Steam Trap System

Complete Fenix Retrofit

10,000 Trap Sample Refinery

Sample Site
Refinery Road
Industrial Site
Texas
USA

Reference: QTP1000

Date: 01/01/2010

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Notes

1. The following proposal provides an example for a hypothetical medium sized refinery with 10,000 steam traps. The breakdown of the type and size of the existing mechanical traps and their typical operating condition is based on numerous surveys of refineries and similar types of process plant.

2. The objective of this study is to provide a rough guide as to the expected benefits that could be achieved from a complete conversion from traditional mechanical traps to Fenix hydrodynamic traps (fixed nozzle traps). The study also provides an example of how Fenix Eearth present the data that would be obtained from a steam system survey.

3. We have made the assumption that all of the live steam that passes through the failed mechanical traps on the 200 psi and 600 psi system is feeding into the 50 psi system and therefore this steam is not lost. In reality the chances are that many of the medium pressure and high pressure traps will vent steam to atmosphere in which case the savings will be greater than shown and the payback much shorter.

4. The main objective of this study is to show the comparative value of the Fenix traps compared with the option of continuing with traditional mechanical traps. The calculated installed cost of the Fenix system is $9.7m USD compared with an estimated cost of $4.4m for the mechanical traps. We have assumed that new mechanical traps will save the same as Fenix traps where as in reality the Fenix traps will save steam even against new mechanical traps. We have also taken the average life of a mechanical trap to be 5 years whereas the life for a trap in good working order is usually much shorter. Despite being conservative with our figures the calculations show that the Fenix system is more than 5 times better value for money compared with traditional mechanical traps.

5. In our experience the true value of the hydrodynamic steam trap is not so much the energy savings or even the maintenance savings but is the increased reliability and operational performance of the process plant. There is very little data available on large scale installations to demonstrate the process problems caused by mechanical trap problems. However one refinery in the USA quoted an annual equipment failure downtime loss figure of $32m. Of this $20m was associated with trap related problems.

In addition to increasing the reliability of the process plant the Fenix traps can improve the stability of the process control system and there is often an increase in the production output. Our experience is that production increases of around 10% are not uncommon.

The combination of increased plant reliability and improved process performance is by far the greatest benefit of the Fenix traps. However the excellent savings in energy costs and maintenance costs more than justify the installation of the traps alone.

6. The FENIX traps come with a 15 year guarantee for the nozzle and the body of the trap (excludes filters, gaskets and ancialláries depending upon model). The guarantee effectively states that the traps will be working as well after 15 years as the day they were installed. Only periodic cleaning of the traps is required and this will be minimal, no more overhauls and large replacement programs.

7. Once all the existing traps have been replaced with the Fenix traps it will not be necessary to purchase other traps in future.

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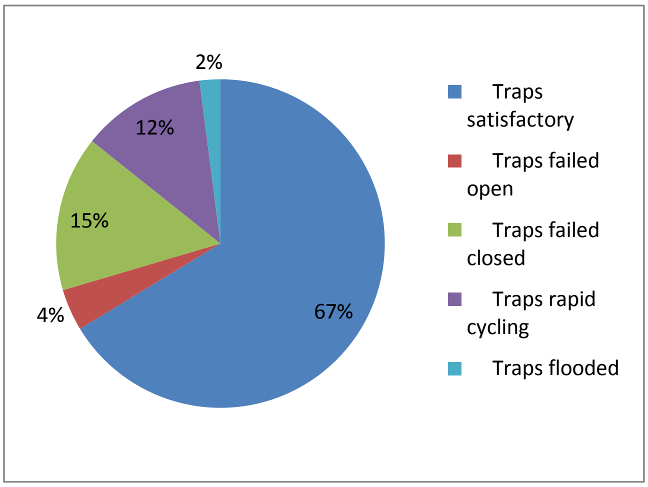
Analysis of Existing System and FENIX System

Introduction

The following analysis is intended to provide a more detailed explanation of the benefits of the proposed new system. Historically steam traps have been considered as an item, this is because they are constantly failing and needing replacing. The purchase of a shell and tube heat exchanger is considered as a project because it is expected to be operating for many years, even if it requires occasional cleaning. The FENIX steam trap system can be considered in the same manner. The benefits from the FENIX system are made obvious when complete plants or areas of plants are converted as a project. The following report provides an analysis of the benefits of converting your plant to the FENIX system.

1. Existing System

1.1 Results of Survey



Surveyed Traps

From the full survey made 2% were not working at the time of the survey but will operate at some time. 0% were not checked usually because access was difficult. 0% are non existing, this means that traps are needed for certain locations but they are not currently installed.

Of the total traps considered in this report only 65% can be considered satisfactory. 4% are failed open which means they are blowing steam straight through, 15% are failed closed passing no condensate, 12% are rapidly cycling which means they are not completely failed open but are partially failed and still passing live steam, 2% are flooded which means they are not passing sufficient condensate and the condensate is backing up in the system, maybe due to the trap being too small or needing maintenance.

1.2 Steam losses

We determine that the steam losses through the traps based on calculations provided by a leading mechanical trap supplier. The only difference is that we assume a small loss even through traps considered to be working satisfactorily. This assumption is based on proven trials of losses through mechanical traps and our own experiences. We consider the values used for the these losses to be conservative.

