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# Laboratory validation of hexavalent chromium formation for safer asset management

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**ABSTRACT**

*Hexavalent chromium, Cr(VI), detected on stainless steel components within turbines and other high temperature equipment in power stations is concerning due to Cr(VI)'s toxic nature. Although robust procedures for treating contaminated Cr(VI) have been developed to treat contaminated components, much of this has been based on the anecdotal plant observation. The key factors that have been identified are: (1) Cr(VI) occurs on steel containing Cr as an alloying element (e.g. stainless steel), (2) the metal is exposed to high temperature and (3) calcium anti-seize paste is present. As a result the industry has moved away from using calcium anti-seize paste, however laboratory confirmation of this hypothesis is scarce. This work attempts to address this gap and also provide some additional information about the physical parameters affecting the formation of Cr(VI). In doing so it aims to assist in predicting Cr(VI) occurance so that during maintainence activities workparties can anticipate its occurance and prepare for dealing with the hazard. The experiments involved coating mild and stainless steel coupons with calcium and nickel-based anti-seize pastes and subjecting them to heat treatment at different temperatures for varying periods. The coupons were then tested for the presence of Cr(VI). It was found that only the stainless steel coupons were susceptible to Cr(VI) formation, with yellow residue accompanying its formation when calcium was present. In addition, both calcium and nickel coatings were found to drive the Cr(VI) formation on stainless steel when exposed to temperatures of 600 °C for 16 h. These findings are in broad agreement with the power industry's observations. The experimental work demonstrated that it is feasible to achieve Cr(VI) formation in the laboratory simulating process parameters and that this information is valuable in validating practical prevention and mitigation strategies.*

**KEY WORDS**

*hexavalent chromium, high temperature components, power generation*

**BIOGRAPHY**

Jason is currently the site Process Safety Engineer at Stanwell Power Station (SPS). He has also worked as a Chemical Technician at both SPS and Mica Creek Power Stations. Prior to moving to industry he has worked as both a researcher and univeristy lecturer with interests in physics, materials science, mineral processing and chemical engineering.

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