# ADVANTAGES IN TECHNOLOGY:
## LOWERING STORAGE TANK EMISSIONS

*Storage tank vapor emissions have experienced significant reductions over the past 30 years. Regulatory requirements have driven a host of tank upgrades now available to industry. Tank upgrades include the following: Internal floating roofs, external floating roofs, guide pole sleeves, double seals, liquid mounted mechanical shoe seals, closed loop sample system, inert gas blanket pads, vapor recovery systems and required & scheduled seal inspections.*

***By Robert A. Buckley, Tank Turnaround Specialist, Forge Tech Inc.***

### A reduction in emissions

Advances in technology, procedures and best practices have contributed greatly to a decrease in emissions as well. Items listed below have further reduced tank emissions:

- Updated tank monitoring systems
- Installation of independent overfill alarms
- Updated operating procedures
- In-service seal repairs
- Minimization of tank over-fill
- Emptying/inerting tank for inactive periods
- Elimination of poor past practices like routine product stripping & refilling

Lowering of tank emissions going forward may be a challenge as most of the larger emission sources have already been addressed. To achieve further reductions will require examining the remaining emission sources.

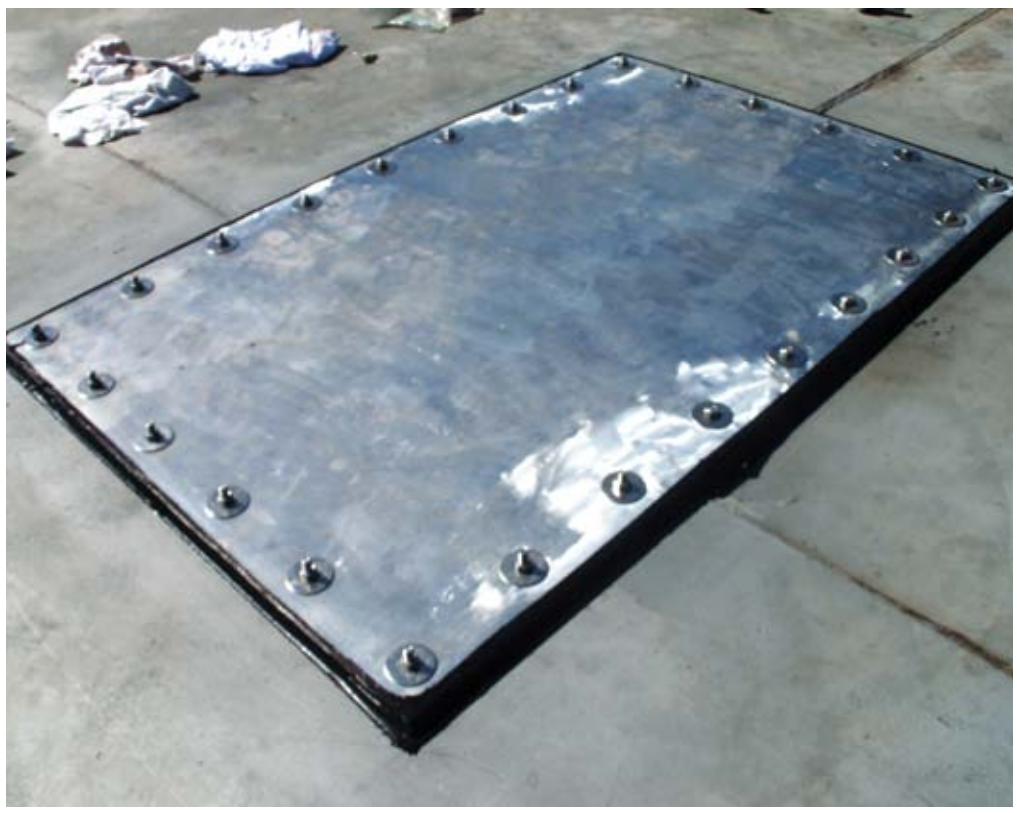
### Preventing hydrocarbon vapors

Tank operations such as tank cleaning, initial filling and unscheduled cleaning/maintenance activities can produce a substantial amount of hydrocarbon (HC) vapors over time. In order to mitigate/reduce emissions from these activities, conventional maintenance practices should be challenged and replaced with the use of better technologies, operations and maintenance procedures.

Due to the migration by industry to the American Petroleum Institute's (API) 653 internal inspection program, one could make an argument that increasing the frequency of internal tank inspections has actually increased emissions from tank de-sludging, cleaning, gas freeing and initial fill operations. That being said, no one would or should challenge the benefits to the environment from scheduled adherence to the API-653 inspection & repair program. It simply requires better/more efficient planning, use and maintenance of the tank fleet to offset any increase in emissions from scheduled internal inspections.

### State requirements

In an effort to combat the increased frequency of tank cleanings several states have placed specific requirements on tank cleaning operations in an effort to minimize vapor emissions. The use of ICE engines, thermal oxidizers, portable condensers, charcoal adsorptions packs, scrubbers and other methods have worked to some extent on specific clean product tanks where the tank atmosphere can be displaced rapidly. However, less



## ABOUT THE AUTHOR

Robert A. Buckley, Tank Turnaround Specialist, has 38 years of experience in the refining and petrochemical industry. He retired from the ExxonMobil Baton Rouge Refinery in 2010 and has since been providing consulting services to companies such as Becht Engineering, Triton Industries, Knighthawk Engineering and Forge Tech Inc., just to name a few.

harmful vapor emissions from the destruction of HC vapors can still occur.

## The problem of crude oil

Minimizing HC vapor emissions from black/crude oil storage tank cleanings can be much more difficult however, as bottom sludge continually emits HC vapors when disturbed during cleaning/mining operations, which can take weeks to complete. Due to the challenges, duration and cost of cleaning crude oil tanks, little headway has been made towards the reduction of emissions from this activity.

The good news is there are now cleaning technologies, methods and practices available to industry that can and do minimize crude oil tank cleaning emissions. Submerged jet mixing

(SJM), solvent selection extraction (SSE) and chemical cleaning (CC) are a few proven technologies that are both cost-effective and work. These cleaning methods typically do not require extended opening of the tank as the solids/sludge is diluted, dissolved and removed from the tank as a liquid product. Once the sludge has been liquefied and pumped from the tank a more typical cleaning can take place similar to clean product tanks. This can significantly reduce the cleaning time and vapor emissions of the tank. An added advantage of the SJM system is the jet mixers can be permanently installed for future use of routine de-sludging and scheduled cleaning without the need for opening up of the tank.

## In-service repairs

Lastly, unscheduled repairs and associated tank cleanings can be avoided all together, in many cases, by making in-service repairs. There are new proven cost-effective repair technologies available to industry that allow for safe, engineered long-term repairs to in-service tanks that have the integrity to keep the tank in service until its next scheduled API-653 internal inspection. Friction Forge Bonding (FFB) is one such technology that successfully bonds 304 stainless steel studs to tank roof or shell plate. Once the studs are installed, an engineered gasketed lap patch stainless steel plate is bolted in place. This in-service repair method restores integrity to the leaking or weakened area of the tank in a similar manner to that of a welded lap patch repair, without the need for conventional welding. No external energy source (other than 120# utility air) is required to complete the stainless steel stud installation.

## Conclusion

In summary, it should be noted that reductions in tank emissions have come a long way due to regulatory-driven and innovative technologies over the years. The combination of drivers and innovation should continue as newer and more innovative technologies continue to evolve.