The steam loss for each trap is based upon the size of trap (giving an approximation of the orifice size), the pressure differential across the trap, the condition of the trap and the trap operating hours. There is no 100% accurate system for assessing the condition and steam losses through mechanical traps however when averaged over a sufficient large sample the calculated steam losses we obtain provide a reasonably accurate correlation with actual steam losses. If anything the calculated losses are conservative in comparison with obtained values.

Calculated steam losses through existing mechanical traps	123309	tonnes/year
Cost of steam	$25	per tonne
Cost of steam losses through mechanical traps	$3,082,723	USD$ per year

1.3 Maintenance Costs

The benefits of the FENIX traps in comparison with traditional mechanical traps are enormous. It is very difficult to accurately calculate a financial saving related to the maintenance, mainly because there is very little data available on the maintenance costs of mechanical traps. We have attempted to calculate the cost of maintaining mechanical traps by using the estimated life of traps, cost of replacement/repairs and the time and man-hour rates.

However in reality the maintenance benefits of FENIX traps compared to mechanical traps are much higher than shown here. This is because it is difficult to put the true impact of trap maintenance into a formula. The mechanical traps require a large inventory of spares, which requires personnel time for requisitions, ordering and stock management. To change a trap requires complex testing, organisation of labour to make the repairs or replacements, a plant shut, and a considerable amount of bureaucratic procedures. It is not surprising that trap maintenance is at the bottom of the priority list and why they are often found in such poor state of repair.

The following provides a break down of the estimated maintenance costs for a mechanical traps included in this report:

Calculations are made based on an man hour rate of	$50.00	USD$ per hour
Survey man-hours	1020	hours
Direct maintenance man-hours	6754.5	hours
Man-hour cost	$388,724	USD$
Replacement/repair cost:	$1,464,994	USD$
Total estimated maintenance cost:	**$1,853,718**	USD$ per year

2. Physical Benefits of FENIX System

2.1 Steam Savings

The principal of the orifice/venturi design is that the condensate itself forms a seal to prevent the steam from escaping. Assuming that the orifice are correctly sized then only condensate will pass through the trap and no live steam. We can therefore save all of the live steam that is currently being loosed through the mechanical traps i.e. USD$3082723

By saving steam there will be further advantages than just the straight cost per tonne of steam. There will be a reduction in the amount of make up condensate, less erosion of pipework, etc. but these are difficult to calculate a financial value for.

2.2 Maintenance Savings

Since we have eliminated the live steam loss through the FENIX traps there will only be condensate passing through the nozzle of the trap in which case, being stainless steel, the erosion can be considered neglectable. Therefore once the correctly sized FENIX trap is installed it can be considered a permanent installation. The only maintenance required will be the occasional cleaning of the trap strainer, which is the same as for mechanical traps, and even less occasional cleaning of the trap nozzle.

The table below reflects the maintenance costs associated with a FENIX trap system:

Calculations are made based on an man hour rate of	$50.00	USD$ per hour
Survey man-hours	140.04	hours
Direct maintenance man-hours	40.3	hours
Man-hour cost	$9,015	USD$
Replacement/repair cost:	$0	USD$
Total estimated maintenance cost:	**$9,015**	USD$ per year

When compared with the cost for maintaining mechanical traps the saving will be USD$1844703 per year

2.3 Process Performance and Reliability

The improved performance and reliability of the process is the single most important benefit of the FENIX trap system. The flow through mechanical traps is intermittent, the flow through FENIX traps is continuous. The fact that the FENIX traps discharge the condensate at the same rate the condensate forms means that flow characteristics are greatly improved. A great deal of time and money is spent looking at control systems and valve actions but when there is a crude device, similar to the internals of a toilet, controlling the outlet flow, there is little chance of obtaining good process control.

With the FENIX traps the flow is stable and continuous and this can have a huge impact both on the overall heat transfer and the stability of the process. It is possible to achieve production increases around 10% and at the same time an improvement in the process control stability. Neither of these parameters are easily to calculate or convert into a financial benefit but the benefits are real and can have an enormous positive impact.

The other major benefit to the process is the improved reliability of the plant. Mechanical traps are just another problem in the system and can cause a shut down or at least divert valuable resources from other priority work. Eliminating a possible failure from the process has immense benefits and is probably the single most discussed benefit of the FENIX traps with the end users.

2.4 Environment Benefits

Aside from the financial benefits associated with steam savings there are also environmental benefits. Saving a tonne of steam will save CO2 as well as SOx and NOx. Irrespective of the financial implications all major manufacturers are under pressure to demonstrate their 'Green' credentials. The FENIX system is permanent so the savings in CO2, as well as SOx and NOx are also permanent.

Based on the above steam saving of	123309	tonnes/year
Assuming a steam generation efficiency of	80.0%	
We get a CO2 savings of	173560	tonnes/year

3 Financial Benefits of FENIX System

3.1 Installation Cost

Before we are able to assess the financial benefits of the project we have to allow for the installation cost. The FENIX product range is designed in such a way as to minimize the man-hours and skill level required to install them. However we still need to take account of the costs when assessing the viability of the proposal.

