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Implementation of Primary Containment System in Petroleum Storage Tank Farm Will Ensure More Safety & Address Environmental Issue

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Abstract: *The tank farm & associated facilities of any oil & gas installation is one of the prime assets as it stores the feedstock or finished product of the installation. Hence it is very essential to ensure the highest safety of these facilities. But in generally tank farm areas are the most unmanned area of the any refinery or Petrochemical complex. Maintenance is also not a regular activity of these areas. The common incident which takes place is spillage of the oil from the flange joints, valve passing, thread joint passing etc. Hence it is essential to design the facilities in such a manner so that this type of spillage can be contained properly so that it doesn't generate vapour cloud, because vapour cloud get fired when it comes in contact with static charges.*

Here is the new concept of the spillage containment & handling of the Oil Water Separation System more safely & efficiently.

Keywords: *Containment System, Safety, Environment.*

1. INTRODUCTION

Generally in tank farm are we provide the dyke wall & bund wall as per OISD 244 [1], OISD 118 [2] & NFPA 30 [3] requirement which act as containment wall to contain the major spillage or leakage from tanks. Hence if there is any spillage or leakage within the tank farm then one containment facility is available & that is dyke wall and bund wall. It means spill oil start spreading over the ground level and then it will be routed through the peripheral Oily Water drain along the dyke. This will result chance of generation of the vapour cloud over the ground.

This vapour cloud is the most dangerous things which cause to fire & can make disaster even.

Apart from that when there is any spillage through any nozzle or flange joints or due to valve passing then this spill oil get mixed with the rain water of entire tank farm area during rain & finally generate more contaminated water which needs to further treatment in Effluent Treatment Plant or Oily Water Separation system.

Now the question is whether there is any solution to contain the above mentioned spill oil before it spread over the entire tank farm and generate the vapour clouds or is there any solution to reduce the contaminated water generation within the tank farm.

The answer is YES. Here is the concept of Primary Containment System.

2. FUNCTIONAL DESCRIPTION

The secondary containment is our conventional dyke wall bund wall & Oily Water drain along the dyke wall which we commonly provide around the all petroleum tank farm. But the Primary containment system is additional containment facilities which is provided around the source of the leakage or spillage area which arrest the leakage or spillage within a small area & allow to flow the spill oil through a underground piping network to the main OWS Header of the refinery outside the tank dyke wall by which it prevent the spreading of spill oil along the ground & as well as reduce the contaminated water generation also.

In details, generally the source of the major leakage or spillage is flange joints of the valves, nozzles, threaded joints of the TSV etc. Generally in tank farm the operating valves are installed at operating manifold just outside the tank farm & the tank body valves are installed in tank body valve manifold near to the tank nozzles. Apart from that there are pump manifold also in product pumping station areas. These areas have major chance of leakage or spillage as there are lots of flanges, thread joints in these areas. The concept of Primary containment is to put a RCC containment wall of height of 300 mm to 500 mm around these manifold and along with RCC sloped paving bellow the manifolds. The spill oil will be collected within that paved & contained area. This will act as a collection basin. That containment area will be connected to a underground piping network. Finally that piping network will be connected to the refinery main OWS network outside the

tank farm. To protect the underground pipe from the correction HDPE material can be chosen for this system. As per "INDONESIAN GUIDLINE FOR INSTALLATION OF OIL & GAS FACILITIES IN MINING AREAS[4]" it is mandatory to ensure the zero discharge from any oil & gas installation which will be built in mining area to ensure safe environment & maintaining a balanced eco system. The above described system will ensure that requirement also.

3. PROCESS FLOW DIAGRAM

Here is the PFD of the Primary containment system & Secondary Containment System to handle Oil water in tank farm:

