill
H. D. Hukill
Director, TMI-1

Enclosure

cc: B. H. Grier
L. Barrett
R. Jacobs

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System Operability
Summary of ECCS Outage Events for TMI-1 LER No.
1976

LER No./Date	System	Description	Outage Time in Days
76-02 1/6/76	NSRW	Inoperable Nuc Suc River Water Pump "A" Discharge Valve Failure to open when Pump started (NR .1A)	0 days #
76-09 2/21/76	MUP	Inadequate Make Up Pump A Procedural Controls (MUP1A)	.04 day +
76-10 2/21/76	D/G	Diesel Generator 1B Breaker failed to close due to inadequate procedure	1 day +
76-14 4/27/76	DHR	The valve stem of DH-V1 was placed in operation while it was released for installation only.	0 days #
76-20 5/20/76	RBI	Reactor Building Isolation valve (WDG-V3) failed to close on ESAS Test Signal.	1 day +
76-21 6/21/76	MUP	Containment Isolation valve MU-V2B failed to close on ESAS Test Signal.	1 day
76-26 6/22/76	KBP	High Range Actuation Mode of a Reactor Building Purge Exhaust Monitor.	0 days #
76-34 9/22/76	RBI	Reactor Building Isolation valve CA-V1 failed to fully close on remote signal	1 day
76-40 11/6/76	DHR	Abnormal degradation of the seal ring in DHW1	2 days +
76-42 11/22/76	NSRW/DHR/EC	Underground River Water Pipe cracks	0 days #
76-44 12/7/76	RBI	Reactor Building Isolation valve AH-V1D failed to fully close.	.33 days
Total			6.57 + *

+ Time taken is total outage duration since operability was not required during shutdown and repair was made during a Refueling/Scheduled Outage

* Capable of performing intended function - not repaired fully until Refueling

See Component List

+ Long Term Shutdown via NRC Order, also, see note "+"

System Operability
Summary of ECCS Outage Events for TMI-1 by LER No.
1977

LER No./Date	System	Description	Outage Time in days
77-01 2/3/77	D/G	Loss of Diesel Generator A with Diesel Generator B out of service	.33 day
77-03 3/9/77	RBS	Failure of Reactor Building Spray Pump Suction Isolation Valve Motor	0 days #
77-11 5/19/77	ES	ES IB Motor Control Center failed to trip during power operations	.01 day
77-12 5/19/77	MUP	Make Up Pump 1A was removed from service prior to checking redundant pump	.20 days
77-14 5/24/77	RBI	Reactor Building Isolation Valve RB-V7 failed to close on test signal	.33 day +
77-18 6/29/77	NSRW	Nuc Suc River Water Pump shaft failed	0 days #
77-24 10/22/77	MUP	Make Up Valve 14B failed to open in response to ES test signal	1 day
77-28 12/8/77	MUP	Reactor Coolant Letdown Sample Isolation Valve (CAV 13) failed to close	.33 day
77-31 12/25/77	MUP	Small pin hole leak at the casing drain hinge weld at MUP-1B	0 days #
Total			2.20 +

+ Time taken is total outage duration since operability was not required during shutdown and repair was made during a Refueling/Scheduled Outage

* Capable of performing intended function - not repaired fully until Refueling

See Component List

++ Long Term Shutdown via NRC Order, also, see note "+"

System Operability
Summary of ECCS Outage Event for TMI-1 by LER No.
1978

LER No./Date	System	Description	Outage Time in days
78-03 1/12/78	D/G	Diesel Generator 1B failed start on ES test signal	.20 day
78-04 1/17/78	MUP	Packing gland leak for MUV74A	.01 day
78-05 1/19/78	RBS	BS-V47 A/B were opened during the B.S. Pump operability test	.33 day
78-06 1/24/81	RBI	Reactor Building Isolation valve CA-V13 failed to close when activated by remote signal	.33 day
78-10 3/18/81	MUP D/G	Make Up Pump 1A & 1C time delay relay in low lube oil trip circuit failure / 10.1 pressure limit switch failure on diesel generators failure	0 days #
78-19 6/5/78	RBI	Reactor Building Isolation valve RB-V7 controlled fuse opened	1.0 day
78-22 7/23/78	DG	Diesel Generator A air valve tagged out without testing other diesel	.16 day
78-25 8/19/78	NSRW	Nuc River Water Pumps not selected to start on ES signal	.37 day
78-27 9/1/78	CF	B Core Flood Tank out of spec low	.20 day
78-28 9/8/78	RBS	Leaky O ring in NaOH level transmitter	.04 day
Total			2.64 +

