



Analysis of Efforts to Maintain the Performance of the Steam Bottle Through Care Water Kettle to Use Guard Element Chemical on Water Bottle in SS. Triputra

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Abstract: This study focuses on the problems that occur on the SS ship. TRIPUTRA, when the author carried out PRALA, namely there was an error in the report on the results of the chemical analysis of boiler water, allegedly due to mistaker in the water chemistry experiment process kettle which causes the boiler water specifications, do not match those determined based on the manual book. Research purposes This is to find the proper and correct boiler water chemistry experiment procedures, better understand the relationship between chemical elements nboiler water with long-term hazards that can occur, and provide socialization and knowledge about material injection chemistry in each engine room crew. The method used is descriptive qualitative, which aims to make a description or describe systematically the background of the problems that occur in the SS. TRIPUTRA, so you can obtain an accurate and systematic picture related to the events being investigated. Data collection techniques are observation, interviews, documentation, and literature study. The results showed that an error causes high levels of hydrazine and the excess hardness in the boiler water in the process chemistry experiment and care kettle water which is human error.

Keyword: Analysis Chemical, Steam Boiler, Water Kettle, Care Water Kettle.

INTRODUCTION

Steamship is a type of boat with arrhasment machining with the principle that uses steam pressurized. To produce steam pressurized, the boat needs a steam generating device called a steam boiler (*boilers*). This pressurized steam is then used to power the main engine drive and machines other help. In general, *steamships* have the main engine of turbine steam. Because size boat is relatively big, turbine steam requires moisture with high pressure for the ship to move and maneuver well. Therefore, kettle steam acts as the “heart” of machinery in this type of ship, so the steam boiler is called the "*central boiler*". Besides In addition, steam from *the main boiler* is also used to drive turbines on machines help other like *turbo-generator* and *main feed water pump* as well as *heater* for tanks ingredient burn and water on accommodation. Because the role which very vital, the performance of the main boiler must

be maintained so that its *lifetime* longer. This is mandatory given that officers machine can't do *overhaul* on *main boiler*. This is caused by the need for continuous pressurized steam or sustainable so that operation play boiler cannot be discontinued except on moment *dry docking*. By because that, an engineer must maintain the condition of the piping at kettle in a way take care of water kettle.

While in SS. TRIPUTRA, the author witnessed the Head Engine Room found an error in the results report boiler water chemical analysis which will affect water treatment kettle. According to the KKM explanation, an error occurred in the process test chemical water kettle which cause specification water the kettle does not match the one specified in the *manual book* on the report at that time. Then after discussing the problem with the Machinist II as the one who is responsible for the boiler water treatment, boiler water chemistry experiments are next carried out more carefully according to the experimental procedure boiler water chemistry based on the *manual book* properly and correctly. This proven with report care water kettle which handed over to KKM next has describe specification water which stable and in accordance with condition which determined.

This causes the authors to study boiler water treatment To use knowing connection chemical Among the pipes kettle (metal) with water, more on water which no pure and contains chemical compounds that can damage metals like ait kettle, remember that water kettle which enter to in the boiler is water from the distillation of seawater in *fresh water generators*.

LITERATURE REVIEW

Analysis Chemical

According to study before, chemical analysis is a branch of chemistry that studies separation and measurement of elements or compound chemicals. In performing the separation or measurement of components or compound chemicals, need or use method analysis chemical.

Kettle Steam

Steam *boiler* is a closed vessel that can form steam with a pressure greater than 1 atmosphere by road heating water kettle which is in it with hot gases from combustion fuel (Suparwo 2016, 213). A *boiler* or steam boiler is a closed vessel-shaped device used to produce *steam* / steam. *Steam* obtained with heat water which is at in in vessel with fuel. *The boiler* converts chemical energy into other forms of energy to produce work. *Boilers* designed for move heat from something source burning, which usually in the form of burning ingredient burn (Ancient 2016, 2).

