Summary Report for PN Steam Trap Reliability.

Updated December 2009

PN Steam Traps Reliability

- Goals
- Background & Strategy
- Action plan & Activity
- Result & Cost expend
- 2010 Strategy

Goals

1. Expectation Reliability for steam trap
For 2009 = 75%

- 2007 Surveyed by TLV. found reliability 51.16%
- 2008 We can improved reliability = 66.4 %
- 2009 Approximately reliability 75%
- 2010 Approximately reliability 85%
- 2011 Approximately reliability >95%

Back ground/Strategy'09

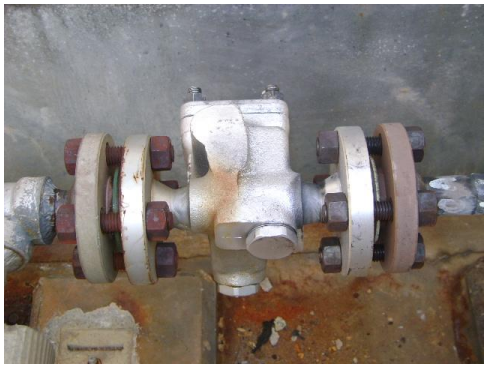
- 100 % Survey all of steam traps condition'08.
  - Steam traps were show condition and money;
    - Blowing Condition = 101,977 $/year (3,365,241Bath)
    - Leaking Condition = 50,919 $/year (1,680,327 Bath)
- Consumption lost from P1 comparing with last survey in 2008.
- Separate area to A1,A2,A3 and A4 for identify failure priority and calculate consumption lost of each area.

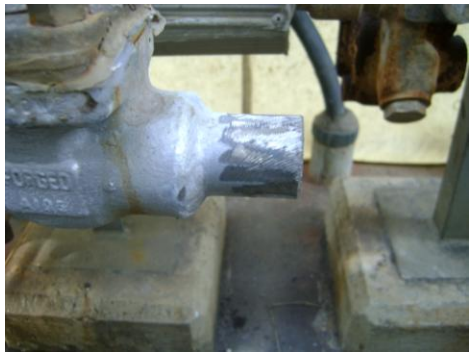
Action plan/Activity'09

- Focus one of each area at high consumption lost (P1).
- Parallel activity by steam trap teams.
  - Repairing priority 1 first and follow up P2. and P3.

Activity'09

- Replace Steam traps priority1.(Cut&Weld)
  - Total plan replace 57 ea./Completed = ***41 ea.***
    - ***8 ea. can't isolated and to be set for S/D work.***
  - Total = 984 x 3 = 2952 MH.
  - Another cost = ***500,000 Bath.***
    - RT, UT, MT costs





Activity'09

- Replace Steam traps priority2.(Change internal parts)
  - Total repaired = ***88 ea.***
  - Total Man-hour = 280 MH.
- Replace Steam traps priority3.(Change internal parts)
  - Total repaired = ***355 ea.***
  - Total Man-hour = 1136 MH.
- Total man-hours = ***4,368 MH.***

* Another 1872 MH. Spend for routine maintenance.

2009 Steam Trap Reliability.

- 2007 Reliability = 50.7 %
- 2008 Reliability = 66.4 %
- ***2009 Reliability*** = ***74.9 %***
- Material cost = *1,501,000 Bath.*
- Man power cost + Another (RT/UT/MT) = *936,800 Bath.*

