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Innovative Design Solutions for Ground Flare Challenges

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Abstract

OBJECTIVE/SCOPE:

Ground flare burn pits need to be reliable to ensure proper handling of the excess/associated gas which, in turn, affects the safety of people and the environment. One of the primary challenges with ground flares is flame deflection due to wind. Specifically, wind deflects the flames from the ground flares into and behind the refractory wall. The flames then may damage the components that make up the ground flare and the burn pit. Accordingly, the present abstract outlines systems and methods for a burn pit ground flare that mitigates deflection of the flames and damage from the flames to the operative equipment into/behind the refractory wall. This can be the basis of the best practice document for burn pit design.

METHODS, PROCEDURES, PROCESS:

This innovative design was developed based on root cause analysis that has identified all root causes of common encountered failure aspects and then came up with design resolution to address each root cause. This innovative design to overcome these challenges was implemented and was filed as a patent. The innovative burn pit design is exhibiting unique design merits such as self-supported inclined retaining wall design, protection refractory sleeve of burner tip and removable back concrete boxes. These design merits is meant to overcome back flame and elevated temperature impact of burned hydrocarbon at the burn pit tip and refractory work as well as associated instrumentation which improves burn bit integrity and ultimately extends its service life.

RESULTS, OBSERVATIONS, CONCLUSIONS:

Following the implementation of the innovative flare tip design, extended service life and realized improved integrity and reliability were demonstrated. In particular fireclay bricks disengagement especially with anchor bolts fixture attachment was eliminated by the inclined wall self-supported design. Moreover, high alloy flare tip deformation and degradation was mitigated with the refractory sleeve concept and muffle blocks arrangement. On the other hand, successful protection of instrumentation components and other auxiliaries have been achieved by removable inverted concrete culverts in the back of the burner pits. All of these are validated by thermal analysis for proper selection of refractory material and required thickness for heat insulation of the design.

NOVEL/ADDITIVE INFORMATION:

Industry Best Practices and Standards lacks details of burn pit design best practices which result in wide variation in burn pits designs in the industry which generally encounter several failure issues associated with over-heating of burn pits

components. To Improve the integrity and reliability of the burn pit and extend service life, successful design practices which have demonstrated extended service life are recommended to be considered as best practice document.