Estimated cost of installation of FENIX system	$789,025	USD$

3.2 Simple payback

Purchase cost of Fenix traps	$8,901,050	USD$
Estimated installation cost	$789,025	USD$
Total project cost	$9,690,075	USD$
Annual energy savings	$3,082,723	USD$
Annual maintenance savings	$1,844,703	USD$
Total savings	$4,927,426	USD$

Simple payback	1.97 years
	23.6 months

3.3 Life Cycle Costs

The simple payback is a very crude method for assessing the true value of a project. A mechanical trap will no doubt provide a shorter payback than a FENIX trap. The problem is that the typical life of the mechanical trap is only around 2 years which is not much beyond the period of the payback. The concept with the FENIX traps is they are effectively a permanent installation and will no doubt last as long as the associated pipework and equipment.

Mechanical traps are similar to tyres on a car, necessary but we accept they are going to wear out. With the FENIX traps the 10 year life cycle benefits are much more important than the simple payback.

Total 10 year life cycle savings compared with existing mechanical traps: USD$ 39,584,190

Another way to look at the life cycle savings is that staying with the exising mechanical trap system will cost the company an extra USD$39584190 over the 10 year period compared to making the investment in the FENIX system.

3.4 Net Present Value (NPV)

The Net Present Value is a more complex accounting system for assessing the true value of a project when compared with other possible options relates future revenues against capital invested. The NPV analysis is used by accountants in making decisions as to which project to invest in but we are also able to use the method to compare the decision to invest in the FENIX system or remain using mechanical steam traps.

To calculate the NPV for both the FENIX system and the existing mechanical trap system the following data is used which is common to both:

Annual depreciation of product	20%
Capital Cost	12%
Corporate tax rate	28%
Inflation	3%

Then there are the factors that are dependent upon the system selection

	FENIX Traps	Mechanical Traps	
Expected life of traps	20	5	years
Fuel savings	$3,082,723	$3,082,723	per year
Maintenance Savings	$1,844,703	$0	per year

We have given the biased the figures in favour of mechanical traps since most operators would consider a typical life of a steam trap to be around 2 years. We have also assumed that if all the existing mechanical traps were replaced with new ones then the steam savings would be the same as for FENIX steam traps. In reality even if we compared FENIX traps with out of the box new mechanical traps there would still be a steam saving with FENIX traps.

The maintenance savings are compared with the existing mechanical traps and again favour the mechanical traps. As discussed above the real costs associated with running mechanical traps are much higher than the calculations predict.

So in all the following results are on the conservative side when comparing a mechanical trap system with a FENIX trap system.

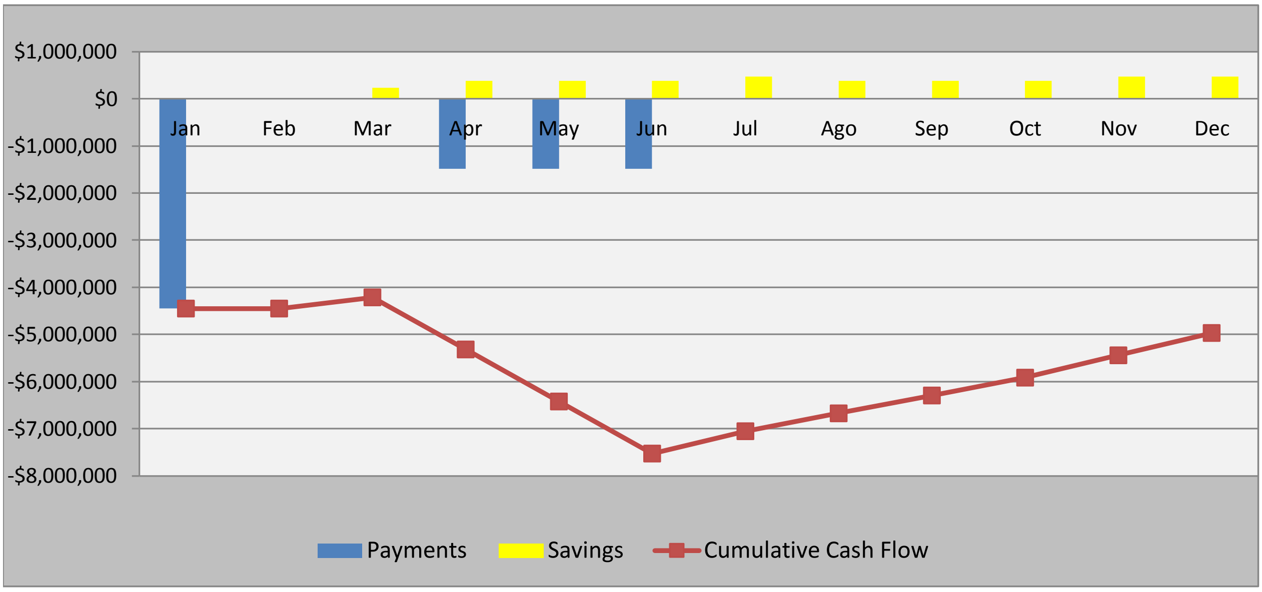
	FENIX Traps	Mechanical Traps
NPV of systems	$26,401,944	$4,842,328
Relative value of FENIX system	5.45	

Therefore based on the above analysis the FENIX system is worth 5.45 more than the existing system.

3.5 Cash Flow Analysis

The advantage of the FENIX system is that the savings from reducing steam consumption pay for the cost of project in a very short time. Usually the paybacks are less than one year. However at the same time there is always a delay between orders being placed and savings being realised. For this reason we have provided a cash flow analysis that helps to predicted the expected time related revenues obtained from the project.

