SURTREAT®

DUQUESNE ELECTRIC SEAWALL

CASE STUDY

PROBLEM

Seawall face had at least 15 areas where concrete was spalling and delaminated from the reinforcing steel (rebar)

STRUCTURE

Duquesne Cheswick Power Station Seawall

PROBLEM

In September 1996, Surtreat Representative Lori Sims toured the Duquesne Light Cheswick Power Station with Nick Bauer to evaluate the condition of concrete structures both inside and outside of the plant. Consideration was given to the water pump area, the switching station, and the seawall in the coal handling area. The tower bases in the switching station showed a lot of deterioration. However, Bauer and Sims focused their attention on the advanced deterioration of the concrete seawall: the unstable condition could potentially disrupt coal-handling operations.

The seawall face had at least 15 areas where concrete was spalling and delaminated from the reinforcing steel (rebar). The rebar was corroding and in some places. This was visible to the naked eye. The weaker concrete in the seawall cap was spalling and delaminated in some areas, other areas were crumbling. Ideally, the seawall should be stable enough to support the tasks associated with coal handling. Typically, personnel are continuously climbing up and down stairs that are hinged between the wall and a work float so that they can physically cross over onto the barges to that are to be repositioned beneath the coal scooping equipment. This task is performed up to seven days a week five hours a day. Eventually, the seawall's instability could result in a disruption to barge unloading operations.

Recognizing Duquesne Light's policy to first allocate funds to mechanical failures that directly impact the combustion and steam generation processes. Bauer asked that our proposal to repair the wall focus on fixing the root cause of the deterioration. That is, the goal of providing a high performance, cost effective “wall stabilization" program was to supersede any budget to "make it look pretty. ”Surtreat's Proposed Restoration and Protection Plan detailed recommendations under Cheswick Service Order 771-6-135prepared in November1996 indicated that without remediation the rebar corrosion, and in turn, the spalling and delamination would continue. And it did.

Two years later, Surtreat received an RFP which appeared to reference the “Surtreat Restoration and Protection Plan, Dec. 6, 1996" document's Scope of Work and Budget. P.O. D166638 was issued. IT included a preliminary site visit to reevaluate the seawall condition with our designated contact, Greg Fleischman. The seawall condition had deteriorated. Sims then prepared a preliminary report requesting a Service Order and a Modification to the Scope of Work since additional labor and materials were necessary to prepare the work site and stabilize the seawall.

ABOVE: Dilapidated seawall, with exposed and rusting rebar.

BELOW (left): Dilapidated seawall, with exposed and rusting rebar ; BELOW (right): Corrosion testing being completed on seawall concrete.

Clearing and cleaning of the work site was required. The area along the seawall was overgrown with weeds and vines. This foliage hid piles of trash and miscellaneous unused equipment including electrical wires and pallets containing rail bases. These had to be moved to designated areas. Fleischman covered this under Cheswick Service Order771-8-230.

In the preliminary report, our Modification to Scope of Work requested a budget increase to which Fleischman also agreed. This was necessary to cover the cost of labor and materials needed to make additional seawall repairs. Concrete deterioration on the seawall cap had tripled. As seen in the December 1996 Restoration and Protection Plan, Surtreat has planned to limit the repairs to the spalled areas of the cap. The decision to apply a protective coating to the entire cap was a consequence of rapid deterioration over the previous two years.

In 1995, only fifteen areas of the seawall face exhibited spalling, delamination and corroding rebar. Accelerated deterioration on the seawall face contributed 35 new repairs as — or fifty total areas with specific concrete repairs. The total surface area requiring protective treatment expanded from 4,650 sq. ft. to approximately 6,500 sq. ft. to include three piers.

OUR SOLUTION

Site Preparation - In the areas adjacent to the seawall, all weeds were cut and the site was cleared of all trash.

Seawall Cap - The cap had experienced significant spalling over 35o/o of its surface area as a consequence of freeze-thaw conditions and alkali silica reaction. Surtreat performed the following repairs. First, the cap was power-washed to remove embedded dirt and loose concrete. This revealed a weak and fragile cap. Three applications of Surtreat GPHP were made. It penetrated the cap's concrete which subsequently became hard and stable. One application of Surcoat, a cement-latex-sand mixture was used to repair cracks and spalled areas and form a hard and uniform protective layer over the damaged area and the whole cap surface. Next, one application of Repel 10 MB was made to the whole cap surface to furnish a water repellant finish.

Seawall Face and Piers - Surtreat conducted remediation to the seawall face from an overhanging basket. First, the face and piers were power-washed and sounded. Delaminated concrete was then removed. The entire wall surface was then given one application of Surtreat VC, a vapor-phase migratory corrosion inhibitor, to stop rebar corrosion. Rebar protection was further enhanced with Surtreat GPHP, a penetrating corrosion inhibitor that also reduces porosity and serves as a concrete strengthening agent. The entire wall surface and piers received two applications of Surtreat GPHP. Finally, two application of Surcoat, a cement-latex-sand mixture, were made to all damaged areas in the wall and to the full surface of the piers to repair cracks and spalled areas where rebar was showing.”

CONCLUSION

The cap surface was hard and stable and covered with a protective cement-latex cover and high performance water repellant. This should prevent any future deterioration. The document “Surtreat Restoration and Protection Plan, Dec.6, 1996" called for only coating the spalled areas on the cap. Surtreat Corp. decided to perform the additional work required to cover the entire cap with a protective coating (e.g., reference document Surtreat "Modification for Scope of Work to P.O. D166638").

The wall face has been impregnated with two migratory corrosion inhibitors to prevent further rebar corrosion and subsequent spalling. The surface damaged areas have been sealed with two applications of a cement-latex coating which will furnish an added measure of protection. The three piers have a hard stable surface protected with a cement-latex covering and coating.

We invite your comments, questions, and inquiries.
Reach us at one of the below.

SURTREAT.COM **INFO@SURTREAT.COM** **412.281.1202**