Problem on Kettle

Precipitate crust (*scale deposits*). When water undergoes evaporation in a steam boiler, salt Dissolved calcium and magnesium precipitate on the surface *tube* as crust. precipitate this very disliked because it is a conductor hot which bad, reduce efficiency, and often cause *tube failure*. Replacement *tube* always expensive, and *shutdowns* which caused by *failure* sort of that even more expensive. Formation of crust on the surface heating (*heating surfaces*) could avoided by removing all calcium salts and magnesium before water enters steam boiler. This known as care external. Ingredient Chemicals can also be added to boiler water which will react with calcium and magnesium for shape mud soft (*soft sludge*). Easy mud issued from *boiler* with *blowdown*. Method this called care internals. Corrosion is the wearing away of boiler metal. If left develop, that could cause damage and *failure* on equipment which need repair big or expensive *shutdowns*. Corrosion in *boilers*, *economizers*, *feed-water heaters*, piping, etc., caused by acid or low pH, plus in the presence of dissolved

oxygen in the feed water (*feedwater*). This can be minimized by add salt alkali for neutralize acid in water and raises the pH. Use deaeration mechanical followed by ingredient chemical *scavenger* for remove remnants oxygen final from water also so effective.

Carryover, foaming, Priming, foaming, priming, and carryover are terms that are very close relation. Each explain conditions that cause boiler water and solids the solute comes out of the kettle. Water brought out in form drip small dot, dot, dot water which trapped in steam (*steams*). Foam (*foaming*) is production foam in surface water. *Foaming* which generated possible is at a little in above the surface water, or possible Fulfill whole room *steam*. In other cases, foaming contaminates *steam* with the amount of kettle water which enough big.

Priming is the removal of water and *steam* which louder and spasmodic than a steam boiler. This matter could compared with collision water which fast often accompanies heating in the room or vessel open. On *boiler prime*, the water level changes relatively big. There is a great release from the bubbles that exploded high into the *steam room*. " *Slugs* " kettle water thrown away together the steam. *Boiler* water solids are also carried in dots water mixed with steam even when no visible indication of foaming or *priming*. Thing this known as *carryover*.

Caustic embrittlement or cracking between crystals steel kettle could defined as destructive action water boiler caustic which very concentrated on metal in lower line water. Crack which no regular appear in where metal is under stress or tension. Crack this seen in lower microscope and follow limit metal crystal.

Metal becomes brittle and weak, which eventually cause *boiler* failure and shutdown. Indication general from metal which vibrated is: Cracks in the metal located below line water. Failure metal (metal failure) in along the drum lining, under the rivets, in the ends of the tubes, and near the metal areas that are is at in under pressure on kettle *Embrittlement* control requires maintenance alkalinity hydroxide which low (*low-hydroxid alkalinity*) in boiler water, avoiding leakage in area metal which stressed, and add substance chemical in the form of inhibitor solution special.

Water Kettle

Boiler water is water heated in a steam boiler to produce pressurized steam. This water comes from the results of the distillation of seawater on the *fresh water generator* above boat. Because the source comes from the sea, the boiler water is still have contents chemical which same with seawater.

Water kettle must in the form of water bid. On ships certain boiler water is sent directly from the land when the ship dock at the port through the *bunkering process*. However, In general, boiler water comes from the use of sea water namely by using an auxiliary machine that called *fresh water generator* to reduce levels of salt as much as possible so that the oxidation process inside kettle steam hampered.

Seawater has a high oxygen content. This matter could cause process oxidation which very fast if no handled remember that reaction Among oxygen with metal can cause rust. Besides that, water sea have content hydrogen which the ion character sour and cause corrosion. Water sea also celements of hardness (*hardness*), namely metal ions that can cause precipitates under certain ions such as sodium ions, magnesium ions, sulfur ions, ions calcium, etc.

Elements which there is on ait sea really dangerous if not treated. Dangers that can what happens in general is the fragility of the pipes inside steam boilers as a result of oxidation and also deposits scrape the pipes the.

