



QUESTION & ANSWERS

INTRO

Changes in operating requirements for fossil boiler units in recent years have put an additional demand for minimizing corrosion on these units under these new conditions. When units shutdown and startup there are large changes in metal temperatures with thermal contraction during shutdown followed by expansion during startup along with a large influx of dissolved oxygen. The increased corrosion causes a large transport of metal corrosion products to the boiler that can cause deposits and corrosion sites that can cause tube failures. Startup times are often increased along with decreased availability. As a result, the need for chemical cleanings can occur on a more frequent basis.

Apollo Water Services has developed FilmPro™ Power Series to address the issues outlined above. FilmPro™ Power Series inhibitors are a paradigm shift to conventional chemistry that rely on water chemistry adjustments (i.e. phosphate, pH) to provide the necessary protection. Instead, FilmPro™ Power Series rely on surface active corrosion inhibitors that focus on surface protection rather than water chemistry adjustments.

The following information are some questions and answers our customers may have when evaluating Apollo Water Service's FilmPro™ Power Series products.

HOW DO SURFACE-ACTIVE CORROSION INHIBITORS WORK?

Surface-active corrosion inhibitors are organic molecules that have the capability to react and attach to the metal surface. Unlike Film Forming Amines (FFAs) they can use much smaller organic molecules without the hazards and operational complications that occur in high pressure units.

HOW CAN AWS'S FILMPRO™ POWER SERIES PRODUCT HELP?

The AWS product attaches a monomolecular layer of a hydrophobic layer to the metal surface that protects the metal surface from further oxidation. Continuous feed protects the metal during normal operation and unplanned shutdown and startups. Even if the unit is drained, protection continues. During startup the film provides continuous protection if the fill water is treated to a pH >9. Suspended iron is minimized, and startups are considerably cleaner.

WHERE SHOULD I FEED THE PRODUCT?

For maximum effect of the passivating film, it should be fed early in the condensate/feedwater system. Some have fed these film forming products (FFP) directly to the condenser. If you have a polisher, you should feed it at the discharge of the polisher. The product is volatile above 1,000 psig and will provide protection throughout the steam/water cycle.

IS FILMPRO™ POWER SERIES THERMALLY STABLE?

All organics, if heated to 1050°F for a long enough period, are subject to decomposition. Due to the velocity of flow in superheated piping the decomposition is quite limited. Since the molecule is smaller than Film Forming Amines (FFAs), the decomposition products of any unattached film will be reduced and much smaller, such as acetic, formic and CO₂.

WILL THE PRODUCT INCREASE CACE ABOVE GUIDELINE LIMITS?

AWS's FilmPro™ Power Series products are designed for minimal effect on CACE. If fed at the recommended feed, you will be able to stay within recommended parameters.

WILL THE PRODUCT HAVE A NEGATIVE EFFECT ON THE DISCHARGE OF MY POLISHER?

No, there have been EPRI studies that have shown no effects on polishers with concentrations less than 200 times the normal feed rate. Due to the reduced loading of iron oxide to the polisher, and resulting lower differential pressure, you should expect longer runs.

SHOULD I BE CONCERNED IF I DON'T SEE A VERY HYDROPHOBIC LAYER?

As you feed FilmPro™ a layer of protection is reacting with the heated metal surface. It does not cover the complete system immediately. There are levels of hydrophobicity, and it increases with the length of application. However, dramatic reductions in corrosive products are likely within days of the initial application depending on the size of the system.

WILL FILMPRO™ FOUL INSTRUMENTS & TRANSMITTERS?

The product reacts with the heated surfaces. There has been no evidence of non-amine-based products fouling probes or sensors.

WHAT IS CLENSING?

When the product is first applied you will see a slight increase in cation conductivity due to the penetration of the existing magnetite layer and releasing any existing anions capable of under-deposit corrosion.

DO YOU HAVE TO INSTALL ADDITIONAL FEED SYSTEMS TO FEED FILMPRO™?

Maybe. If you feed a passivating agent (like carbohydrazide) you should replace the scavenger with FilmPro™ Power Series. You will see a marked improvement in cleanliness of startups without having the concern of oxygen pitting. Many systems dilute their amine or ammonia in a day tank to avoid pump gassing issues. If you have an ammonia or amine day tank you can add the FilmPro™ Power Series product directly to the day tank with no adverse effects to the product.

HOW DO I CONTROL THE FEED OF THE PRODUCT?

Most plants control the feed of non-amine-based filming products based on flow. If the pump is set up based on maximum flow rate it will increase the product concentration at reduced loads. However, overfeed is not an issue with these products up to double the recommended feed rate of 1 PPM (for STM-5100). If you have a pump with control functions, you can adjust the product based on feedwater flow. If you add the product to the ammonia day tank we will provide the calculation for your system to control feed based on pH.

HOW DO I MEASURE CONCENTRATION?

There are no accurate field measurements available for these non-amine film products. There is on-line TOC that can measure the on-line concentration. Most plants do drawdowns at the pump and compare the rate to the system flow rate.

THERE ARE OTHER FILMERS IN THE MARKET, WHAT MAKES FILMPRO™ DIFFERENT?

Non-amine-based filming product are difficult to blend at high concentrations. We have developed an innovative manufacturing process that has allowed us to achieve higher concentrations than normally available. As such, the use costs are lower, there is less freight and FilmPro™ Power Series products provide better asset protection.

ARE THERE HEALTH, SAFETY & ENVIRONMENTAL CONCERNS?

AWS FilmPro™ Power Series products are considered both non-toxic and nonhazardous.