

Performing Coating and Corrosion Assessments to Maintain Military Fuel Piping

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ABSTRACT

The US Military has and maintains several thousand bases. Several hundred of those bases are outside the United States. The Air National Guard has several hundred installations across the United States. One commonality at each of these facilities is a Fuels Management System, that is, a collection of pipelines, storage tanks, containment dikes, pumping stations, fuel islands, and canopies. Maintaining all the above ground and underground assets is no small task so one important method of preventative maintenance includes a regular coatings and corrosion assessment/survey.

A well-planned assessment/survey includes numerous steps. For example, all the painted assets are identified and visually observed across the total surface. Estimating the total surface area and the percent and type of corrosion is extremely invaluable when discussing with potential painting contractors. Highlighting areas of concern and coating defects in digital photos provide information to someone that is not onsite. Secondly, the physical condition of each coated asset should be evaluated. These evaluations include determining the coating system thickness via electromagnetic gauge, the degree of adhesion to the substrate and/or prior coatings, and the degree of chalking indicating coating system breakdown. Also, collecting coating samples for heavy metal testing is important to protect workers.

By thoroughly examining all the data, one must decide on the appropriate coating recommendation, that is, should the coating system be spot repaired, spot repaired and overcoated, or be removed and replaced. A series of questions must be asked, i.e., if overcoating is selected, which coating system and type of surface preparation is necessary for sufficient compatibility between the prior coating and new coating system? If the coating system is removed, which coating system chemistry should be selected for the service environment. If coating defects were found, what can be done to prevent similar defects in the future, if anything. Why should one select one strategy over another? How does the type of corrosion found on each asset affect future planning and design? What is the timeline to implement each strategy? How do different substrates (carbon steel, stainless steel, concrete) affect the recommended coating maintenance strategy?

Even though seemingly complex due to the number of assets, an organized approach to asset management is key. Performing coating and corrosion assessment/surveys and acting upon the recommendations will lead to successful mitigation of corrosion and ultimately protect the numerous fueling systems assets of the US Military.

INTRODUCTION

In any military base, there are numerous assets that need to be maintained. These assets can easily be traced from the fuel offload all the way through to the fuel dispenser. In between, this fuel travels through pipelines, into storage tanks, into pump stations, through filter separators, into fuel dispensers, and finally into either a track or non-track vehicle including jets. Therefore, it is extremely important to

develop a system to inventory all assets and perform condition assessments on each to prevent degradation, corrosion, possible section loss of the metallic substrate, and loss of the liquid fuel. This paper will highlight some of the assets related to the fuels pipeline and related assets.

THE CONDITION ASSESSMENT

What is a condition assessment? It can be described as way to analyze each individual asset and describe its current condition, whether in terms of the coating system or substrate. From all the collected information, decisions will be made with regards to any substrate or coating repairs. Next, to explain how the condition assessment process is accomplished, a methodology and referenced standards must be followed for each unique asset. Seven steps have been chosen to give a flavor or what can be encountered in the fuels piping and what needs to be accomplished.

Step 1- Asset Inventory and Surface Area Estimations: Breakdown the fueling assets into smaller pieces. In many cases, the US military installation has already broken then down and defined each tank, pipeline, or collection of piping under a canopy as a “Facility”. Within that facility, there are individual assets or items such as pipelines, pipe support, or pumps. There are also assets that are attached to the item that are equally as important. Sub-items might include soil to air interfaces as pipelines go underground or concrete pedestals for the pipe support. Estimating the surface areas for each of these assets is essential for contractors and others offsite to gain a sense of how much coating would be needed later. It also indicates the overall size of each facility to decide if any maintenance project is small, medium, or large.



Photo 1. Various items are inventoried: valves, valve handles, and pipelines.



Photo 2. Within an item, there may be sub-items, such as pipe supports, pipe to support interface, and pipe support pedestal.

Step 2 – Identify the metallic substrate: It is important to know what material is being coated or used to recommend repair procedures or develop specifications in the future. Substrate can A magnet is an excellent tool to have available in case you aren’t sure if the substrate is carbon steel, stainless steel, cast iron, cast Aluminum, or even an alloy. An even better tool to have on hand is a PMI device (positive material identification) which allows one to check the chemical composition of the alloy. It is also important to have a very basic understanding why some materials are chosen over others. For example,