Care Water Kettle

Boiler water treatment can be carried out before boiler water into the steam boiler and also after the boiler water enters to in kettle as well as in system the piping. By because that, water treatment kettle divided Becomes two that is:

Care External

External treatment of boiler water only required in cases where the level of impurities in the boiler water very tall so that performance kettle steam disturbed. As example, sediment from dirt this could cause blockage on system piping kettle water. External treatments can reduce some types dirt on water kettle like salt and gases dissolved, organic elements, oxides of ferrous metals and manganese, as well as hydroxide. Will but, process care external produce waste so that disposal arrangements must be controlled. Process- process in external care water kettle: Clarification; Coagulation and Flocculation; Filtration or Filtering; Deaeration; *Blowdown* /disposal water

Care Internal

After going through external treatment, there are still possibility that water kettle contain substances which could cause sediment and corrosion onkettle. Term internal on care this illustrates that the internal water treatment process kettle in system kettle steam is for maximizing care external water kettle which have been done previously. Destination from care internal water kettle could summarized as follows: Prevent formation crust; Prevent corrosion.

Test Chemical Water Kettle

Boiler water treatment needs support from results test chemical water kettle. With so, addition of chemicals to the boiler water system could controlled.

RESEARCH METHOD

Time and The place Study

Study based on experience writer when been on the ship for approximately 1 year 1 day. Study held when writer undergo Practice Work Real, that is a program education on semester V and VI for whole cadets School Tall Knowledge Cruise. Writer undergo Practice Work Real on the SS ship. TRIPUTRA with a screen life of 12 months 1 day, counted since date 1 August 2019 until 1 August 2020.

Method Approach

Writer use method approach descriptive qualitative which aim for make description or systematically describe the background problem which occur in SS. TRIPUTRA, so that could obtained description which accurate and systematic which associated with incident which investigated.

Technique Collection Data

Writer use a number of technique collection data on study this. Technique collection data the Among other: Observation; Interview; Documentation; Studies References

Subject Study

Subject study on study this is how effort in care water kettle To use guard element chemical in boiler water to maintain boiler performance steam so that no cause loss for whole the party who related as well as effort increase Skills crew which responsible answer will water treatment kettle.

FINDINGS AND DISCUSSION

Description Data

Based on experience which experienced writer During carry out sea practice on SS ships. TRIPUTRA, author watching Head Room Machine find existence error in boiler water maintenance report caused by lack of supervision injection hydrazine to in system water kettle. Results from report care water kettle it does not match the specifications from the manual treatment, of which in the report, there are two that point significant, that is: High rate hydrazine on water kettle (± 0.054); height content violence (hardness) on water kettle i.e. rate silica (± 1.78) and phosphate (± 12)

Analysis Data

height Rate Hydrazine on Water Kettle

Hydrazine is a chemical for boiler water treatment which aims to bind oxygen of boiler water. This is considered to reduce the oxidation process which boiler water is applied to the pipes in its path. Based on *manual book about Boilers Water Treatment*, normal levels of hydrazine in water the kettle is above 0.01 but should not exceed the pH value limit water bait kettle (*feeds water*). If rate hydrazine in in excess of boiler water, hydrazine can be decomposed into ammonia, which is an acidic chemical compound which can cause corrosion of the pipe itself. By because that, in process injection hydrazine, special supervision is required controlled.

height rate hydrazine on water kettle this could caused by two Thing which sustainable, that is: Occur error when doing process boiler water chemistry experiment; Process injection hydrazine which wrong consequence guidelines from results test no in accordance.

Besides second because the, lack of supervision on injection hydrazine also Becomes wrong one factor height rate hydrazine. This caused by injection pump work by manual in meaning no have automatic control when pump operation the. As a result, the pump cannot *auto- running* and *auto stop*. By because that, supervision special which controlled need conducted so that dose injection hydrazine which enter to in system no excess.