Payment Terms	50%	Down Payment
Instalments after delivery	3	
Delivery time	10	weeks
Installation time	4	weeks



The above chart shows the cash flow over a 12 month period in terms of the payments made, the savings and the cumulative cash flow. The ideal is to have a positive cumulative cash flow by the end of the year. If this is the case then the FENIX system can be considered free!

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FenixEarth

Net Present Value (NPV)

Customer:	**10,000 Trap Sample Refinery**
Description:	Complete Fenix Retrofit
Quote:	QTP1000
Date:	01/01/2010

	FENIX Traps		Mechanical Traps	
Costs of System	$9,690,075		$4,506,589	
Initial revenue	$4,927,426		$3,082,723	
Capital Cost, y	12%		12%	
Inflation	3%		3%	
Annual depreciation of product	20%	5 years	20%	5 years
Corporate tax rate	28%		28%	
Life expectancy, t	20	years	5	years
Net Present Value (NPV)	$26,401,944		$4,842,328	

Relative value of FENIX system 5.45

Notes:
i) The calculations assume that new mechanical traps would have the same efficiency as Fenix traps in reality the even new mechanical traps will pass more live steam than Fenix traps.
ii) The calculations are based on a Fenix life expectancy of 20 years which is no doubt lower than the actual value. For mechanical traps the life expectany is taken as 5 years which can be considerably longer than the life of mechanical traps.

Based upon the above assumptions the relative value of the Fenix traps is on the conservative side compared with the reality.

Even though the mechanical traps are cheaper, the NPV analysis shows that the Fenix traps are considerably better value for money - by a factor of 5.45

10,000 Trap Sample Refinery
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USA

Project Summary

Total surveyed	9800	98%
Traps satisfactory	6499	65%
Traps failed open	402	4%
Traps failed closed	1499	15%
Traps rapid cycling	1200	12%
Traps flooded	200	2%
Traps out of service	200	2%
Total number of traps	10000	

Purchase cost of Fenix traps	$8,901,050
Estimated installation cost	$789,025
Total project cost	**$9,690,075**
Annual energy savings	$3,082,723
Annual maintenance savings	$1,844,703
Total savings	**$4,927,426**
10 Year life cycle savings	$39,584,190
Simple payback period	23.6 months
Net Present Value (NPV)	$26,401,944
Relative value of Fenix steam traps	5.45

Steam savings	123309	tonnes/year
	14.08	tonnes/hour
CO_2 savings	173560	tonnes/year

Existing Trap Status

FenixEarth

Customer: 10,000 Trap Sample Refinery
Location: Sample Site
Date: 01/01/2010
Ref.: QTP1000

No.	Area	Location	Quantity	Make	Type	Size	Connection	Application	Inlet		Outlet		Condition
									Press	Temp	Press	Temp	
						in			psi	°F	psi	°F	
1	LP Steam System	Distribution and trace heating	82	Unknown	Thermodynamic	1/2	Screwed	Drip Leg - Sat	50		0		Failed Open
2	LP Steam System	Distribution and trace heating	240	Unknown	Thermodynamic	1/2	Screwed	Trace Heating	50		0		Rapid Cycling
3	LP Steam System	Distribution and trace heating	300	Unknown	Thermodynamic	1/2	Screwed	Drip Leg - Sat	50		0		Failed Closed
4	LP Steam System	Distribution and trace heating	40	Unknown	Thermodynamic	1/2	Screwed	Trace Heating	50		0		Flooded
5	LP Steam System	Distribution and trace heating	40	Unknown	Thermodynamic	1/2	Screwed	Drip Leg - Sat	50		0		Out of Service
6	LP Steam System	Distribution and trace heating	1300	Unknown	Thermodynamic	1/2	Screwed	Trace Heating	50		0		Satisfactory
7	LP Steam System	Distribution and trace heating	40	Unknown	Thermodynamic	3/4	Screwed	Drip Leg - Sat	50		0		Failed Open
8	LP Steam System	Distribution and trace heating	120	Unknown	Thermodynamic	3/4	Screwed	Drip Leg - Sat	50		0		Rapid Cycling
9	LP Steam System	Distribution and trace heating	150	Unknown	Thermodynamic	3/4	Screwed	Trace Heating	50		0		Failed Closed
10	LP Steam System	Distribution and trace heating	20	Unknown	Thermodynamic	3/4	Screwed	Drip Leg - Sat	50		0		Flooded
11	LP Steam System	Distribution and trace heating	20	Unknown	Thermodynamic	3/4	Screwed	Trace Heating	50		0		Out of Service
12	LP Steam System	Distribution and trace heating	650	Unknown	Thermodynamic	3/4	Screwed	Drip Leg - Sat	50		0		Satisfactory
13	LP Steam System	Process Applications	14	Unknown	Ball Float	1	Screwed	Process Application	50		0		Failed Open
14	LP Steam System	Process Applications	42	Unknown	Ball Float	1	Screwed	Process Application	50		0		Rapid Cycling
15	LP Steam System	Process Applications	52	Unknown	Ball Float	1	Screwed	Process Application	50		0		Failed Closed
16	LP Steam System	Process Applications	7	Unknown	Ball Float	1	Screwed	Process Application	50		0		Flooded
17	LP Steam System	Process Applications	7	Unknown	Ball Float	1	Screwed	Process Application	50		0		Out of Service
18	LP Steam System	Process Applications	227	Unknown	Ball Float	1	Screwed	Process Application	50		0		Satisfactory
19	LP Steam System	Process Applications	6	Unknown	Ball Float	1 1/2	Screwed	Process Application	50		0		Failed Open
20	LP Steam System	Process Applications	18	Unknown	Ball Float	1 1/2	Screwed	Process Application	50		0		Rapid Cycling
21	LP Steam System	Process Applications	22	Unknown	Ball Float	1 1/2	Screwed	Process Application	50		0		Failed Closed
22	LP Steam System	Process Applications	3	Unknown	Ball Float	1 1/2	Screwed	Process Application	50		0		Flooded
23	LP Steam System	Process Applications	3	Unknown	Ball Float	1 1/2	Screwed	Process Application	50		0		Out of Service

