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Establishment of Performance Criteria on Maintenance Rule Program Implementation

150

(Maintenance Rule)

가

SSC

3,4

가

가

Abstract

The objective of the Maintenance Rule is to require monitoring of the overall continuing effectiveness of licensee maintenance programs to ensure that the safety related and certain nonsafety-related SSCs are capable of performing their intended functions. And, for the nonsafety-related equipment, failures will not occur that prevent the fulfillment of safety-related functions, and failures resulting in scrams and unnecessary actuations of safety-related systems are minimized. That is, proper maintenance is essential to plant safety. To monitor the overall continuing effectiveness of licensee maintenance program, it is needed to establish the proper performance criteria for each SSC. Therefore, we surveyed the performance criteria establishment methods and implemented them to the Auxiliary Feedwater System and Component Cooling Water System on UCN3,4 Units. Also we understand which data is required to establish the performance criteria and what the problems are.

1.

(Maintenance Rule)^[1]

가

가 SSC SSC SSC SSC

2.

PSA가

2.1

of servie time) (Out

PSA 가 가 PSA 가 PSA 가 가 가

$$\Delta CDF \% = 10^{-0.5 \log CDF_{base} - 1}$$

2.2

2 2 가 가 EPRI [7.8]

EPRI 가 : (demand-based failure rate) 가 가 , (time-based) 가 demand & time-based Poisson 가 가

가

:

$$P(r) = \frac{n!}{r!(n-r)!} P^r (1-P)^{n-r}$$

Poisson :

$$P(n) = \frac{(IT)^n}{n!} e^{-IT}$$

(False alarm rate) :

$$f(r) = 1 - \sum_{x=0}^n P(x)$$

가

가

P(n)

P(r)

5%

,

P(x)가 95%

가

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,

가 95%

, False alarm rate f(r) 5%

.

5%

(false alarm)

.

0

,

0

3.2

1

,

SSC

5

20

(fail to start)

