Innovative Armored Product
Provides for Fail Safe Solution at
Nuclear Munitions Conversion Plant

**Product:** FRP composite filament wound armored and protected Schedule 10 grade WP316L stainless steel pipe in precision special lengths, for speedy installation.

**Customer:** U. S. Government Nuclear Munitions Plant - Paducah, Kentucky.

**Application:** FRP armor guarding of 4” diameter containment piping over 2” stainless steel carrier piping. The application is dual containment handling of anhydrous ammonia and condensate vapors.

**Background:** A private firm, as an agent of the United States Government, needed to expand the capacity to convert nuclear materials from obsolete munitions. The specifying engineers mandated high grade stainless steel, in a dual containment system. Because of the potential for external corrosion from aggressive soil conditions, the specifying engineers wanted a special corrosion impervious thermoset FRP armoring of the stainless steel containment pipe.

**Method and Materials of Construction:** To provide both maximum piping strength and maximum external pipe corrosion resistance, Industrial Fiberglass proposed that we factory FRP composite armor, by filament winding, the outside of 4” diameter Schedule 10 grade 316L stainless steel pipe. This would be done using a proprietary premium grade high-impact, high-temperature, epoxy vinylester resin with superior corrosion resistance.

The FRP armoring laminate was a specially designed extra heavy 125 mils. The filament wound external FRP composite armoring was "held back" 6” from each end of each spool, to allow for field welding of the stainless steel pipe.

*It Is Ingenuity That Sets Us Apart*
Industrial Fiberglass furnished specially cut field overlay weld kits with the appropriate reinforcement fabrics and proprietary resin formulations for completing the armoring protection after the field stainless steel pipe welded joints were made.

The Challenges: To minimize field labor, and to speed field installation, the customer asked Industrial Fiberglass to furnish the 4” diameter FRP composite armored stainless steel pipe in all variations of special lengths from 6'-7” to 17'-9”. As with many FRP pipe manufacturers, our filament winding machines were constructed to wind 20 or 30 foot lengths for the 4” pipe sizes. To meet the customer’s requirements we modified our winding equipment and procedures to provide the requested filament wound armored pipe in the unusual individual lengths.

Because of the critical nature of the application, the design engineers mandated in the governing specification that holiday (porosity) detection spark testing be performed on the FRP composite guardian armoring after production with 36,000 volts. While common for coatings, this particular proof of integrity testing is typically not specified for FRP composite windings. Yet, the extensive, wide materials engineering background of Industrial Fiberglass provided the sophisticated technology, equipment, and procedures to accomplish the testing and provide formal certified quality assurance acceptance reports.

Customer Benefits: Through ingenuity and the creative combining of the strength of stainless steel pipe, with the tough and highly corrosion resistant FRP composite - Industrial Fiberglass was able to provide a solution for the customer that minimized installation costs - and ensured fail-safe operations to the end user. Our ESP program, production flexibility, and multiple materials engineering skills, provided this "higher level" U.S. Government requirement for a "fail safe" solution to a demanding application.

Opportunities for Your Customers: Which one of your customers or clients could benefit from Industrial Fiberglass' unique ability to provide creative corrosion resistant equipment - from concept to finished solution - using ingenuity, superior resin technology, tooling, flexible fabrication technology, and ESP commitment?

Call them and ask. Then call us.