High Hardness Content on Water Kettle

Formation substance mineral which could cause damage on component kettle steam originated from height rate content violence (*hardness*) on kettle water. Based on the *manual book about Boiler Water Treatments*, rate violence (*hardness*) which allowed on water boiler feed is 0.0 ppm. Condition water charging kettle which used must really meet the requirements, which means fit with which are desired according to the boiler manual steam to prevent happening sediment hard in side boiler water pipes. Furthermore, the deposit can clog the water pipe which will become narrower and cause circulation water kettle in in pipe hampered. Scale formation means formation crust or hardening of the pipe section due to piles sediment and dirt which harden and difficult for removed from the pipe kettle. Content violence (*hardness*) which could cause happening crust what's in the water kettle is: Silica (SiO_3); Sodium carbonate (Na_2CO_3); Phosphate. Deposits this will cause crust on part edge the pipes kettle steam. If no handled, this scale will make the boiler pipes brittle so that in period long will could give rise to hole on the pipes the.

Alternative Solution Problem

To do Analysis Water Kettle Through Test Chemical which In accordance with Procedure or Instruction Book Manual and Report Previously as well as Giving Directions Regarding Chemical Injection Socialization about injection ingredient chemical need conducted. Thing this related with safety or *safety* in guard quality water kettle. Besides that,

Thing this also aim for avoid usage ingredient chemical which excessive. Emphasis in socialization this is about importance supervision which controlled if want do the injection.

In To do action prevention which appropriate so need given dose care chemical in the right amount. Water quality inspection (analysis) This kettle should be refilled regularly. so also with suction (surface or base) and then chemical treatment is carried out so that get better results with understanding mixing ingredient chemical and water kettle already homogeneous. Where is the supply of the tools used? and the place storage must noticed. Then results analysis noted. In To do care water kettle with add ingredient chemicals must pay attention to existing supplies and equipment security must always worn, like gloves, masks, safety goggles, etc. other. Thing this for avoid things which nodesired.

Delivering Chemicals Into the System

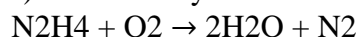
Arrangement which good in gift chemical on water kettle of course very required To use prevent emergence minerals which could damage component kettle. Inspection which routine run every day very needed. Inspection which routine run every day very required because condition water any time Keep going changed. For that required data collection and notes in gift care chemical on water kettle. Machinist must make a graph or scale comparison between water and water treatment added to water for levels which appropriate. And Thing the must is known by every crewman which replace for responsible answer on kettle steam in on boat. There is miscellaneous type ingredient chemical for care water kettle. Below are some of the commonly used methods for take care of boiler water on boat:

1) Care with Use *Calcium Hydroxide* Ca (OH)₂

Method this aim for avoid happening sediment which caused by chemical from violence permanent. Water kettle which contain *magnesium chloride* (MgCl₂) or *magnesium sulfate* (MgSO₄), so after react with calcium hydroxide will cause ingredient other in the form of mud.

2) Addition of Sodium Hydroxide (NaOH) Method care with usesodium hydroxide (NaOH) this very effective because ingredient chemical the react with ~~drinks~~ salts that cause violence temporary on kettle, for example *Calcium hydrocarbonates* Ca (HCO₃)₂ and alsosalt chemical which *sulfate* (MgSO₄) and *magnesium chloride* (MgCL₂).

3) Care by using Hydrazine Used for prevent happening corrosion which caused by oxygen (O₂). ReactionHydrazine with dissolved oxygen:



The main function of giving the above chemicals is: is:

- 1) Component which harden Becomes crust transformed to be obliterated and absorbed, be it sediment or scale so that it can be easily thrown away go out from boiler part.
- 2) The pH of the boiler water is maintained at its alkalinity so that it does not occur formation crust silica.
- 3) Corrosion caused by dissolved oxygen is prevented with move oxygen from in water.
- 4) Move and remove ingredient congested from in kettle to steam, prevented and maintain the standard value so that the water quality stay safe good.
- 5) For increase efficiency work kettle and extend boiler life.

In side to do care water, care to tools for To do testing also need guarded and treated.

