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Accurate identification of high temperature area of coal fire is the premise of coal fire control, coal fire monitoring is the test of coal fire control effect, coal fire detection and monitoring are the key and difficult points of coal field fire fighting engineering. This post first introduces the characteristics of high temperature anomalies in coal fire areas, and then proposes corresponding detection and monitoring methods, finally, comprehensive comparative analyses are adopted to achieve the purpose of identifying and monitoring the fire area.

**Abnormal characteristics**

*-High temperature.* Temperature rise is the most direct manifestation of heat release from coal seam combustion. The temperature anomaly in coal field fire is high temperature anomaly.

*-Spontaneous potential.* Coal seam combustion forms REDOX environment, high temperature area collects positive charge, negative charges accumulated in the outer region.

*-Magnetic field intensity.* There are a lot of iron minerals in the coal measure strata, these iron minerals are weakly magnetic. However, after high temperature, the magnetic

induction intensity is enhanced.

*-Resistivity.* With the coal seam burning, the resistivity of the formation decreases. At the same time, the upper part of the combustion center shows the abnormal characteristics of high resistivity along with the generation of holes and cracks.

*-Gas content.* Coal seam combustion leads to the generation of flue gas and the change of gas composition. Oxygen concentration decreased and carbon monoxide concentration increased.

**Commonly used methods**

*-Thermal infrared remote sensing method.*



*-Temperature measurement method.*



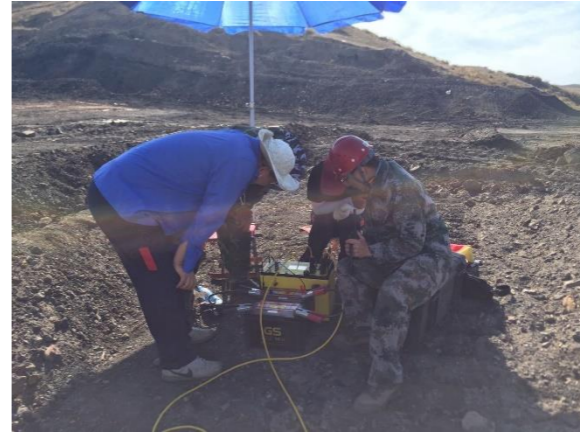
*-Natural electric field method.*



*-Magnetic method.*



*-High density resistivity method.*

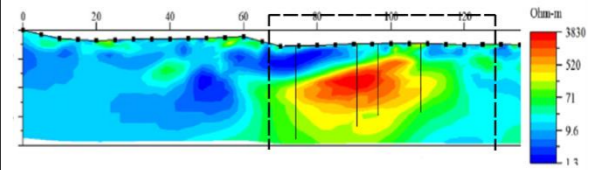


*-Gas component measurement method.*



**Comprehensive comparative analysis**

*-Coal field detection.* Combination analysis of high density resistivity method and drilling. The figure upper shows a cross-section of the high density resistivity method. The red part is the characteristic of high resistivity. The chart below shows the high temperature distribution of the corresponding area based on borehole data. It can be found that the shape and scale of the high resistivity and high temperature distribution are consistent.



*-Coal fire monitoring.* Combination analysis of natural electric field method and magnetic method. The upper curves are the natural electric field values, the middle curves are the magnetic induction values, and the lower picture shows the coal seam section. The blue curve shows before the fire was controlled, and the green curve shows the most recent. The other two are in the process of extinguishing a fire area. It can be found that with the extinguishing of the fire area, the magnetic induction intensity increases and the spontaneous potential decreases.

