RECOATING WHILE REFUELING

Rehabilitating In-Service Fuel Tanks

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When numerous fuel storage tanks and related appurtenances on a U.S. Army base in Oklahoma required coating rehabilitation, the work plan needed to minimize down time while still operating safely around various fuel systems.

Defense Logistics Agency fuel systems are maintained through various contracts, one of which is the Recurring Maintenance and Minor Repair program. The RMMR program, managed by the U.S. Army Corp of Engineers, provides some advantages over other types of contracts as it allows for a faster route to contract execution. As a result. USACE is able to contract coating maintenance at the optimum time for overcoating, reducing the total cost of ownership.

This coatings project grouping was the single largest service order in the RMMR program, which allowed performance in a single contractor mobilization. Innovative to this project, the coatings engineering team was able to specify safe surface methods

Fig. 1 (top): Seven fuel storage tanks—including these two concrete-encased vessels—required rehabilitation.

Fig. 2 (bottom): The original tank coatings had faded, exhibited poor adhesion and outlived their intended service life.
PHOTOS COURTESY OF THE AUTHOR

that could be performed without draining the tanks, saving cleaning and minimizing downtime.

This article will highlight how the contractors carefully planned the project in order to clean and recoat the tanks on time and on budget to ensure that the critical U.S. Army training and other operations could continue on the base.

THE TANKS

In total, seven tanks were slated for rehabilitation—five carbon steel tanks and two concrete-encased (fireproofed) steel tanks.

The carbon steel tanks included:

- A 51-foot-long, 10.5-foot-diameter gas tank;
- A 46.5-foot-long, 10.5-foot-diameter diesel tank; and
- Three 47-foot-long, 12-foot-diameter diesel tanks.

The fireproofed tanks were both 18-foot-long, 9.5-foot-diameter vessels—one for storing gas, and one for storing diesel, and both coated with an acrylic latex coating, which was removed prior to recoating.

In addition to the tanks themselves, the project also required cleaning and coating almost 2,000 feet of associated steel piping, valves and supports, ranging in diameter from 2 inches to 6 inches.

PRE-PROJECT PLANNING

Prior to the start of the project, the capitalized facilities were inspected for corrosion by a coating condition survey as recommended by the Uniform Facility Guide Specifications (UFGS) Section 09 97 13.27, Exterior Coating of Steel Structures. An industry best practice was put into motion by grouping facilities that needed coating repairs together, thus lowering the unit cost of repairs and saving both the USACE and the taxpayer money. USACE verified this cost-effective procedure by pricing the facilities as separate service orders and as grouped service orders for comparison.

In addition, the quality assurance evaluator at the base liked the fact that the coatings maintenance could be performed through the RMMR program, due to the increased speed of delivery from assessment to the Notice to Proceed.

Due to operations tempo at the base, the tanks needed rapid return to service. Draining the tanks and piping, cleaning and making the tanks gas-free would add significant cost to the project, and increase return to service times. Per the UFGS, the coatings engineering services team modified the specifications to match the condition assessment, but specified wet abrasive blasting methods, which could be performed with the tanks full of fuel, without compromising safety. The contractor worked with base operations to isolate the tanks and secure the vents to prevent hazardous and flammable atmospheres inside containments in order to be able to complete the work safely.

SCOPE OF WORK

In July of 2019, the coatings rehabilitation project began. For the carbon steel tanks, wet abrasive blast-cleaning was carried out, using garnet abrasive, to provide an SSPC-WAB 10/NACE WAB-2, Near White Wet Blast finish. The two concrete-encased tanks were brush-off blast-cleaned to remove the existing coatings and roughen the concrete fireproofing materials.

After surface preparation, the steel tanks received a three-coat, organic zinc-epoxy-urethane coating system in compliance with MIL-SPEC coating specifications. The concrete-encased tanks

Fig. 3: Scaffolding and containment were erected to isolate the tanks and provide proper environmental conditions for cleaning and coating.

Fig. 4: The contractors used wet abrasive blast-cleaning to prepare the steel tanks.

Fig. 5: After surface prep, a three-coat system was spray-applied to the steel tanks.

were prepared with a concrete and masonry primer before receiving two coats of acrylic latex protective coating.

WEATHER CHALLENGES

In addition to the requirement to keep the tanks full, fluctuating weather over the course of the yearlong project presented additional challenges. The project was performed during multiple weather seasons, with temperatures ranging from 18 F in the winter to 105 F during the summer. This provided unique challenges with the specified wet abrasive blasting, as potential freezing and icing conditions existed. Measures were taken to maintain UFGS temperature requirements within containments, including adding heating and cooling units as well as using dehumidification equipment.

Aside from seasonal temperature variations, there were several instances where severe weather impacted the project, including over 70-mile-per-hour straight-line winds, which, on one occasion, destroyed the contractor's containment and scaffolding. The contractor was able to recover and complete repairs to the containment without causing delays to the project.

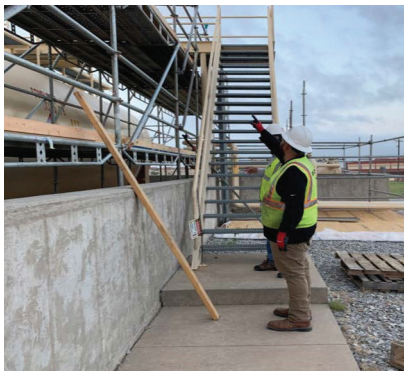

Fig. 6: A coating inspector examined the tanks after work was completed to ensure quality application and curing.

All the while, full operations remained ongoing at the base, and fueling operations were successfully coordinated with base employees to minimize shutdown and effects on daily operations.

The project was completed with no OSHA recordable injuries or lost-time accidents with over 20,493 worker-hours logged.

IN-PROCESS INSPECTION

Unlike other construction disciplines, coatings application is one that cannot be verified after the fact; all QA/QC must be performed at the time of application. Personnel training, performance and verification of quality checks are critical to maximizing the service life of the applied coating. With these quality checks, the total cost of ownership is reduced. The reason the certification program was developed was to lend credibility to the quality process that at times in the past had been murky.

To ensure that both the coating contractor and the inspection company have an audited QA/QC process, the applicable UFGS required the coating contractor possess an SSPC-QP 1/QS 1 certifications, and the inspection company was an SSPC-QP 5-certified firm. As part of the program, each firm certified was subject to external field audits of processes and procedures by SSPC, the auditing agency.

Upon final completion of the project in March 2020, the quality assurance evaluator performed a final and thorough walk-through and offered his thanks and satisfaction for the work completed.

CONCLUSION

This was a complex repair that required the full support of all stakeholders involved. By combatting weather challenges and the logistical issues that cleaning and recoating full fuel storage tanks presented, the coating contractor was able to provide an example for future projects. The project was completed on time and on budget, and the U.S. Army was able to continue carrying out base operations. **JPCL**

Fig. 7: The U.S. Army Corps of Engineers were satisfied with the finished appearance of the newly applied coatings.

ABOUT THE AUTHOR

David Hunter is a Principal and Coatings Program Manager for Pond & Company, Inc., a multi-discipline engineering firm. He graduated from Virginia Tech with a Bachelor of Science degree in civil engineering and has more than 20 years of experience in the corrosion and coatings industry. Hunter is certified as an SSPC Protective Coatings Specialist (PCS), an SSPC Level-2 Coatings Inspector, a NACE Level-III Coating Inspector, a NACE Offshore Corrosion Assessment Technician and is an instructor for each of these programs.