Existing Trap Status

Customer: 10,000 Trap Sample Refinery
Date: 01/01/2010
Location: Sample Site
Ref.: QTP1000

No.	Area	Location	Quantity	Make	Type	Size (in)	Connection	Application	Inlet Press (psi)	Inlet Temp (°F)	Outlet Press (psi)	Outlet Temp (°F)	Condition
24	LP Steam System	Process Applications	97	Unknown	Ball Float	1 1/2	Screwed	Process Application	50		0		Satisfactory
25	LP Steam System	Process Applications	4	Unknown	Ball Float	2	Screwed	Process Application	50		0		Failed Open
26	LP Steam System	Process Applications	12	Unknown	Ball Float	2	Screwed	Process Application	50		0		Rapid Cycling
27	LP Steam System	Process Applications	15	Unknown	Ball Float	2	Screwed	Process Application	50		0		Failed Closed
28	LP Steam System	Process Applications	2	Unknown	Ball Float	2	Screwed	Process Application	50		0		Flooded
29	LP Steam System	Process Applications	2	Unknown	Ball Float	2	Screwed	Process Application	50		0		Out of Service
30	LP Steam System	Process Applications	65	Unknown	Ball Float	2	Screwed	Process Application	50		0		Satisfactory
31	MP Steam Sytem	Distribution and trace heating	60	Unknown	Thermodynamic	1/2	Welded	Drip Leg - Sat	200		50		Failed Open
32	MP Steam Sytem	Distribution and trace heating	180	Unknown	Thermodynamic	1/2	Welded	Trace Heating	200		50		Rapid Cycling
33	MP Steam Sytem	Distribution and trace heating	225	Unknown	Thermodynamic	1/2	Welded	Drip Leg - Sat	200		50		Failed Closed
34	MP Steam Sytem	Distribution and trace heating	30	Unknown	Thermodynamic	1/2	Welded	Trace Heating	200		50		Flooded
35	MP Steam Sytem	Distribution and trace heating	30	Unknown	Thermodynamic	1/2	Welded	Drip Leg - Sat	200		50		Out of Service
36	MP Steam Sytem	Distribution and trace heating	975	Unknown	Thermodynamic	1/2	Welded	Trace Heating	200		50		Satisfactory
37	MP Steam Sytem	Distribution and trace heating	40	Unknown	Thermodynamic	3/4	Welded	Drip Leg - Sat	200		50		Failed Open
38	MP Steam Sytem	Distribution and trace heating	120	Unknown	Thermodynamic	3/4	Welded	Drip Leg - Sat	200		50		Rapid Cycling
39	MP Steam Sytem	Distribution and trace heating	150	Unknown	Thermodynamic	3/4	Welded	Trace Heating	200		50		Failed Closed
40	MP Steam Sytem	Distribution and trace heating	20	Unknown	Thermodynamic	3/4	Welded	Drip Leg - Sat	200		50		Flooded
41	MP Steam Sytem	Distribution and trace heating	20	Unknown	Thermodynamic	3/4	Welded	Trace Heating	200		50		Out of Service
42	MP Steam Sytem	Distribution and trace heating	650	Unknown	Thermodynamic	3/4	Welded	Drip Leg - Sat	200		50		Satisfactory
43	MP Steam Sytem	Process Applications	32	Unknown	Inverted Bucket	1	Welded	Process Application	200		50		Failed Open
44	MP Steam Sytem	Process Applications	96	Unknown	Inverted Bucket	1	Welded	Process Application	200		50		Rapid Cycling
45	MP Steam Sytem	Process Applications	120	Unknown	Inverted Bucket	1	Welded	Process Application	200		50		Failed Closed

