Tank Cleaning

An Overview

Reasons for Cleaning Tanks

Preparing for Inspection

Inspections are typically conducted every ten years, although the frequency may vary depending on site-specific conditions and applicable regulatory requirements. Prior to inspection, the tank must be fully emptied and all internal surfaces cleaned to bare metal. Confined-space entry is generally required for cleaning, and it is almost always necessary to complete the inspection. Increasingly, drones are being utilized to supplement inspection activities and enhance safety and efficiency. The primary drivers for this work are regulatory compliance and personnel safety.

Improving Capacity

As solids or high-viscosity fluids accumulate in an Aboveground Storage Tank (AST), the effective storage capacity is progressively reduced. Eventually, this loss of capacity diminishes the value of the tank beyond the cost of removing the accumulated material. The objective of this procedure is to reduce these accumulations and restore usable storage capacity.

Under this approach, a residual amount of material remaining in the AST is generally acceptable, and full surface cleaning is not required. The use of appropriate chemical treatments in support of this objective may also reduce or eliminate the need for tank entry. The primary driver for this project is cost optimization.

Preparing for a Change of Product

When an Aboveground Storage Tank (AST) is selected for a change of service, the existing product must be removed. The required level of cleaning can vary significantly, ranging in some cases to the standard necessary for inspection. More commonly, a limited amount of residual material is acceptable; therefore, the cleaning objective typically falls between inspection-level cleaning and capacity-restoration cleaning.

Other Reasons for Cleaning

Numerous additional objectives may arise, although they are less common and can require widely varying scopes of work. These objectives may include tank dismantling, leak repair, emergency response activities, among others.

Product & Disposal

Tanks may contain refined products, crude oil, or petrochemicals. Product conditions can vary significantly and may change over time within the same tank; consequently, the composition of any settled residual material can also vary widely. For this reason, chemical selection and dosing cannot be reliably predicted without product-specific analysis and testing.

Disposal of the extracted material requires a clear understanding of both its hydrocarbon value and the concentration of potential contaminants. Disposal facilities and feedstock users have varying tolerance limits for contaminants. In many cases, the application of appropriate chemical treatments can upgrade the recovered material, thereby increasing its value.

The typical extraction value chain can be summarized as follows:

Low-Value Hazardous Waste ⟹ Non-Hazardous Waste ⟹ Discounted Feedstock ⟹ High-Value Feedstock

When coupled with the variability of project objectives, chemical treatments may deliver a value uplift, but this outcome is not guaranteed. Each project must be evaluated to determine the most appropriate category:

- Provides significant value
- Technically and economically viable
- Technically feasible but not economically justified
- Not technically appropriate

In some cases, off spec extracted material can be treated externally, outside the AST, to achieve an upgraded product.

Tanks & Facilities

Tanks can vary widely in size and design. Each tank may feature unique piping, access ports, internal components (such as mixers or heaters), venting systems, roof styles, spray nozzles, sensors, cameras, and other equipment. Similarly, facilities differ in site-specific availability of utilities, heat sources, cutter fluids, frac tank staging, and related infrastructure.

Health and safety reviews, as well as project requirements, will vary depending on the combined hazards and working conditions. Consequently, tank cleaning designs should be value-engineered to account for local conditions.

Performing front-loaded engineering and material analysis for tank cleaning projects is strongly recommended. Although this approach increases upfront costs, it typically results in reduced cleaning time, greater confidence in the efficacy and quantity of chemicals required, and the potential for upgrading the recovered material—benefits that more than offset the initial investment.

Process Overview

Tank cleaning projects are influenced by tank size, the type of product, and the heel—the layer of settled material at the bottom of the tank. The project can be organized into three main activities:

Step One: Mobilization

1. Set up
2. Connections

Step Two: Cleaning

1. Sludge removal (and/or treatment)
2. Degassing
3. Cleaning - the scope of the cleaning activity depends upon two main factors – the purpose of the cleaning (e.g., regular maintenance, repair, or change of product), and the size of the heel (the volume of settled material in the tank) which is the most significant factor affecting timing.

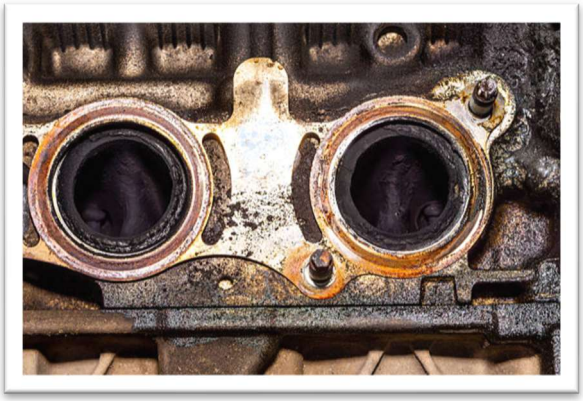
Step Three: Demobilization

Chemicals that Enhance the Cleaning Process

While some tank cleaning operations rely primarily on mechanical methods, the use of chemicals can enhance efficiency and provide opportunities for process improvement. In certain cases, tank contents can be recovered and converted into reusable or recyclable compounds. Chemical solutions are available for all stages of the tank cleaning process, enabling tailored treatment for specific conditions and objectives.