+ Time taken is total outage duration since operability was not required during shutdown and repair was made during a Refueling/Scheduled Outage

* Capable of performing intended function - not repaired fully until Refueling

See Component List

++ Long Term Shutdown via NRC Order, also, see note "+"

System Operability
Summary of ECCS Outage Events for TMI-1 by LER No.
1979

LER No./Date	System	Description	Outage Time in days
79-01 1/7/79	DHRW	Decay Heat River Water Pump 1A had a rag in pump suction	1.9 days
79-02 1/12/79	DHR	DH-V5B Motor breaker tripped	1 day
79-03 2/17/79	MU	MU-P-1C tripped on overload	0 days #
79-04 2/17/79	D/G	Emergency Diesel 1B tripped on overspeed	.33 days +
79-05 2/25/79	DHR/RBS	DH-V15 A/B, DH-V6A, DHV5A and BS-V3B packing leaks	2 days +
79-06 2/28/79	RBI	CA-V5B failed local leak rate test	0 days #
79-07 3/23/79	DHR/MU	Dome collapse on BWST (DH V27 vacuum breaker)	0 days #
79-08 3/10/79	RBI	AH-V1B failed local leak rate test	2 days +
79-11 4/5/79	DHR/RBS/MU	Intergranular stress corrosion cracking of 304 SS pipe	0 days #
79-12 6/18/79	DHR	ESAS relay failed to drop out	0 days #
79-13 6/20/79	DHR	BWST suction line crack	0 days #
Total			7.23 days +

+ Time taken is total outage duration since operability was not required during shutdown and repair was made during a Refueling/Scheduled Outage

* Capable of performing intended function - not repaired fully until Refueling

See Component List

++ Long Term Shutdown via NRC Order, also, see note "+"

System Operability
Summary of ECCS Outage Events for TMI-1 by LER No.
1980

<u>LER No./Date</u>	<u>System</u>	<u>Description</u>	<u>Outage Time in days</u>
80-03 2/17/79	MU P	MU-V-73A/B had loose internal (tilting disc check valves)	0 days #
80-06 3/25/80	REI	RB-V7 failed local leak rate test	0 days #
Total			0 days #

+ Time taken is total outage duration since operability was not required during shutdown and repair was made during a Refueling/Scheduled Outage

* Capable of performing intended function - not repaired fully until Refueling

See Component List

++ Long Term Shutdown via NRC Order, also, see note "+"

Component List

Summary of ECCS Outage Events for TMI-1 LER No. 1976

LER No./Date	System	Description	Outage Time in Days
76-02 1/6/76	NSRW	Inoperable Nuc Sur River Water Pump "A" Discharge Valve Failure to open when Pump started (NR-PIA).	60 days +
76-14 4/27/76	DHR	The valve stem of DH-V1 was placed in operation while it was released for installation only.	29 days +
76-26 6/22/76	RBP	High Range Actuation Mode of a Reactor Building Purge Exhaust Monitor.	11 days
76-42 11/22/76	NSRW/DHR/EC	Underground River Water Pipe cracks.	108 days +
Total			208 days +

+ Time taken is total outage duration since operability was not required
during shutdown and repair was made during a Refueling/Scheduled Outage

* Capable of performing intended function - not repaired fully until refueling

See Component List

++ Long Term Shutdown via NRC Order, also, see note "+"

Component List

Summary of ECCS Outage Events for TMI-1 by LER No.

1977

<u>LER No./Date</u>	<u>System</u>	<u>Description</u>	<u>Outage Time in Days</u>
77-18 6/29/77	NSRW	Nuc Suc River Water Pump shaft failed.	45 days
77-31 12/25/77	MUP	Small pin hole leak at the casing drain hinge weld at MUP-1B	90 ⁺ days
			Total 135 days

+ Time taken is total outage duration since operability was not required during shutdown and repair was made during a Refueling/Scheduled Outage

* Capable of performing intended function - not repaired fully until Refueling

See Component List

++ Long Term Shutdown via NRC Order, also, see note "+"

Component List

Summary of ECCS Outage Event for TMI-1 LER No.