Total expend cost = ***2,437,800 Bath.***

Gain Benefit

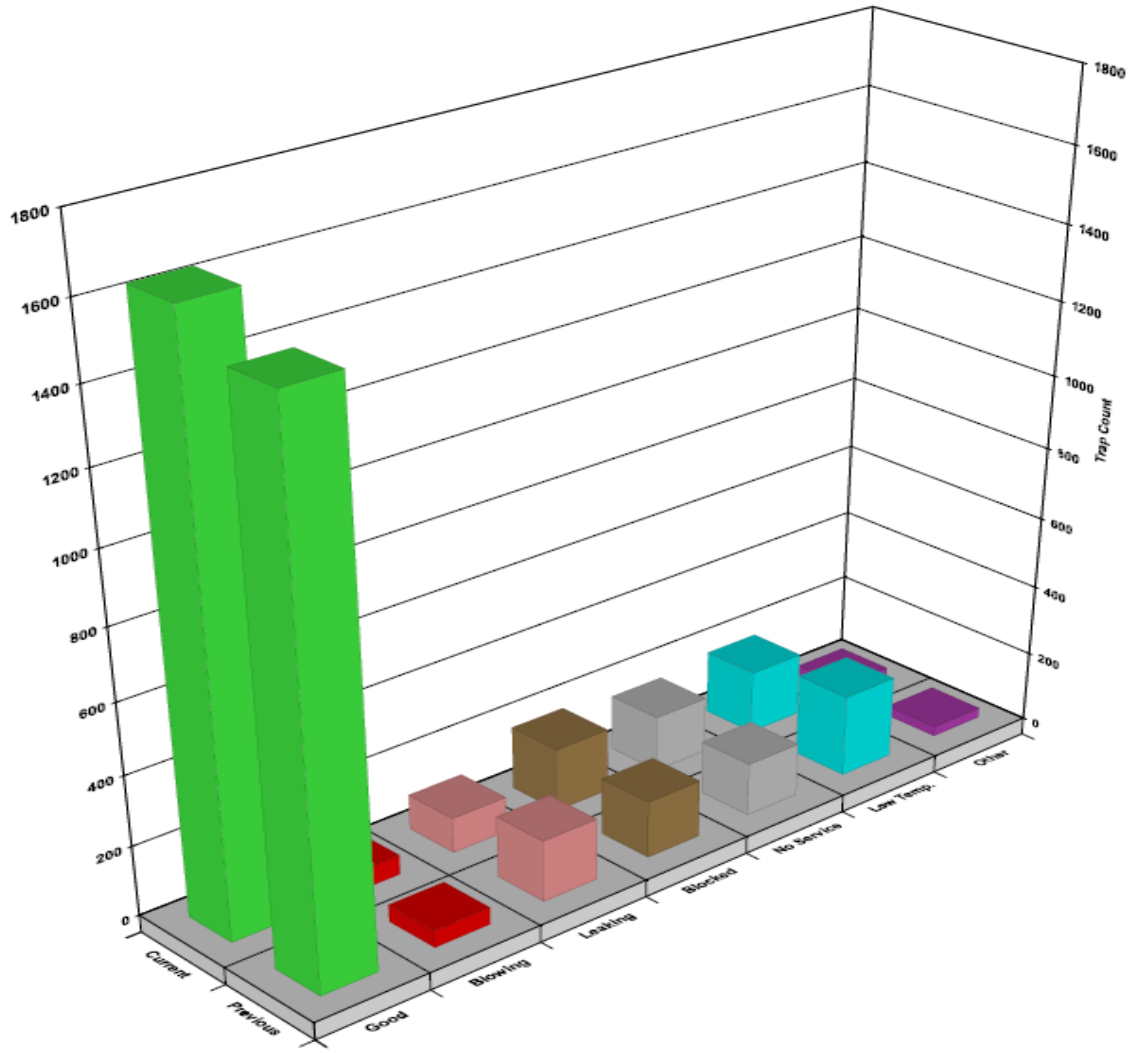
(5,045,568 – 2,437,800) = 2,607,768 Bath.

* Remark : Surveyed on the end of year 2009.

2009 Survey report.

Year	2007		2008		**2009**	
Condition	Previous ea.	Percentage %	Present ea.	Percentage %	Present ea.	Percentage after survey
Good	1158	50.74 %	1487	66.44 %	1633	**74.9 %**
Fail	1124	49.26 %	751	33.56 %	548	**25.1 %**
No service	67	-	111	-	160	-

