

CASE STUDY: Sub-Bituminous Coal

TIVAR® 88 High Performance Lining Solution

THE CASE IN BRIEF

Application: Coal Bunker

Quantity: 2 Bunkers

Liner: TIVAR® 88-2, 1/2" Thick

Bulk Material: Sub-Bituminous Coal (PRB)

Substrate: Gunitite

Problem: Flow problems, plugging and ratholing

Date Installed: 1995

TIVAR® 88-2 LININGS ACHIEVE MASS FLOW, ELIMINATE COAL STAGNATION, BUNKER FIRES

Background: A generating station located in Wisconsin, built and commissioned in the mid-60s, has six coal-fired units with a total generating capacity of 387 MW. The type of coal burned is sub-bituminous which is transported by rail from the Powder River Basin in Wyoming.

Problem: The plant was originally designed to burn bituminous coal. As part of the effort to comply with the Clean Air Act Amendment, the plant switched to low sulfur sub-bituminous coal. Unfortunately, problems soon developed with the fuel handling and storage systems because the sub-bituminous coal has a higher concentration of fines and increased moisture content, making it more cohesive.

The fuel storage bunkers for the six generating units were designed for funnel flow. This type of flow pattern was suitable for handling bituminous coal, but does not work well with sub-bituminous coal because the sub-bituminous coal builds up and adheres to the gunitite surface of the bunkers, resulting in stagnant coal. If coal remains stagnant for an extended period of time, spontaneous combustion can occur, resulting in bunker fires. In 1992, a bunker explosion occurred, the result of a bunker fire. The explosion was caused when coal dust was being back-filled into the bunker while a hot pocket of coal was present. The resulting explosion damaged the conveyor floor and roof above. Several employees were injured during the explosion.

Solution: A corrective action plan was implemented to alleviate the coal flow problems. An internationally known flow consultant was hired to do a flow analysis on the bunkers and to develop a solution for eliminating the bunker fires. The recommendation was to convert the bunkers from funnel flow to mass flow. Achieving mass flow would require adding valley angle clean-out plates and covering all of the sloping wall surfaces with TIVAR® 88-2 (Fig. 1).

In early 1995 the retrofit of two 750-ton bunkers was initiated. Steel clean-out plates were mounted to the steel bunkers after the gunitite was removed from the attachment areas. Once this was completed, 1/2"-thick TIVAR® 88-2 was installed over the clean-out plates and the remaining sloping wall surfaces. Shortly after the unit was brought back on line, it was evident that the flow pattern had been significantly changed and that mass flow had been achieved with the sub-bituminous coal.

Results: Since the installation, the bunkers have performed extremely well. Coal stagnation and the risk of bunker fires have been eliminated.

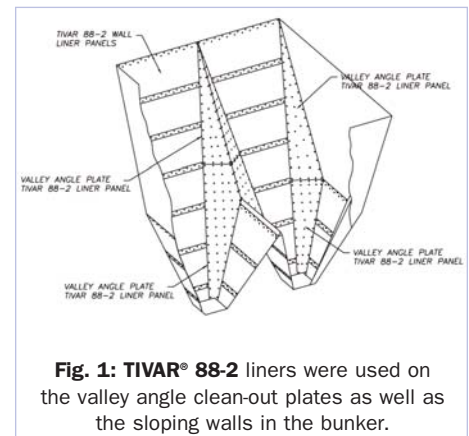


Fig. 1: TIVAR® 88-2 liners were used on the valley angle clean-out plates as well as the sloping walls in the bunker.

Important: Most plastics will ignite and sustain flame under certain conditions. Caution is urged where any material may be exposed to open flame or heat generating equipment. Use Material Safety Data Sheets to determine auto-ignition and flashpoint temperatures of material or consult Quadrant Engineering Plastic Products.

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