0.01

100% 가

1

5%

15%,

2

0.1%

1%

가

2.3

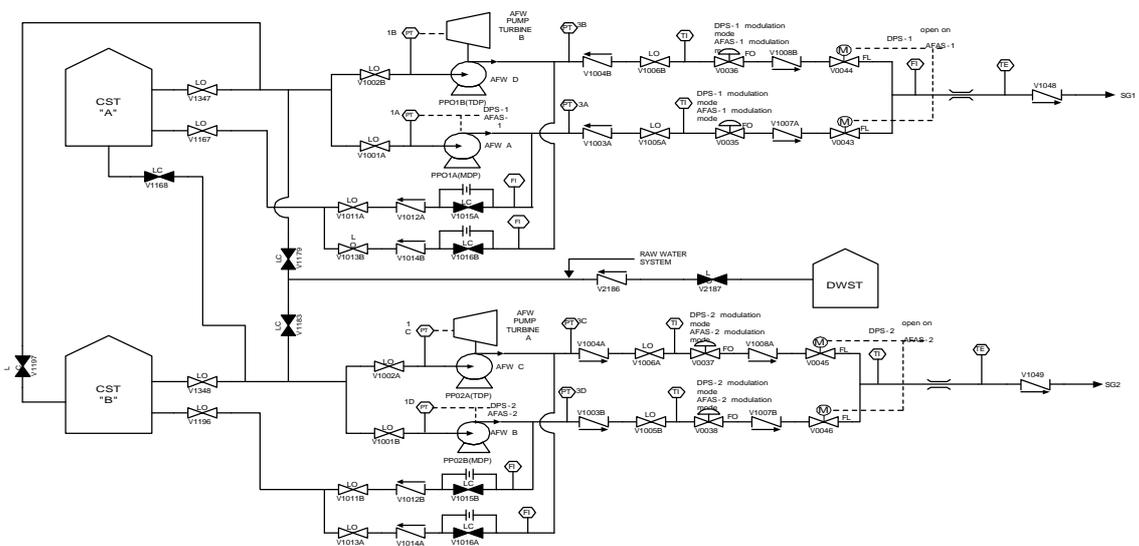
7000

가

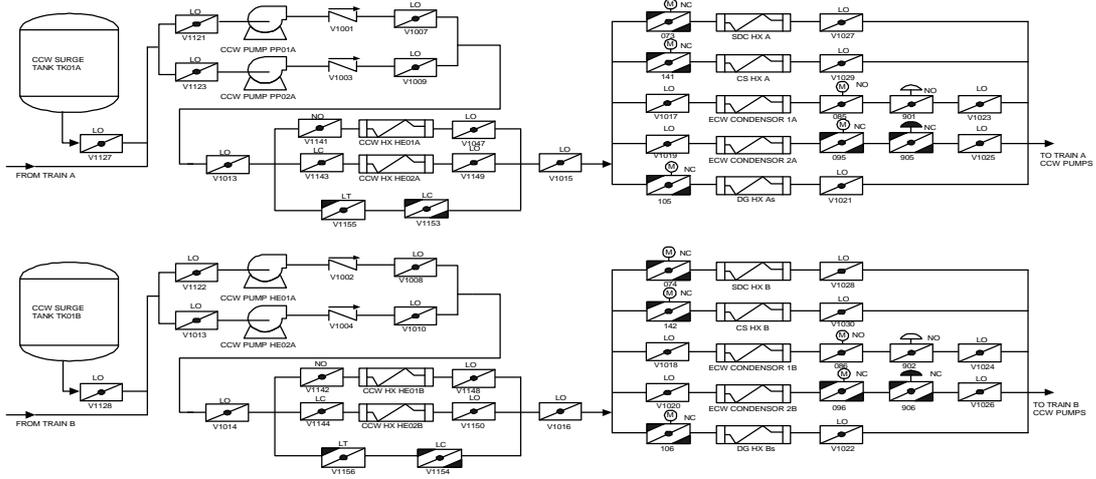
(capability)

3. :

3,4
4 2
4 1 가가 2
4 6
가



3,4



3,4

PSA

2

3,4

가 2.1

34.67%

3.2

PSA

SSC

가

SSC
PSA

(match)

PSA

2

가

24

가

가

3

2

32

가

가

가

10

가

5

3

가

0.26

가

9

3

가

18

가

8760

PSA

2

PSA

1.1709,

0.2688

가

Poisson

가

3

8.3%

5%

96.87% 95%

2.43%

5%

가

가

1

20.54%

96.87%

2

2.76%

가 가

1

2

PSA Event for Functional Failure Minimal Cutsets	PSA Value	Data Basis: Demand or Hourly	Failure Rate(per Demand or Hourly)	Estimated Demands or Hours	No. of Trains Aggregated	No. of Expected Failures Aggregated	P(n) %	P(n+1) %	Cumulative P(n)%	n	n+1
AFMPR01AA	3.6-e-3	Hourly	1.5e-4	5	1	1.1709	8.3	2.43	96.87	3	4
AFMPR02BB	3.6-e-3	Hourly	1.5e-4	5	1						
AFMPS01AA	3.6-e-3	Demand	3.0e-3	32	1						
AFMPS02BB	3.6-e-3	Demand	3.0e-3	32	1						
AFTPR01BA	7.2e-3	Hourly	3.0e-4	29	1						
AFTPR02AB	7.2e-3	Hourly	3.0e-4	29	1						
AFTPS01BA	1.5e-2	Demand	1.5e-2	32	1						
AFTPS02AB	1.5e-2	Demand	1.5e-2	32	1						
CCMPR001PA	1.2e-4	Hourly	5.0e-6	8660	1	0.2688	20.54	2.76	96.97	1	2
CCMPR001PB	1.2e-4	Hourly	5.0e-6	8760	1						
CCMPR002PA	1.2e-4	Hourly	5.0e-6	8760	1						
CCMPR002PB	1.2e-4	Hourly	5.0e-6	8760	1						
CCMPS002PA	1.3e-3	Demand	1.3e-3	18	2						
CCMPS002PB	1.3e-3	Demand	1.3e-3	18	2						

4.

PSA

, PSA

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2~3

RCM 가

RCM 가

Acknowledgment

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