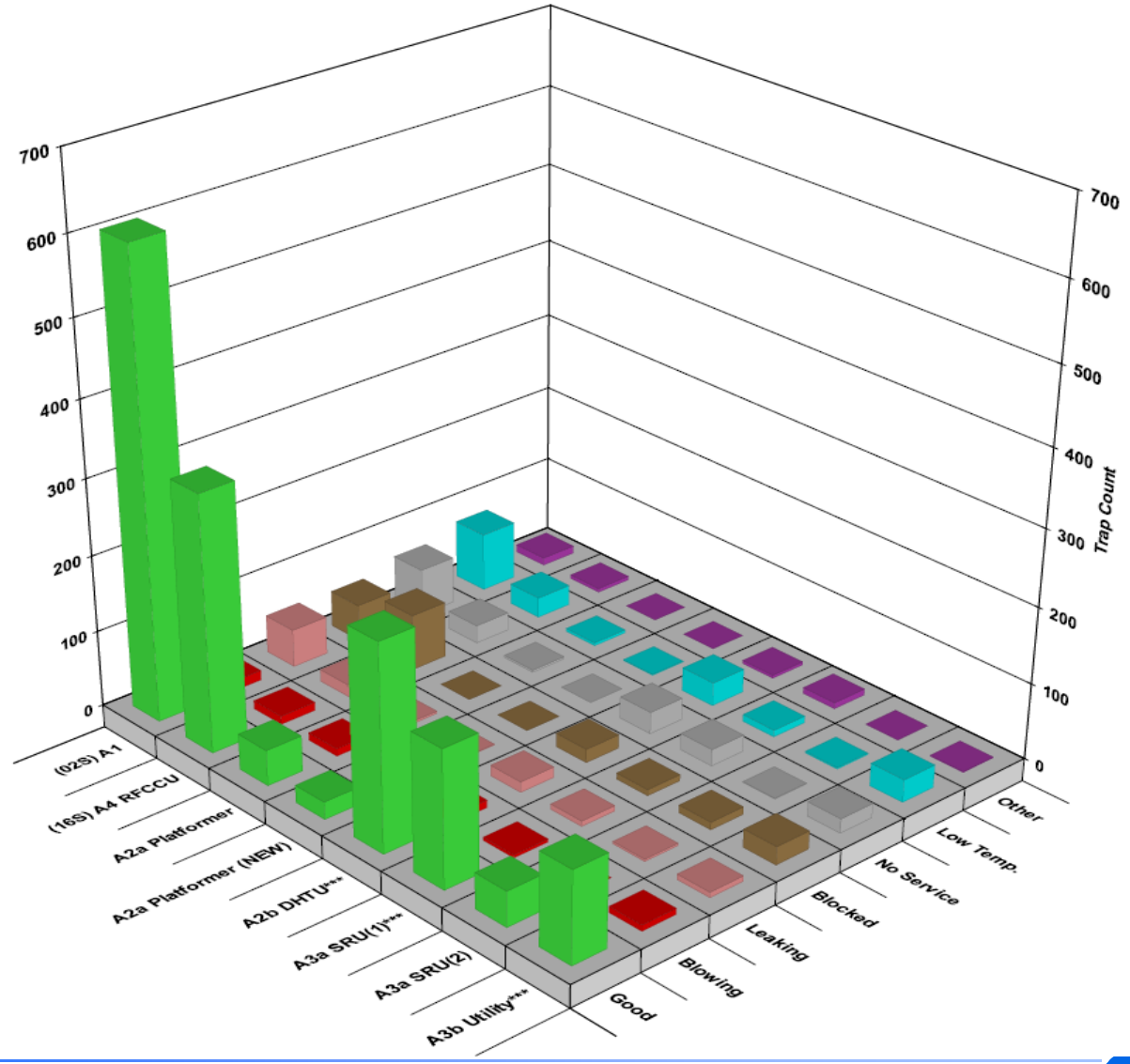
Steam trap condition after surveved'2009.



Failure identify after surveyed 2009.

Condition		Failure trap after survey (ea.)			Percentage of total traps. %			Reliability After Survey
		2007	**2008**	**2009**	**2007**	**2008**	**2009**	
P1	Blowing	57	43	56	2.45	1.92	2.57	Good Condition
P2	Leak	229	156	101	9.85	6.97	4.63	**74.9 %**
P3	Block	422	207	182	18.42	9.24	8.34	
P3	Low temp.	388	314	181	16.91	14.03	8.3	Bad condition
	Other	28	31	28	1.2	1.39	1.28	**25.1 %**
	No service	67	111	160	1.2	2	6.83	
	Total fail	1124	751	548	48.84	33.6	25.1	

Failure identify after surveyed 2009.



2010 Steam trap strategy.

- 100 % Survey all of steam traps end year 2009.
- Separate failure priorities and focus on;
  - P1 Blowing condition = 56 ea.(145,965 $/year)
  - P2 Leaked condition = 101 ea.(30,715 $/year)
  - P3 Block, Low temp and other = 391 ea.
- Start perform as per priority by replacing
  - Internal parts replacement P2 and P3 due to easy to do it and spare parts available.

2010 Steam trap strategy.

- Do MOC cover for P1 to change new model for steam traps blowing condition.
- Order spare parts;
  - New models for Cut&Weld ; JH5SL, SH5NL,VL, SS1NH,VH, P46SRN.
  - Internal parts for repair ; A46, A65, L21S, P46SR, SH5NL, LEX3N
  - Another parts (Flange and valve)

Tentative Plan 2010

ID	Task Name	Duration
1	**Tentative plan PN steam traps 2010**	**274 days**
2	Replace Trap Priority 2	30 days
3	Replace Trap Priority 3	60 days
4	Replace Trap Priority 4	15 days
5	Haft year survey	20 days
6	MOC Process and order spare parts	120 days
7	Replace Trap Priority 1	150 days