Existing Trap Status

FenixEarth

Customer: 10,000 Trap Sample Refinery

Location: Sample Site

Date: 01/01/2010

Ref.: QTP1000

No.	Area	Location	Quantity	Make	Type	Size	Connection	Application	Inlet		Outlet		Condition
									Press	Temp	Press	Temp	
						in			psi	°F	psi	°F	
46	MP Steam Sytem	Process Applications	16	Unknown	Inverted Bucket	1	Welded	Process Application	200		50		Flooded
47	MP Steam Sytem	Process Applications	16	Unknown	Inverted Bucket	1	Welded	Process Application	200		50		Out of Service
48	MP Steam Sytem	Process Applications	520	Unknown	Inverted Bucket	1	Welded	Process Application	200		50		Satisfactory
49	MP Steam Sytem	Process Applications	28	Unknown	Inverted Bucket	1 1/2	Welded	Process Application	200		50		Failed Open
50	MP Steam Sytem	Process Applications	84	Unknown	Inverted Bucket	1 1/2	Welded	Process Application	200		50		Rapid Cycling
51	MP Steam Sytem	Process Applications	105	Unknown	Inverted Bucket	1 1/2	Welded	Process Application	200		50		Failed Closed
52	MP Steam Sytem	Process Applications	14	Unknown	Inverted Bucket	1 1/2	Welded	Process Application	200		50		Flooded
53	MP Steam Sytem	Process Applications	14	Unknown	Inverted Bucket	1 1/2	Welded	Process Application	200		50		Out of Service
54	MP Steam Sytem	Process Applications	455	Unknown	Inverted Bucket	1 1/2	Welded	Process Application	200		50		Satisfactory
55	MP Steam Sytem	Process Applications	24	Unknown	Inverted Bucket	2	ANSI300	Process Application	200		50		Failed Open
56	MP Steam Sytem	Process Applications	72	Unknown	Inverted Bucket	2	ANSI300	Process Application	200		50		Rapid Cycling
57	MP Steam Sytem	Process Applications	90	Unknown	Inverted Bucket	2	ANSI300	Process Application	200		50		Failed Closed
58	MP Steam Sytem	Process Applications	12	Unknown	Inverted Bucket	2	ANSI300	Process Application	200		50		Flooded
59	MP Steam Sytem	Process Applications	12	Unknown	Inverted Bucket	2	ANSI300	Process Application	200		50		Out of Service
60	MP Steam Sytem	Process Applications	390	Unknown	Inverted Bucket	2	ANSI300	Process Application	200		50		Satisfactory
61	MP Steam Sytem	Process Applications	8	Unknown	Inverted Bucket	3	ANSI300	Process Application	200		50		Failed Open
62	MP Steam Sytem	Process Applications	24	Unknown	Inverted Bucket	3	ANSI300	Process Application	200		50		Rapid Cycling
63	MP Steam Sytem	Process Applications	30	Unknown	Inverted Bucket	3	ANSI300	Process Application	200		50		Failed Closed
64	MP Steam Sytem	Process Applications	4	Unknown	Inverted Bucket	3	ANSI300	Process Application	200		50		Flooded
65	MP Steam Sytem	Process Applications	4	Unknown	Inverted Bucket	3	ANSI300	Process Application	200		50		Out of Service
66	MP Steam Sytem	Process Applications	130	Unknown	Inverted Bucket	3	ANSI300	Process Application	200		50		Satisfactory
67	MP Steam Sytem	Process Applications	4	Unknown	Inverted Bucket	4	ANSI300	Process Application	200		50		Failed Open

Existing Trap Status

Customer: 10,000 Trap Sample Refinery
Location: Sample Site
Date: 01/01/2010
Ref.: QTP1000

No.	Area	Location	Quantity	Make	Type	Size	Connection	Application	Inlet		Outlet		Condition
									Press	Temp	Press	Temp	
						in			psi	°F	psi	°F	
68	MP Steam Sytem	Process Applications	12	Unknown	Inverted Bucket	4	ANSI300	Process Application	200		50		Rapid Cycling
69	MP Steam Sytem	Process Applications	15	Unknown	Inverted Bucket	4	ANSI300	Process Application	200		50		Failed Closed
70	MP Steam Sytem	Process Applications	2	Unknown	Inverted Bucket	4	ANSI300	Process Application	200		50		Flooded
71	MP Steam Sytem	Process Applications	2	Unknown	Inverted Bucket	4	ANSI300	Process Application	200		50		Out of Service
72	MP Steam Sytem	Process Applications	65	Unknown	Inverted Bucket	4	ANSI300	Process Application	200		50		Satisfactory
73	HP Steam System	Distribution and trace heating	40	Unknown	Inverted Bucket	1/2	Welded	Drip Leg - Sup	600		50		Failed Open
74	HP Steam System	Distribution and trace heating	120	Unknown	Inverted Bucket	1/2	Welded	Drip Leg - Sup	600		50		Rapid Cycling
75	HP Steam System	Distribution and trace heating	150	Unknown	Inverted Bucket	1/2	Welded	Drip Leg - Sup	600		50		Failed Closed
76	HP Steam System	Distribution and trace heating	20	Unknown	Inverted Bucket	1/2	Welded	Drip Leg - Sup	600		50		Flooded
77	HP Steam System	Distribution and trace heating	20	Unknown	Inverted Bucket	1/2	Welded	Drip Leg - Sup	600		50		Out of Service
78	HP Steam System	Distribution and trace heating	650	Unknown	Inverted Bucket	1/2	Welded	Drip Leg - Sup	600		50		Satisfactory
79	HP Steam System	Distribution and trace heating	20	Unknown	Inverted Bucket	3/4	Welded	Drip Leg - Sup	600		50		Failed Open
80	HP Steam System	Distribution and trace heating	60	Unknown	Inverted Bucket	3/4	Welded	Drip Leg - Sup	600		50		Rapid Cycling
81	HP Steam System	Distribution and trace heating	75	Unknown	Inverted Bucket	3/4	Welded	Drip Leg - Sup	600		50		Failed Closed
82	HP Steam System	Distribution and trace heating	10	Unknown	Inverted Bucket	3/4	Welded	Drip Leg - Sup	600		50		Flooded
83	HP Steam System	Distribution and trace heating	10	Unknown	Inverted Bucket	3/4	Welded	Drip Leg - Sup	600		50		Out of Service
84	HP Steam System	Distribution and trace heating	325	Unknown	Inverted Bucket	3/4	Welded	Drip Leg - Sup	600		50		Satisfactory