To do Blowdown on Kettle Steam

Blowdown is the discharge of water in the water tank steam boiler which aims to reduce the concentration impurities in the kettle by using pressure from steam boiler that alone.

There is two type blowdown: Surface Blowdown, Water disposal is carried out from the *steam drum* at kettle steam to sea. Process this aim for reduce dirt which is on surface

water in tank *steam drums*. *Surface blowdown* could be conducted without disturbing operational from kettle steam that alone; Bottom Blowdown, Disposal of water is carried out from the *water drum* on the kettle steam to sea. Process this aims for throw away deposits which is at the bottom of the *water drum* tank. This disposal process is conducted when the boat is currently in condition silent in the sense that the main engine is not operated. This is related with needs steam pressurized on the main engine coming from high boiler water evaporation. When *bottom blowdown* is done when the main engine is running operated, so production steam pressurized becomes not stable and disturbs performance main engine that alone. With *To do blowdown* which is controlled, quality water kettle could be guarded in side with doing injection ingredient chemical which is accompanied with a chemical experimental analysis in accordance with procedure on book manually.

Solution Problem

Doing Disposal Water (Blowdown) By Periodic

Blowdown is the most effective way for control quality water kettle so that level evaporation kettle steam could walk steadily. This is related with principle base which is the same as draining water in a tub that automatically updates whole volume water which is in the tank. If this is done regularly, age use kettle steam could be extended.

Doing Injection Compound Chemical in the form of fastener Oxygen for Reduce Rate Oxygen on Water Kettle

Because oxygen is a main factor reason corrosion in steam boilers, especially piping, then by injecting chemical compounds in the form of fastener oxygen like hydrazine or *oxygen scavenger* other is the wrong step which is precise and most efficient in preventing happening corrosion, so that kettle steam confirmed no need repair, replacement, or *shut down* in soon and can operate longer.

Carrying out Chemical Experiments or Water Analysis Kettle In accordance Procedure and Give Injection Compound which is Appropriate Based on Results Analysis as well as Give Instruction About Injection Ingredient Chemical

Analysis water kettle which will give information appropriate for the administration of chemical injections into the in system water kettle added with socialization regarding proper control of chemical injection. Therefore, in its implementation, attention is necessary from every member room machine.

CONCLUSION AND SUGGESTION

Conclusion

Based on the description that the author has put forward, the writer could conclude why this problem can occur among others as follows. Height Rate Hydrazine on Water Kettle Happening error on process test chemical moment to do analysis element chemical result in injection ingredient chemical to in tank water kettle steam not by dose which determined and cause height rate hydrazine on water kettle. Because that required attention special from every member room machine. The High Content of Hardness (*Hardness*) in Water Kettle

Uncontrolled chemical elements in boiler water result in excessive content violence (hardness). Because of that, need blowdown is carried out regularly to control boiler water quality so that the steam boiler's life could endure longer.

From two reason problems the, the writer could conclude location point main problem, is operator error or *human error*. All procedures which have given maker machine (maker) and all the form of the machining instruction book on the ship cannot be adequately applied if an error occurs from the user.

Back again, safety is the key important in every job, especially work with a high risk such as work on a ship. By because that, socialization routine very required remember there is a hierarchy on board and also the personality of the members different engine rooms so awareness of the importance of safety at work for every member of the room engine can arise.

Suggestion

Remember that every care is crucial kettle steam, based on the conclusions of the problems studied by the author provide solutions that can be taken into consideration by readers, especially to the ship's party in the future, that is: height Rate Hydrazine on Water Kettle Increase knowledge of every member room machine by giving socialization routine about injection ingredient chemical on water kettle. Always pay attention to chemical analysis procedures water kettle which in accordance with book instructions manual and compare results analysis with the best previous report astrial reference chemical next. height Content Violence (*Hardness*) on Water Kettle; Doing *surface blowdown* and *bottom blowdown* by routine to avoid long-term harm that can occur in the pipe's kettle; Each other reminds between people member room machine when to do care water kettle, good on care external nor care internal so that supervision and implementation give results which maximum.

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