Discussion on the Intensive Construction of Double Assay Supervision in Coal Power Enterprises

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Abstract: In order to deal with the problems of double laboratory supervision in coal power enterprises, this paper tries to improve the supervision effect through the construction of centralized laboratory. The construction plan, supervision effect and economic benefit of centralized laboratory are also described.

Keywords: Coal power quality inspection; Double assay supervision; Intensive construction

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1. Introduction

Double test is an important way of fuel quality inspection and supervision [1] in coal and electricity enterprises. At present, the power plant is mainly carried out through in-plant double testing, and the risk control of the laboratory factory testing link of incoming coal is realized through data comparison.

2. Current Situation Analysis

The coal quality inspection department shall sample, prepare samples, weigh and test the batches arriving at the factory every day, and send a number of samples separated in the final stage of sample preparation to the laboratory of power generation Operation Department for supervision test. The test results of both sides will be compared and analyzed by the Planning and Operation Department, and the test results shall be reported when the comparison difference is within the tolerance range.

3. Problems Exist

The supervision scope of double testing does not fully cover all the coal batches, and some units carry out double testing only on the market coal or spot check on the coal on the current day. For example, according to the company's system to carry out 10% of the spot check, the overall proportion of double testing did not reach 100%.

The test items are not fully covered. The comparison items of some companies contain key indexes such as calorific value and volatile fraction, and lack comparison of other indexes such as ash content and total sulfur.

The tolerance evaluation is more relaxed [2]. For example, the allowable ash difference is greater than the reproducibility critical difference specified by the national standard

The out-of-tolerance analysis is not thorough and the management is not closed loop [3]. There is no detailed traceability analysis of the over-deviation, and the closed-loop management of double assay supervision is not fully realized.

Double laboratory failed to completely achieve information isolation, and information exchange offset double assay supervision effect.

4. Management Objectives

According to the current situation of double assay supervision and management, the objectives of double assay management were put forward, namely full coverage, back-to-back, feedback closed-loop and comprehensive evaluation.

5. Analysis of Causes

In terms of personnel, the failure to equip enough testing personnel in the dual laboratory is the main reason for the failure to achieve full coverage of supervision. The configuration of staff should adapt to the actual requirements of the dual laboratory service. The management personnel to perform double assay data comparison is not a full-time supervisor, but a planning financial personnel.

In the aspect of equipment, the management standards of the factory incoming coal laboratory and the furnace incoming coal laboratory carrying out double testing are not uniform, which is the main reason for the wide tolerance range.

In terms of sample management, the process of sample preparation and the treatment of special coal samples are also the reasons for the large tolerance. For example, the milling time in the flour making process, the heat preservation measures of difficult burning coal, lack of clear unified norms. At the same time, the information management of sample number lacks perfect and effective supervision mechanism.

In terms of mechanism design, dual assay work is carried out by multiple departments, but there is no coordination between departments. There is room for improvement in closed-loop feedback and quantitative evaluation.

In terms of environment configuration, the storage of hardware devices meets the requirements, but there is a lack of perfect environment monitoring program.

6. Program Planning

6.1 Post Setting

Personnel input is determined according to the workload, which includes detection work and management work. This paper only takes the detection work as an example for quantitative analysis, and the detection workload is quantified by working hours.

Laboratory work can be divided into business management, technical management, quality management and testing work.

Business management includes revenue business management such as project negotiation, contract signing and contract review, expenditure business management such as equipment, consumables and service procurement, as well as dispute settlement, supervision and audit in business management.

Technical management refers to the planning, execution, supervision and certificate storage of laboratory technology.

Quality management refers to all the support work to ensure the accuracy of test data and the reliability of instruments and equipment.

The test work can be divided into test operation, data statistical processing and test guarantee measures.

The test items can be divided into three categories according to the workload calculation method. Type A means that the total workload of this type of work is linearly proportional to the number of samples, which means that the doubling of sample quantity leads to the doubling of working hours. Type B means that the working time of this type has a basic value, on the basis of which the increase of sample quantity leads to the increase of working time Type C refers to the work type with fixed working hours, which is not sensitive to changes in sample volume.

Testing operations include powder making, calorific value testing, industrial analysis testing and total sulfur testing. The duration of various operations is shown in Table 1. The estimated total working hours are calculated as 20 samples per day.

Table 1. Estimate of operating hours

Item	Type	handing time	Estimated average daily operating hours (h)(S=20)
powder process	A	H(Q)=0.2SQ	4
calorific value testing	A	H(Q)=0.5SQ	10
industrial analysis	B	H(G)=3+0.15SG	6
total sulfur testing	B	H(S)=2+0.1SG	4

According to this, it can be determined that the average daily operation positions are 4 or 5, which are responsible for daily manual testing and operation tasks. In addition, there are 3 full-time management personnel for business, technology and quality, and the responsibilities of equipment management, file management, training management and safety management are held by the above personnel. In summary, it is planned to set up 3 management posts and 7 testing posts.

6.2 Equipment Allocation

The equipment configuration is calculated according to the service time of the equipment. The service time of the equipment can refer to the manual operation hours of the above test items, which is calculated as the average daily working time of 8 hours, and the average daily testing quantity under the condition of full service time of 6 hours after the test guarantee measures and data processing are excluded for 2 hours, as shown in Table 2.

Table 2. Capacity information table

Item	Average daily detection volume	Estimate the equipment station
Sealed mill	30	2
calorimeter	12	4
industrial analyzer	20	2
Sulfur analyzer	40	2

In addition to the average sample quantity of 20 samples per day, the uneven distribution of sample quantity should be considered in the estimated number of equipment, that is, the maximum daily capacity should meet 30 samples per day. Second, all kinds of instruments and equipment should be equipped with more than one, in order to facilitate the quality control of equipment compar-

ison. Third, we need to consider other businesses besides the double assay business.

6.3 Environment Configuration

The environmental renovation work mainly depends on the technical requirements, equipment conditions and operation convenience of the test items.

For example, the calorimeter requires a stable ambient temperature and a northward orientation. Room layout can follow the sample testing process for sequential layout.

7. Implementation Effect

From February 2022 to August 2022, the monthly sample quantity increased from 227 samples to 743 samples, realizing the full coverage of the supervision of incoming coal batches. At the same time, the contrast between ash and total sulfur was increased.

Among them, a total of 47 exceedances were made, with an exceedance rate of 1.74%. All exceedance items were analyzed and rectified.

The power plant test results and the centralized test results are uploaded and compared automatically through the information management system of both sides to achieve information isolation and ensure the supervision effect.

Comprehensive evaluation was carried out according to the results of double assay comparison, and the quality inspection of each power plant was ranked.

8. Economic Benefits

Economic benefits can be divided into two parts: supervision benefits and intensification benefits. Unique assay can supervise the supervision revenue refers to the cases, there is no supervision in enterprise management losses, such as the supplier due to acceptance process uncertain conservative quotation, or mistrust of the testing data of the supplier business management cost, etc., after monitor input, which can effectively reduce the unsupervised losses, no loss and supervision in difference is the direct supervision of the proceeds. The benefit of intensification means that the capital investment of multiple distributed testing laboratories can be replaced by the construction of a centralized testing center, and the investment of multiple distributed laboratories can be replaced by the investment of one centralized laboratory, thus realizing resource optimization. In addition, the concentration effect is reflected in the extensibility of technology concentration and capital concentration, which is conducive to the training of talent team and the flexible expansion of testing business, with broad development potential.

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