Proposed Replacement Traps

Customer: 10,000 Trap Sample Re[f] Date: 01/01/2010
Location: Sample Site Ref.: QTP1000

No.	Area	Location	Quantity	Type	Size in	Connection	Application	Inlet Press psi	Outlet Press psi	Observations
1	LP Steam System	Distribution and trace heating	82	EF	1/2	Screwed	Drip Leg - Sat	50	0	
2	LP Steam System	Distribution and trace heating	240	EF	1/2	Screwed	Trace Heating	50	0	
3	LP Steam System	Distribution and trace heating	300	EF	1/2	Screwed	Drip Leg - Sat	50	0	
4	LP Steam System	Distribution and trace heating	40	EF	1/2	Screwed	Trace Heating	50	0	
5	LP Steam System	Distribution and trace heating	40	EF	1/2	Screwed	Drip Leg - Sat	50	0	
6	LP Steam System	Distribution and trace heating	1300	EF	1/2	Screwed	Trace Heating	50	0	
7	LP Steam System	Distribution and trace heating	40	EF	3/4	Screwed	Drip Leg - Sat	50	0	
8	LP Steam System	Distribution and trace heating	120	EF	3/4	Screwed	Drip Leg - Sat	50	0	
9	LP Steam System	Distribution and trace heating	150	EF	3/4	Screwed	Trace Heating	50	0	
10	LP Steam System	Distribution and trace heating	20	EF	3/4	Screwed	Drip Leg - Sat	50	0	
11	LP Steam System	Distribution and trace heating	20	EF	3/4	Screwed	Trace Heating	50	0	
12	LP Steam System	Distribution and trace heating	650	EF	3/4	Screwed	Drip Leg - Sat	50	0	
13	LP Steam System	Process Applications	14	IVP	1	Screwed	Process Application	50	0	
14	LP Steam System	Process Applications	42	IVP	1	Screwed	Process Application	50	0	
15	LP Steam System	Process Applications	52	IVP	1	Screwed	Process Application	50	0	
16	LP Steam System	Process Applications	7	IVP	1	Screwed	Process Application	50	0	
17	LP Steam System	Process Applications	7	IVP	1	Screwed	Process Application	50	0	
18	LP Steam System	Process Applications	227	IVP	1	Screwed	Process Application	50	0	
19	LP Steam System	Process Applications	6	FL150	1 1/2	Screwed	Process Application	50	0	
20	LP Steam System	Process Applications	18	FL150	1 1/2	Screwed	Process Application	50	0	
21	LP Steam System	Process Applications	22	FL150	1 1/2	Screwed	Process Application	50	0	
22	LP Steam System	Process Applications	3	FL150	1 1/2	Screwed	Process Application	50	0	
23	LP Steam System	Process Applications	3	FL150	1 1/2	Screwed	Process Application	50	0	

Proposed Replacement Traps

Customer: 10,000 Trap Sample Re[f] Date: 01/01/2010
Location: Sample Site Ref.: QTP1000

No.	Area	Location	Quantity	Type	Size in	Connection	Application	Inlet Press psi	Outlet Press psi	Observations
24	LP Steam System	Process Applications	97	FL150	1 1/2	Screwed	Process Application	50	0	
25	LP Steam System	Process Applications	4	FL150	2	Screwed	Process Application	50	0	
26	LP Steam System	Process Applications	12	FL150	2	Screwed	Process Application	50	0	
27	LP Steam System	Process Applications	15	FL150	2	Screwed	Process Application	50	0	
28	LP Steam System	Process Applications	2	FL150	2	Screwed	Process Application	50	0	
29	LP Steam System	Process Applications	2	FL150	2	Screwed	Process Application	50	0	
30	LP Steam System	Process Applications	65	FL150	2	Screwed	Process Application	50	0	
31	MP Steam Sytem	Distribution and trace heating	60	EF	1/2	Welded	Drip Leg - Sat	200	50	
32	MP Steam Sytem	Distribution and trace heating	180	EF	1/2	Welded	Trace Heating	200	50	
33	MP Steam Sytem	Distribution and trace heating	225	EF	1/2	Welded	Drip Leg - Sat	200	50	
34	MP Steam Sytem	Distribution and trace heating	30	EF	1/2	Welded	Trace Heating	200	50	
35	MP Steam Sytem	Distribution and trace heating	30	EF	1/2	Welded	Drip Leg - Sat	200	50	
36	MP Steam Sytem	Distribution and trace heating	975	EF	1/2	Welded	Trace Heating	200	50	
37	MP Steam Sytem	Distribution and trace heating	40	EF	3/4	Welded	Drip Leg - Sat	200	50	
38	MP Steam Sytem	Distribution and trace heating	120	EF	3/4	Welded	Drip Leg - Sat	200	50	
39	MP Steam Sytem	Distribution and trace heating	150	EF	3/4	Welded	Trace Heating	200	50	
40	MP Steam Sytem	Distribution and trace heating	20	EF	3/4	Welded	Drip Leg - Sat	200	50	
41	MP Steam Sytem	Distribution and trace heating	20	EF	3/4	Welded	Trace Heating	200	50	
42	MP Steam Sytem	Distribution and trace heating	650	EF	3/4	Welded	Drip Leg - Sat	200	50	
43	MP Steam Sytem	Process Applications	32	IVP	1	Welded	Process Application	200	50	
44	MP Steam Sytem	Process Applications	96	IVP	1	Welded	Process Application	200	50	
45	MP Steam Sytem	Process Applications	120	IVP	1	Welded	Process Application	200	50	