Sludge Removal

The chemicals used at this stage are formulated to liquefy tank bottoms. Most are solvent-based and can be combined with cutter stock or oil to help fluidize the material. These compounds are primarily applied when the tank bottom has hardened or aged into a non-pumpable form. The selection of the appropriate chemical depends on the specific nature and composition of the material within the tank.



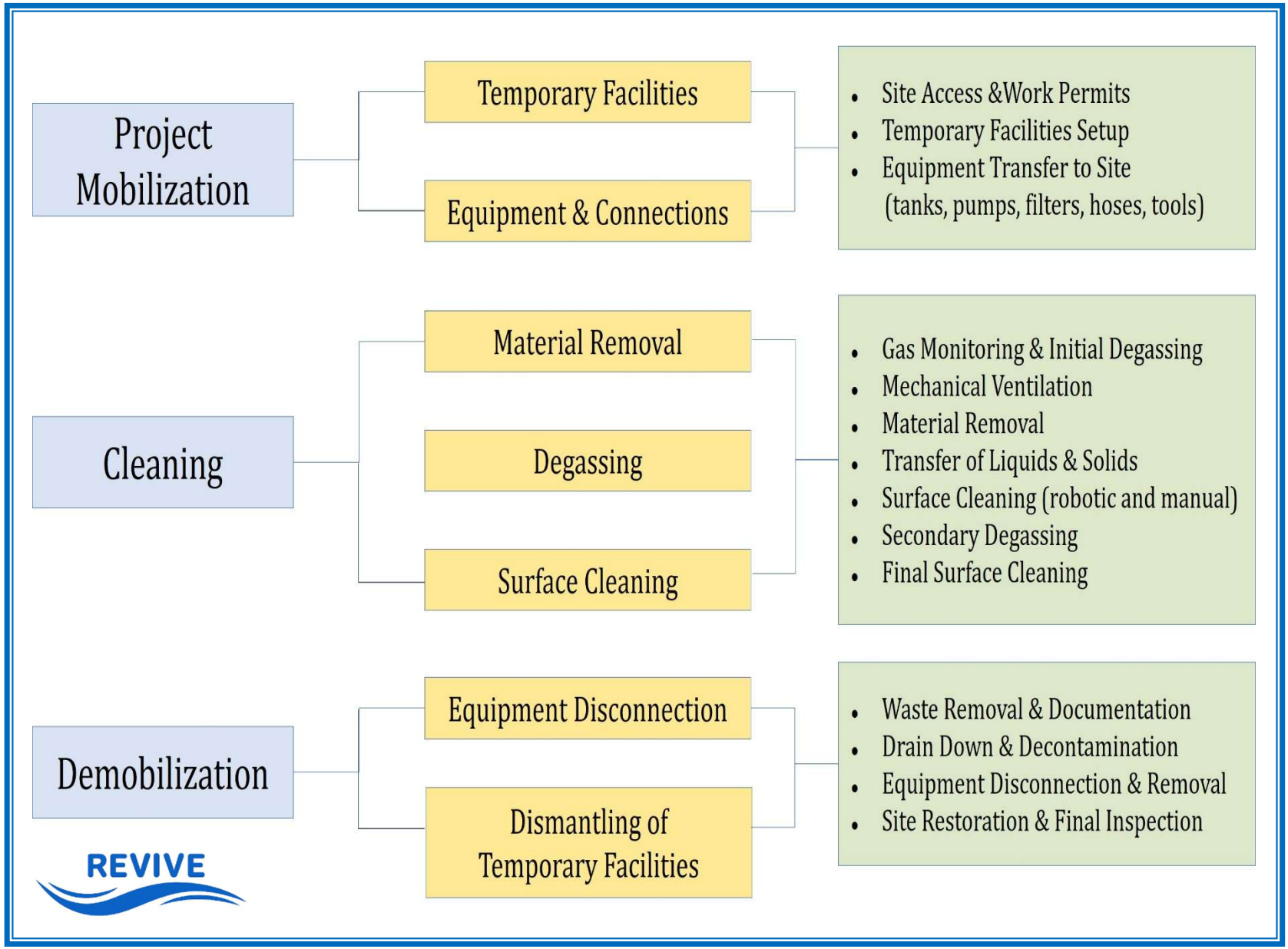
Degassing

The products used during tank degassing are primarily surfactant-based. Their purpose is to reduce concentrations of VOCs (Volatile Organic Compounds) and LELs (Lower Explosive Limit gases) to safe levels, allowing cleaning to proceed with minimized risk. These treatments are effective whether the cleaning method requires full tank entry or only limited access.

Surface Washing

Similarly, a variety of products are available for performing the surface washing required during tank cleaning, most of which are surfactant-based. Selection of the appropriate product depends on the desired degree of cleanliness, which is determined by the purpose of the project. An additional consideration is the compatibility of the cleaning agent with the site's waste treatment facilities.

PROJECT OVERVIEW- DESLUDGING AND CLEANING HYDROCARBON STORAGE TANKS



PROCESS FLOW – DESLUDGING AND CLEANING HYDROCARBON STORAGE TANKS