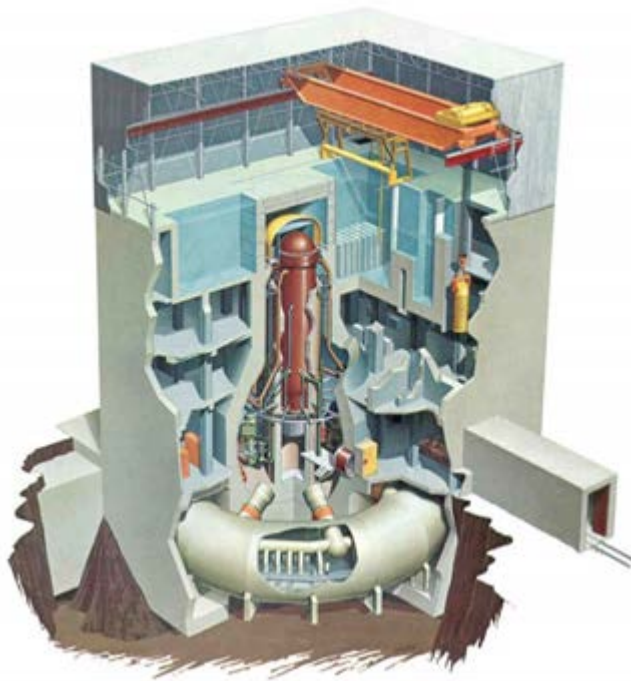


# CASE HISTORY ~ CH-060

## BIO-DUR 560 BLUE RELINES AND PROTECTS NUCLEAR TORUS

**THE CHALLENGE:** A nuclear torus, or suppression pool, is a huge steel pressure vessel situated beneath the nuclear reactor in an atomic power plant. In the diagram below the torus is the doughnut shaped vessel at the base of the building. The torus is half-filled with water to provide both emergency cooling water and a large heat sink. When first constructed in 1974 the torus was protected with an inorganic zinc silicate coating. After almost 30 years of service the zinc coating was depleted and the torus shell was at risk of corrosion.

Because it is a pressure vessel the access to the torus interior is limited to only two 54" manways. Spraying large amounts of conventional, solvent based coatings would be impractical due to the difficulty in providing adequate ventilation for safe working and proper solvent release. Retained solvent in cured coating films is a prime cause of osmotic blistering upon subsequent immersion.



**THE SOLUTION:** BIO-DUR 560 Blue was developed especially for this application building on over 16 years of nuclear coating experience. Development and testing for nuclear approval was undertaken with the goal of producing a highly effective coating with particularly easy application characteristics. The outstanding characteristics of BIO-DUR 560 Blue are shown below:

- Designed for heated, plural component airless spray. An ink blue epoxy base mixes with a snow white curing agent in 1/1 volume ratio to yield a sky blue mix. This system ensures an instant visual confirmation that proportioning and mixing is proceeding correctly.
- High build application for proper coverage in a single coat. BIO-DUR 560 Blue applies at film thicknesses of 10 mils to 60+ mils with no sagging. "Stripe Coat" application on welds and sharp edges is easily accomplished from small "hotpot" mixes by brush or roller.
- Solvent-free formulation ensures safe working with minimal ventilation requirements. Absence of epoxy solvents eliminates the potential for osmotic blistering caused by solvent retention.
- Application and curing on normal ambient temperature surfaces – no post-application baking required.
- Very rapid immersion after application, "nuclear" specifications call for only 4 hours minimum.
- Excellent underwater application characteristics allowing simplified future maintenance by divers.
- BIO-DUR 560 Blue is "NonHazmat" for shipping by air or surface – this facilitates shipping by any form of transportation at minimal cost.

