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Troshkin S.E., adjunct
(Cherkasy Institute of Fire Safety named after Chernobyl Heroes, National University of Civil Protection of Ukraine, Cherkasy)

ANALYSIS OF RESULTS OF NATURAL FIRE TESTS AT ZAPORIZHZHIA NPP

The study of the temperature regime of fires is a relevant issue since vertical cable tunnels differ in geometric configuration, types of cables laid in them, fire loads, and aerodynamic characteristics. This can lead to differences in the temperature regime of fires in such tunnels compared to both the standard regime and among themselves. In this case, it is impossible to guarantee compliance of the fire resistance limits of tested structures. In such a situation, the safety of people and property during fires in vertical cable tunnels of nuclear power plants may be significantly compromised.

Significant contributions to experimental and theoretical studies of heat and mass transfer in tunnels have been made by Hsu W.S., Ji J., Zhao Y., Zhu G., Gao Y., Vaari J. [1-4].

The cable floor of the reactor compartment of the main building of the NPP, with a height of 6 meters, at an elevation of 33,200 m of the reactor containment of the VVER-1000, with an internal space measuring 2600×1800×6000 mm. The thickness of the enclosure of the cable tunnel is as follows: side walls - 200 mm, ceiling slabs - 200 mm. The combustible material of the electrical cable is polyvinyl chloride, while the materials exposed to heat include steel brackets and steel wires made of St.3sp quality steel. To correlate the results, three experiments were conducted on sections of the vertical cable tunnel of the NPP, which are analogs of the designed building structures of the Zaporizhzhia NPP at different elevations of the vertical cable tunnel (Fig.1).

Fig. 1 - Cable tunnel of the NPP during the experiment.

The duration of each experiment was 90 minutes. The tests were conducted at a temperature of +15°C and relative humidity of 48%. The results for each of the 8 installed thermocouples are shown in (Fig. 2).

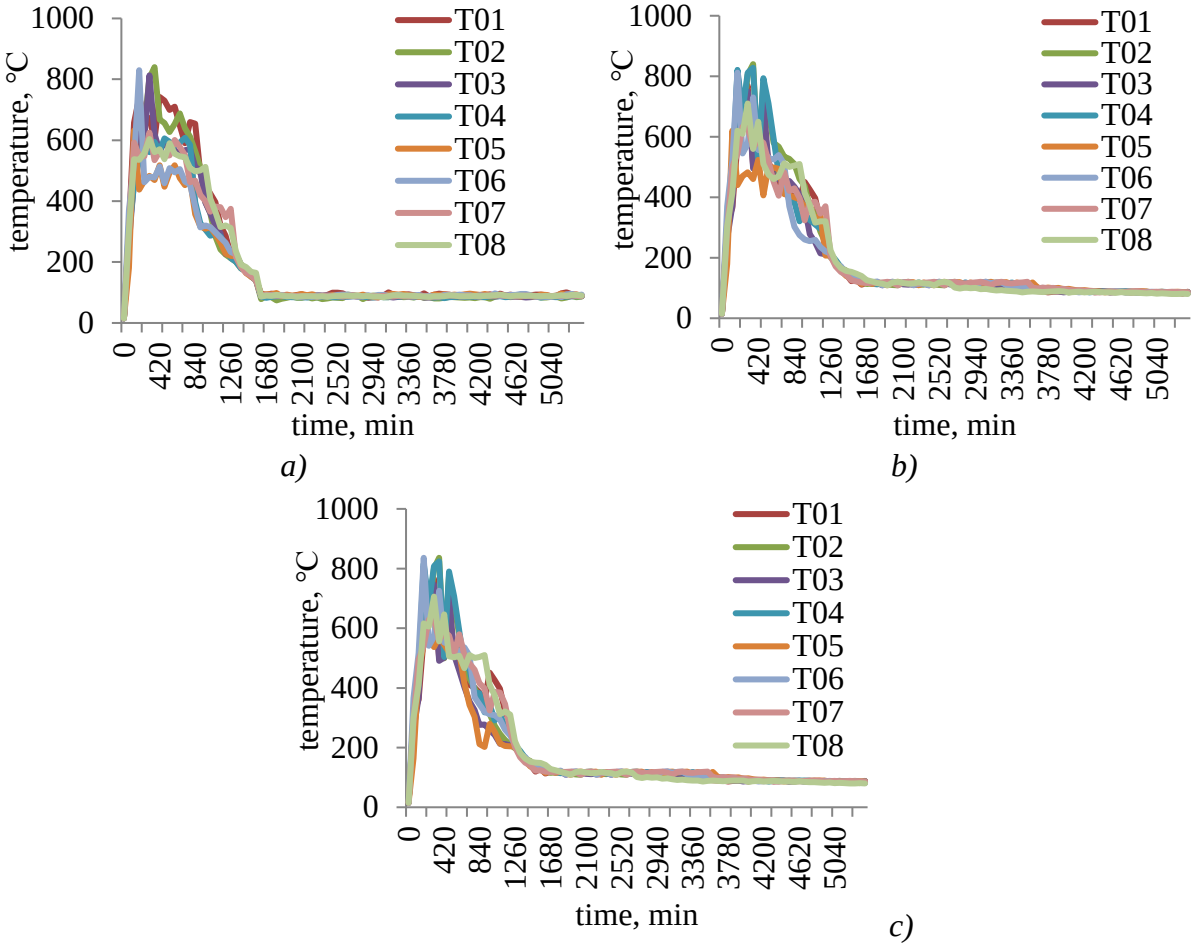

Fig. 2 - Temperature-time dependence in the vertical cable tunnel of the NPP based on the results of three (a), (b), (c) experimental studies for each of the 8 installed thermocouples.

The prospects of this study lie in the fact that the obtained data serve as a basis for verifying computer models of fires in vertical cable tunnels of NPPs and determining the temperature regime of fires for testing the fire resistance of building structures in vertical cable tunnels of NPPs with different geometric characteristics and fire loads. Further work can be focused on creating a computer model of the vertical cable tunnel in which the experiment was conducted.

References:

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