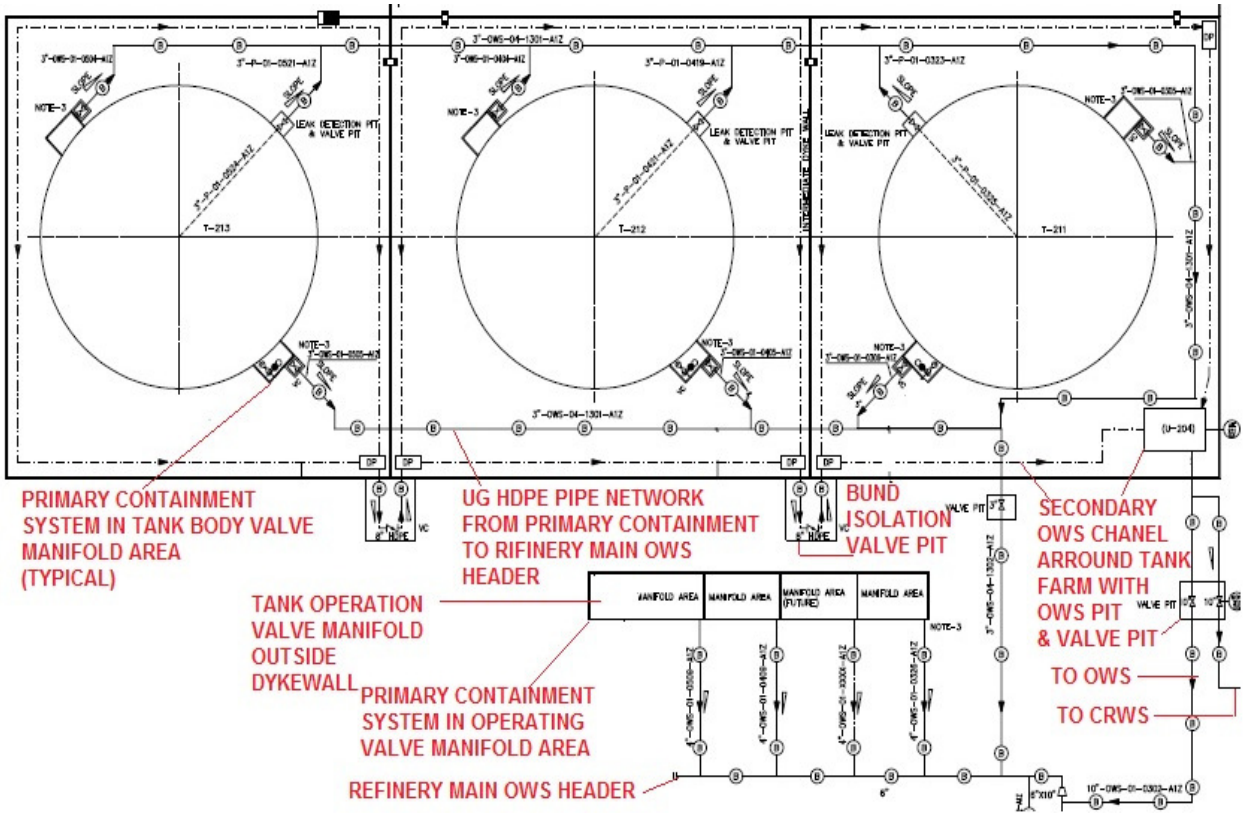

Fig. 1. PFD of the Primary containment system & Secondary containment system

4. TECHNICAL & COMMERCIAL FEATURE

As per above Process Flow Diagram, in the tank farm there are three tanks of classified petroleum product around which there is dyke wall & bund wall which is acting as secondary containment. There is also bund wall between the tank which is part of the secondary containment. The peripheral Oil Water open channel drain is also available to route the oil water up to OWS Pit at the corner of the tank farm.

In addition to above there are additional primary containment facilities which are shown in the PFD & tagged in RED. This primary containment facility has been shown in the tank side manifold area, main operating manifold outside the tank farm, Pumping station manifold area. It means that in all the above mentioned areas there are containment wall of height 300 to 500 mm and ground level is RCC paved & sloped toward the point where the underground piping network will be connected. The piping network which has shown in the PFD it underground HDPE pipes with proper slope to maintain gravity flow & will be connected to refinery main OWS Piping network outside the tank farm.

Now when there will be any spillage or valve passing incident take place in the manifold area then that oil will be arrested within the primary containment area & will flow through the closed pipe network to OWS header outside tank farm. There will not be any chance of spreading of spill oil over tank farm. Even though there is rain during or after that spillage incident then also the spill oil will not get mixed with rain water as it has been arrested by the primary containment. Apart from above as a part of primary containment System there is individual bund isolation facility has been shown.

There is bund wall between two to adjacent tank which also part of containment system. When there will be any major spillage for any particular tank then it is required to contain that spillage within that tank particular bund area only. To isolate any particular bund area there will isolation valve with piping connection which will be connected with the

secondary OWS surface drain through drain pit outside the dyke wall. In emergency by closing that valve from outside the dyke wall any particular bund can be isolated. Thus the how the Primary Containment System will work jointly with secondary OWS containment System or with our conventional OWS handling System will ensure more safety in the installation.

Now come to the commercial feasibility of the above described system.

The above system involves some underground piping works, some isolation valves, some concrete works & some engineering man hours. If we compare the total cost of implementation of the above primary containment system it will not be even 0.1% of any tank farm construction cost. But in return it will ensure more safety in tank farm, improving HSSE aim toward zero discharge.

5. CONCLUSIONS

The above primary containment system will add value with our conventional Oil Water Handling System & Spillage containment system which will result an improvement of the overall Oil Water handling System & ensure more safety in tank farm area.

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