
Our *fga* tank management services is a very effective way for our clients to maintain storage tanks to high operating efficiency and industry standards.

We have been involved in hundreds of tank maintenance projects and have developed an expertise that you can utilize in a format that best suites your requirements. We can, at your request, manage an entire tank cleaning and maintenance program for you or we can provide specifically requested expertise to any portion of your program. We have also worked with some companies where we have provided the *fga* tank management services as a support and learning tool for their new staff engineers.

We would be pleased to provide our services on an ongoing basis or work with you on specific one-off projects.

An entire tank maintenance project would typically include most of the following topics:

1. Evaluation and planning:
 - i. Site security issues.
 - ii. Tank rooftop and perimeter access and safety systems.
 - iii. Safety procedures.
 - iv. Regulatory issues.
 - v. Insurance issues.
 - vi. Required maintenance.
 - vii. Planned upgrades.
2. Work scope definition and allocations.
3. Budget estimate preparation and approval.
4. Scheduling.
5. Tender preparation, tender issuing, bid evaluation, recommending and awarding of:
 - i. Cleaning and sludge processing services.
 - ii. Inspection services.
 - iii. Repair and maintenance services.
6. Cleaning, sludge processing and waste disposal operations and management.
7. API structural inspection.
8. Design of repairs or modifications to:
 - i. Tank structural components and access ways.
 - ii. Paint or coating system
 - iii. Insulation system

- iv. Supply and withdrawal piping.
 - v. Valves.
 - vi. Heating systems.
 - vii. Mixers.
 - viii. Floating roof.
 - ix. Fire protection systems.
 - x. Electrical systems.
 - xi. Lighting
 - xii. Instrumentation systems.
 - xiii. Spill containment systems.
 - xiv. Site grades.
 - xv. Signage
- 9. Installation of repairs or modifications.
 - 10. Hydro testing.
 - 11. Calibration.
 - 12. Painting.
 - 13. Insulation.

We can prepare the project estimates as well as your internal documentation and approvals. During the execution of over 300 tank related project our *fga* tank management services has developed an extensive repertoire of software and tender formats and contracts that can be used to facilitate the management of a wide variety of tank management projects.

Cost estimating for a tank maintenance project has been developed in an automated spreadsheet to provide a fast, accurate compilation of the project costs. Tender documents and contracts for the various phases of projects have been developed as templates to expedite their preparation, issuing and evaluation.

We have supervised many of the major Canadian contractors that are involved with the cleaning, inspection and repair of tank facilities and ancillaries and we are familiar with their track record. We keep abreast of developments in the field such as reclamation of the usable hydrocarbons by various techniques such as centrifuge separation and filter press operations. We have specified and supervised insulation of tanks using innovative scaffolding to reduce the cost and time. We have evaluated various technological improvements and changes in the tank internals such as mixers, heating and instrumentation systems and have recommended and installed cost effective alternatives.

We have prepared, issued, evaluated and recommended award of tenders for all phases of a tank maintenance program as outlined above and have provided on site daily management of in house and or site contractors.

Our extensive experience in managing tank maintenance programs supported by our API inspection services, structural engineering and welding engineering groups provides for a rapid response to virtually any findings from the inspection programs.

We are affiliated with Canspec through our *fga*-Canspec joint venture. This puts at our disposal the combined expertise of the largest non-destructive testing organization in North America. The highly qualified professional engineers and technicians of this group have experienced virtually every known tank design and failure mode in the industry and can provide advice on any abnormal situation that may be encountered during the cleaning, inspection and repair. Through our Canspec operations we have participated in tank project management on virtually every continent and in all of the oil producing and processing regions of the globe.

As authorized by the client, the *fga* tank management services can draw on the design capacity of *fga* Consulting Engineers Limited to effect rapid design of cost effective solutions to unanticipated items discovered during the post cleaning inspection. Typical designs include:

1. Detailed structural designs for replacement of corroded portions of the tank.
2. Detailed design of repair methodology.
3. Welding procedures.
4. Stress analysis.
5. Detailed engineering reviews of as found conditions and existing and anticipated loads.
6. Interpretation and second opinions of inspection reports and the API standards.

The ability of *fga* to provide this scope of services in a timely manner and usually at short notice enhances the overall quality and depth of the project management services.

Our *fga* tank management services include risk analysis and review. These analysis and reviews applied a variety of analytical techniques such as Job Safety Analysis, Hazard Identification and Analysis, Safety audit and surveys, and Management of Change to critical activities. Our standard policy is to apply Hazard and Operability study to a system if the Management of Change review determined that the change warranted such a review.

fga Consulting Engineers Limited have undertaken numerous tank design projects and piping projects. As stated earlier the tank and piping project list included over 300 projects. These projects deal with; tank maintenance, tank cleaning, tank designs, tank foundation design and improvements, investigations of tank failures, repair design, project management of tank rebuilds, design of piping and heating systems for tanks and tank inspections. With our combination of engineering services, non destructive testing and inspection services and *fga* tank management services we are one of the few organizations that can provide the extensive range of professional expertise and experience necessary to fully complete a detailed tank refurbishment program.

It is our opinion and belief, supported by customer feed back, that we can provide the best tank management services available.

Our track record in terms of working with international companies and supporting field offices demonstrates the commitment and ability of *fga* Consulting Engineers Limited to work with the international oil industry. Our work with the industry over the past number of years has been well received and supports our belief that we can fully support your requirements for this project.

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