Proposed Replacement Traps

Customer: 10,000 Trap Sample Re| Date: 01/01/2010

Location: Sample Site Ref.: QTP1000

No.	Area	Location	Quantity	Type	Size in	Connection	Application	Inlet Press psi	Outlet Press psi	Observations
46	MP Steam Sytem	Process Applications	16	IVP	1	Welded	Process Application	200	50	
47	MP Steam Sytem	Process Applications	16	IVP	1	Welded	Process Application	200	50	
48	MP Steam Sytem	Process Applications	520	IVP	1	Welded	Process Application	200	50	
49	MP Steam Sytem	Process Applications	28	IVP	1 1/2	Welded	Process Application	200	50	
50	MP Steam Sytem	Process Applications	84	IVP	1 1/2	Welded	Process Application	200	50	
51	MP Steam Sytem	Process Applications	105	IVP	1 1/2	Welded	Process Application	200	50	
52	MP Steam Sytem	Process Applications	14	IVP	1 1/2	Welded	Process Application	200	50	
53	MP Steam Sytem	Process Applications	14	IVP	1 1/2	Welded	Process Application	200	50	
54	MP Steam Sytem	Process Applications	455	IVP	1 1/2	Welded	Process Application	200	50	
55	MP Steam Sytem	Process Applications	24	FL300	2	ANSI300	Process Application	200	50	
56	MP Steam Sytem	Process Applications	72	FL300	2	ANSI301	Process Application	200	50	
57	MP Steam Sytem	Process Applications	90	FL300	2	ANSI302	Process Application	200	50	
58	MP Steam Sytem	Process Applications	12	FL300	2	ANSI303	Process Application	200	50	
59	MP Steam Sytem	Process Applications	12	FL300	2	ANSI304	Process Application	200	50	
60	MP Steam Sytem	Process Applications	390	FL300	2	ANSI305	Process Application	200	50	
61	MP Steam Sytem	Process Applications	8	FL300	3	ANSI306	Process Application	200	50	
62	MP Steam Sytem	Process Applications	24	FL300	3	ANSI307	Process Application	200	50	
63	MP Steam Sytem	Process Applications	30	FL300	3	ANSI308	Process Application	200	50	
64	MP Steam Sytem	Process Applications	4	FL300	3	ANSI309	Process Application	200	50	
65	MP Steam Sytem	Process Applications	4	FL300	3	ANSI310	Process Application	200	50	
66	MP Steam Sytem	Process Applications	130	FL300	3	ANSI311	Process Application	200	50	
67	MP Steam Sytem	Process Applications	4	FL300	4	ANSI312	Process Application	200	50	

Proposed Replacement Traps

Customer: 10,000 Trap Sample Re Date: 01/01/2010
Location: Sample Site Ref.: QTP1000

No.	Area	Location	Quantity	Type	Size in	Connection	Application	Inlet Press psi	Outlet Press psi	Observations
68	MP Steam Sytem	Process Applications	12	FL300	4	ANSI313	Process Application	200	50	
69	MP Steam Sytem	Process Applications	15	FL300	4	ANSI314	Process Application	200	50	
70	MP Steam Sytem	Process Applications	2	FL300	4	ANSI315	Process Application	200	50	
71	MP Steam Sytem	Process Applications	2	FL300	4	ANSI316	Process Application	200	50	
72	MP Steam Sytem	Process Applications	65	FL300	4	ANSI317	Process Application	200	50	
73	HP Steam System	Distribution and trace heating	40	EF	1/2	Welded	Drip Leg - Sup	600	50	
74	HP Steam System	Distribution and trace heating	120	EF	1/2	Welded	Drip Leg - Sup	600	50	
75	HP Steam System	Distribution and trace heating	150	EF	1/2	Welded	Drip Leg - Sup	600	50	
76	HP Steam System	Distribution and trace heating	20	EF	1/2	Welded	Drip Leg - Sup	600	50	
77	HP Steam System	Distribution and trace heating	20	EF	1/2	Welded	Drip Leg - Sup	600	50	
78	HP Steam System	Distribution and trace heating	650	EF	1/2	Welded	Drip Leg - Sup	600	50	
79	HP Steam System	Distribution and trace heating	20	EF	3/4	Welded	Drip Leg - Sup	600	50	
80	HP Steam System	Distribution and trace heating	60	EF	3/4	Welded	Drip Leg - Sup	600	50	
81	HP Steam System	Distribution and trace heating	75	EF	3/4	Welded	Drip Leg - Sup	600	50	
82	HP Steam System	Distribution and trace heating	10	EF	3/4	Welded	Drip Leg - Sup	600	50	
83	HP Steam System	Distribution and trace heating	10	EF	3/4	Welded	Drip Leg - Sup	600	50	
84	HP Steam System	Distribution and trace heating	325	EF	3/4	Welded	Drip Leg - Sup	600	50	