1978

LER No./Date	System	Description	Outage Time in days
78-10 3/18/81	MUP D/G	Make Up Pump 1A & 1C time delay relay in low lube oil trip circuit failure/10.1 pressure limit switch failure on diesel generators failure.	60 days +
Total			60 days +

+ Time taken is total outage duration since operability was not required
during shutdown and repair was made during a Refueling/Scheduled Outage

* Capable of performing intended function - not repaired fully until Refueling

See Component List

++ Long Term Shutdown via NRC Order, also, see note "+"

Component List

Summary of ECCS Outage Events for TMI-1 by LER No. 1979

LER No./Date	System	Description	Outage Time in Days
79-03 2/17/79	MU	MU-P-1C tripped on overload.	4 days +
79-06 2/28/79	RBI	CA-V5B failed local leak rate test.	30 days +
79-07 3/23/79	DHR/MU	Dome Collapse on BWST (DH V27 vacuum breaker).	360 days +
79-11 4/5/79	DHR/RBS/MU	Intergranular stress corrosion cracking of 304 SS pipe.	266 days ++
79-12 6/18/79	DHR	ESAS relay failed to drop out.	14 days ++
79-13 6/20/79	DHR	BWST suction line crack.	465 days ++
Total			1139 days +, ++

+ Time taken is total outage duration since operability was not required during shutdown and repair was made during a Refueling/Scheduled Outage

* Capable of performing intended function - not repaired fully until Refueling

See Component List

++ Long Term Shutdown via NRC Order, also, see note "+"

Component List
Summary of ECCS Outage Events for TMI-1 by LER No.
1980

<u>LER No./Date</u>	<u>System</u>	<u>Description</u>	<u>Outage Time in Days</u>
80-03 2/17/79	MU	MU-P-73A/B had loose internal (tilting disc check valves).	468 days +
80-06 3/25/80	RBI	RB-V7 failed local leak rate test.	482 days ++
Total			950 days ++

+ Time taken is total outage duration since operability was not required during shutdown and repair was made during a Refueling/Scheduled Outage

* Capable of performing intended function - not repaired fully until Refueling

See Component List

++ Long Term Shutdown via NRC Order, also, see note "+"

SURVEILLANCE OF ECCS SYSTEMS

Average Outage Times

<u>Tech. Spec.</u>	<u>Procedure No.</u>	<u>Item</u>	<u>Frequency</u> x	<u>Avg. Time</u>	=	<u>Annual Time in Days</u>
4.1.20	1303-4.14	Rx Bldg. Spray	M(12)	2 hrs.		24 hrs. 1.00d
4.6.1	1303-4.16A	Diesel Gen. A	M(12)	3 hrs.		36 hrs. 1.50d
4.6.1	1303-4.16B	Diesel Gen. B	M(12)	3 hrs.		36 hrs. 1.50d
4.1.43	1303-4.18	4KV ES Bus UV Relay Test	M(12)	.5 hrs.		6 hrs. .25d
4.1.18	1303-5.1	RB Clg & Isol Logic CH & Comp	Q(4)	50 hrs.		200 hrs. 8.33d
4.1.18, 19	1303-5.2	LDC Seq. & Comp Tst Hi/Lo Press Inst	Q(4)	4.0		16 hrs. .67d
4.2.1	1303-11.26	RB Isolation Valve Cycle Test	A(1)	4 hrs.		4 hrs. .16d
4.12.1	1303-5.7	RB Purge Air Treat Op Test	M(12)	1.0 hrs.		12 hrs. .50d
4.12.1	1303-5.9	RB Air Treat Diff Pr Test	A(1)	4.0 hrs.		4 hrs. .16d
3.8.9	1303-10.1	RB Purge Sys	A(1)	2 hrs.		2 hrs. .08d
4.2.1	1303-11.16	DHR System Leak	A(1)	30 hrs.		30 hrs. 1.25d
4.4.1	1303-11.25	RB Local Leak Rate	W(52)	1 hrs.		52 hrs. 2.16d
4.5.2	1303-12.4	Vent DH Pumps & LPI Lines	SA(2)	5 hrs.		10 hrs. .42d
4.2.1	1300-3C	DC Pumps Function Test	M(12)	3 hrs.		36 hrs. 1.50d
4.2.1	1300-3A A	Rx Bldg. Sys Pump & Valve Test	Q(4)	40 hrs.		160 hrs. 6.67d
4.2.1	1300-3B A	DHR Sys Pump & Valve Test	Q(4)	1.0 hr.		4 hrs. .16d
4.2.1	1300-3D	DR-PIA/B Pump & Valve Test	M(12)	4 hrs.		48 hrs. 2.0d
4.2.1	1300-3H A	MUP 1A/B/C & Valve Test	Q(4)	10 hrs.		40 hrs. 1.67d
4.2.1	1300-3H B	Make Up Pump Function Test	M(12)	3 hrs.		36 hrs. 1.5d
4.2.1	1300-3I B	NR-P 1A/B/C Pump & Valve Test	M(12)	5 hrs.		60 hrs. 2.5d
4.2.1	1300-3J	NS-PIA/B/C Valve Funct Test	M(12)	3 hrs.		36 hrs. 1.5d
4.2.1	1300-3K A	RR System Pump/Valve Funct Test	Q(4)	6 hrs.		24 hrs. 1.00d

