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Convault BEA Executive Summary

Blast Effects Analysis

Convault, Inc. recently employed [Karagozian & Case \(K&C\)](#) a World Leader in Blast Consulting and Blast-Resistant Design to perform Blast Effects Analysis (BEA) on the design of the Convault protected Aboveground Storage Tank (AST). K&C provides a unique and highly technical set of skills as consultants by providing engineering services for the design and analysis of structural and mechanical systems subjected to blast and shock effects. K&C services include design of structures, risk assessment, and hazards' mitigation related to blast, impact, and shock loads, and they are a leading firm in the areas of designing government and commercial facilities to resist terrorist attacks. K&C has been in business for over 60 years and is well respected and recognized for its capabilities both nationally and internationally.

Three different threat scenarios facing ASTs were investigated to determine the inherent blast resistance of Convault's design for the tank. The scenarios investigated were: a blast from a vapor cloud such as might accumulate at a refinery with explosive pressures at 10 psig (the higher end of the range of expected pressures), a blast from 50 lbs of High Explosive (HE) TNT as might be carried by a typical suicide bomber, and a blast from 500 lbs of High Explosive (HE) TNT representing a typical car bomb. A 2000 gallon tank was used to represent a typical Convault tank design.

The criteria for a successful test was considered to be one where the tank would not move more than two inches, and the integrity of the primary tank would not be compromised. In a real life situation there should be no fuel leaks from the primary tank.

Overall, the BEA indicates that the Convault AST is **very** resistant to the effects of the blast loads considered. The mass provided by the concrete outer shell protected the steel tank extremely well, and greatly enhanced the resistance to all blasts. The tank passed all three tests. It withstood the blast with high limit pressures resulting from the explosions from a vapor cloud, a 50 lb HE – TNT blast centered at 5 feet from the tank and a 500 lb HE – TNT blast centered at 20 feet from the tank.

The magnitude of these blasts at the respective proximities would be expected to destroy and/or relocate lighter, less robust fuel storage tanks. However, the Convault AST will not only remain in place, it will survive with no fuel leakage from the primary tank.

Additional information is available upon request.