THE EFFECTIVENESS OF CLEANING THE SYSTEM OF STEAM POWER PLANTS

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Prior to and after putting newly constructed steam power plants into operation various impurities (in the form of deposits and/ or sludge) accumulate. According to the data from various literature sources those impurities have direct effects on the mechanical and technological properties as well as on the steam power plant operational efficiency [1]. Because of that, steam power plants must be cleaned, prior to and during their operation [2]. In practice, the effects of cleaning are determined based on the successive measurements of feed water (ph, O_2, CaO, FeO, CO_2, oil and consumption $KMnO_4$), boiler water (ph, SiO_2, P_2O_5, concentration salts as electricity, conductivity and density), hot and super heated water (ph, CaO, P_2O_5, O_2, consumption $KMnO_4$, concentration of salts as density and volatile residue) and cooling water (ph, CO_2, Cl_2, P_2O_5, salts and sludge). Today, these methods are accompanied by x – ray diffraction methods, with a goal of improving the effectiveness of the cleanings [3]. To determine the structural and morphological changes in the protective magnetite film, samples were taken alongside by stem before and during the exploitation as well as after the cleaning. These samples were taken in the form of pieces of tube. From each piece 10 x 100 mm stripes were cut. Each strip was further cut into 10 x 10 mm plates. From each strip deposits and/or magnetite layers were scraped off, grounded and homogenized for 15 minutes in the WC attachment of the Spex mixer mill. The prepared samples were examined directly with a Philips x – ray diffractometer with CoK_α radiation using counting and photographic technique as well as by a scanning electron microscope and an atomic absorption spectrometry. The concentration of Fe_3O_4, αFe_2O_3 and FeO were determined by the method of external standards and film thickness by Delhez, et al [4]. The values obtained were treated mathematically. The values prior to exploitation, during exploitation and after cleaning were continuously compared to each other. It was noticed that the obtained values before exploitation and after chemical cleaning were similar. However, after 50,000 hours of exploitation drastic changes were noticed in the phase composition and the thickness of magnetite film as well as the morphology, concentration and distribution of the phases of: Fe_3O_4, αFe_2O_3, FeO, ZnO, SiO_2, αAl_2O_3, $\gamma FeO(OH)$, $CaCO_3$, $3CaO \cdot 2SiO_2$, $2FeO \cdot SiO_2$, $Al_2(SO_4)_3 \cdot 5H_2O$, $MgAlSiO_4$ and $CaMg(CO_3)_2$.

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