Average Outage Times

4.2.1	1300-3K B	RR P 1A/B Funct Test	M(12)	4 hrs.	48 hrs.	2.0d
4.2.1	1300-3Q	Ortly ISI Valve Test	Q(4)	3 hrs.	12 hrs.	.50d
4.1.13	1302-5.7	HI RB Press Chan	A(1)	15 hrs.	15 hrs.	.62d
4.1.17	1302-5.8	HP & LP Ins Analog Chan	A(1)	204 hrs.	204 hrs.	8.50d
4.1.19	1302-5.10	Rx Bldg 4psig Chan	SA(2)	76 hrs.	152 hrs.	6.24d
4.1.22	1302-5.11	Rx Bldg Press B ESAS	A(1)	10 hrs.	15 hrs.	.42d
4.1.29	1302-5.18	HP1/LPI Flow Chan.	A(1)	200 hrs.	200 hrs.	5.33d
4.1, 15-17	1303-4.11	HP1/LPI Analog Chan	M(12)	8 hrs.	96 hrs.	4.00d
4.1.19	1303-4.13	RB Emerg. LLg & Isol Sys Anal CH	M(12)	16 hrs.	192 hrs.	8d
4.2.1	1302-14.1	BS Inst. Cal	A(1)	107 hrs.	107 hrs.	4.62d
4.2.1	1302-14.1	DH Inst. Cal	A(1)	6 hrs.	6 hrs.	.25d
4.2.1	1302-14.1	NH Inst. Cal	A(1)	32 hrs.	32 hrs.	1.33d
4.2.1	1302-14.1	NR Inst. Cal	A(1)	16 hrs.	16 hrs.	.67d
4.2.1	1302-14.1	NS Inst. Cal	A(1)	20 hrs.	20 hrs.	.83d
4.6.1	1301-8.2	A D/C Annual Insp	A(1)	240 hrs.	240 hrs.	10d
4.6.1	1301-8.2	B D/C Annual Insp	A(1)	240 hrs.	240 hrs.	10d
				Total		97.8d

W - Weekly

M - Monthly

Q - Quarterly

SA - Semi Annual

A - Refueling (Normally done annually and

time estimates are on an annual basis)

KEY

- MUP - High pressure injection by the makeup and purification system.
- DHR - Low pressure injection by the decay heat removal system.
- CF - Core flooding by the core flooding system.
- RBC - Reactor building cooling by the reactor building emergency cooling units.
- RBS - Reactor building cooling by the reactor building spray system.
The removal of fission products in the reactor building atmosphere.
- RRI - Reactor building isolation.
- D/G - Diesel Generator.
- DHRW - Decay Heat River Water System.
- NSRW - Nuclear Services River Water System.