Efficient Management and Application of Mine Fire Prevention Data

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Abstract. In view of the current monitoring and effect investigation of coal seam fire prevention measures and technologies, it has the characteristics of numerous on-site observation points, large data volume, poor effectiveness and low efficiency, which brings great difficulties to the analysis of coal seam fire prevention situation. In this paper, the arrangement of observation points of coal seam fire prevention measures or technical requirements is combined with the result of fire prevention data processing to avoid the isolation of fire prevention data analysis. It can directly show the data, curve and changing trend of coal seam fire prevention and extinguishing in the measuring point layout. It can timely and effectively put forward the corresponding coal seam fire prevention measures to improve the mine fire prevention management measures.

Key words: Fire prevention and extinguishment; database; hyperlinks; curve.

1. Preface

No. 1 coal seam roadway in xinji no.2 mine were all tunneled under the goaf, with only separated pieces of dirt of about 1m in thickness. According to the plan of coal seam spontaneous combustion prevention and control, 1 fire observation point should be arranged for every 50-70m tunnel tunneling. At present, 220115 roadway, 220115 air lane, 210103 air lane, 210103 air lane and other roadway are arranged under the goaf, and there are about 80 fire observation points. It is necessary to survey the observation points twice a week, and 640 fire observation points will be generated every month. At present, there are many fire prevention measures and technologies, which play a good role in spontaneous combustion of coal seams and spontaneous combustion of residual coal in goaf. However, no matter which method or technology is adopted, a large number of observations and observation points are needed, which brings great difficulties to fire prevention and fire analysis [1-7]. Since a large number of observation points cannot be directly reflected in the drawings and the large amount of data makes it insensitive to the data, it cannot timely adopt targeted fire prevention measures through the changing trend of the data, resulting in spontaneous ignition.

First of all, draw the fire observation point layout, can directly reflect the position of the observation point; The fire observation point data is automatically generated into a curve, inserted into the data processing software and set a hyperlink, click the corresponding observation point on the drawing, can
generate the corresponding fire observation point data and trend chart, simple, intuitive, clear. In this way, the drawing can be combined with the database, and the gas variation of each observation point can be grasped more conveniently and quickly. At the same time, it can greatly shorten the time of reviewing fire data, improve the efficiency, increase the sensitivity of fire-fighting data, and play a positive guiding role in the next step of taking targeted measures.

2. Database graphic hyperlink flow
Firstly, the data of each fireproof observation point is built up in the data processing software and the data curve is generated. Draw the fire observation point arrangement plan, and insert the fire observation point arrangement plan into the data processing software; By setting the hyperlink mode and clicking the corresponding fire observation point on the drawing, the basic situation of the fire observation point can be intuitively observed. This is shown in figure 1

![Diagram showing the process of database hyperlinks]

**Figure 1.** The process of database hyperlinks

3. Establish the database of fire observation points and generate corresponding curves
In the data processing software, the data of each fireproof observation point is respectively set up in the worksheet, then the fireproof data is used to draw a chart, and the data of each observation point is automatically generated into a data curve. As shown in table 1 and figure 2.

| Day  | CH$_4$ | O$_2$ | CO | C$_2$H$_2$ | C$_2$H$_4$ | C$_2$H$_6$ | CO$_2$ | N$_2$ |
|------|--------|-------|----|-----------|-----------|-----------|-------|------|
| 1.17 | 0.73   | 14.68 | 379| 0         | 0         | 694       | 2.74  | 81.29|
| …    | …      | …    | … | …         | …         | …         | …   | …    |

**Table 1.** Data of fire protection observation points
4. Fire observation point drawing
In the drawing software, draw the layout drawing of the fire observation point, and convert it to the picture format, and then insert the picture of the fire observation point layout drawing into the data processing software to form the layout drawing of the fire observation point, as shown in figure 3.

5. Hyperlink mode Settings
In the data processing software, hyperlink is used to link the contents of the worksheet, and the data and curves of the fireproof observation point can be intuitively reflected.
6. Technical characteristics
Through the observation point data points area, equinoctial large databases, then observation point data to automatically generate graph, through the way of hyperlinks, click on the drawing on the corresponding observation points, can be intuitive to reflect the data change trend of the observation point, for the next step to take pertinent measures have played a positive role in guiding.

7. Conclusion
(1) the fire observation point layout drawing can directly see the observation point layout position.
(2) the fireproof observation point data is directly generated into a curve to dynamically grasp the gas concentration change in the observation point.
(3) hyperlink is adopted to combine the drawing with the database, so as to grasp the gas change of each observation point more conveniently and quickly.
(4) in this way, the time to review fire data is greatly reduced, the efficiency is improved, and the sensitivity to fire prevention data is increased.

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