PRODUCT: BIO-DUR 560

YEAR: 2013

LOCATION: EAST COAST, USA

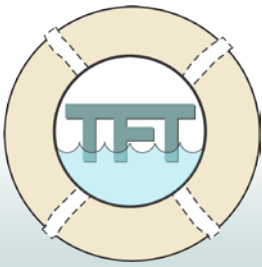
*We go where others fear to spread!*

Thin Film Technology, Inc.  
802 Utah Street  
South Houston TX 77017  
USA

PHONE (713) 910-6200  
FAX (713) 910-6210  
E-MAIL [Answers@thinfilmtech.net](mailto:Answers@thinfilmtech.net)  
WEB SITE <http://www.thinfilmtech.net>

© 2015 Thin Film Technology, Inc

CH-060\_BD560 Nuclear Torus recoat \_2013 draft  
Page 1 of 2

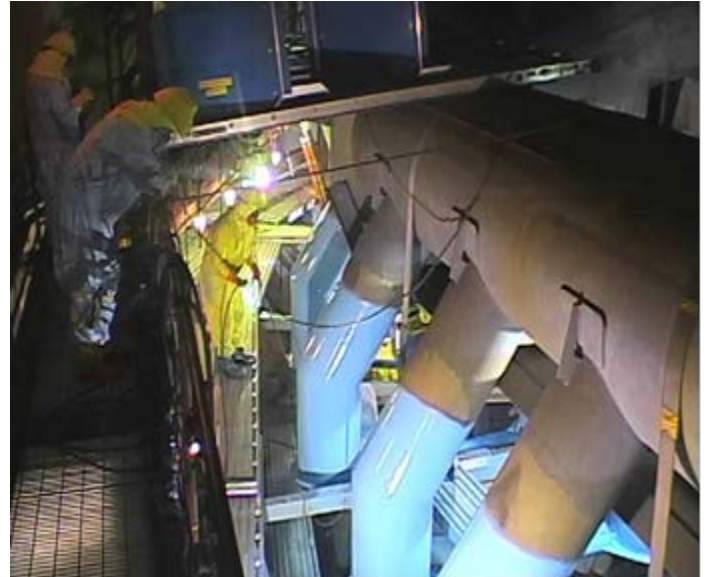


**APPLICATION:** A great deal of preliminary work had to be accomplished prior to coating application. This began with “desludging” the water inside the torus with specially trained nuclear divers. The torus itself has a cross section diameter of 31 feet with an overall doughnut diameter of 145 feet. The inside structure is very complex with an abundance of structural steel and piping. The object of the coating operation was to apply BIO-DUR 560 Blue to the lower half of the torus which is submerged in deionized water. This required extensive staging to be erected to enable access for abrasive blasting and spraying.

Steel grit was used for abrasive blasting to SSPC-SP10, “Near White” standard, steel grit was chosen because it could be reused many times thus reducing the generated waste. Steel grit also created an aggressive angular profile to optimize adhesion of the BIO-DUR 560 Blue.

The BIO-DUR 560 Blue was applied through four (4) heated plural spray systems with a pressure of 4,000psi at the pumps and a fluid temperature of about 140°F. Because of the uniquely difficult access it was necessary to site the spray units outside of the torus with coating delivered through heated hosepacks of 425 feet length. Base and curing agent were mixed in high pressure static mixers with 40 foot unheated “whips” of 1/4” hose to the spray guns. The quality of the spray was excellent, assisted by the quality of the plural spray equipment which provided reliable and precise control over temperature, pressure and mixing. When the photograph opposite was taken a total of four (4) airless spray guns were in operation – note the almost complete lack of spray mist in the air.

The coating was allowed to cure for about 14 hours after initial spray application to the internal surfaces, QC inspectors then entered the torus to check for holidays, (missed areas), and film thickness. Repairs to correct deficiencies were made by spray, brush and roller application of BIO-DUR 560 Blue and when complete the torus was flooded shortly after the last coating was applied.



**RESULT:** The torus is now protected against corrosion with an excellent, inert lining. Actual coating application went hours ahead of schedule with “no drama”.

BIO-DUR products can be applied underwater using procedures developed over 16 years by professional nuclear divers should future repairs be necessary to cover missed or damaged areas.

For more information regarding this project, contact:

Jeff Longmore,  
TFT Technical Director

Email: [Jeff@thinfilmttech.net](mailto:Jeff@thinfilmttech.net)