Prepare alignment samples of crude oil contained water detection and analysis of the test data dispersion in the primary laboratory of Daqing Oilfield China

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ABSTRACT

Water content of the oil production of oil field development is relatively important parameters; it is calculating the comprehensive water cut oil field, and an important basis of evaluation of development effect. Because the water content of oil well an item is all oilfield laboratories must analyze project, which is the detection project throughout the whole process of oilfield development, that is the typical and representative, preparation of crude oil moisture detection comparison samples of oil base laboratories, can effectively inspect the grass-roots laboratory test ability and analytical testing level, make each laboratory to strictly enforce the standards, issued by the inspection data onto high accuracy and comparability, meet the test oil company in the production process testing requirements. At the same time on the primary laboratory comparison samples test data dispersion is analyzed, so that the data can greatly improve the comparability. This paper introduces how to prepare comparison samples, and through the sample test data dispersion analysis, considers that the scientific method of reducing the data divergence is unified testing standards, unified operation equipment, unified using medicament, unified operation method.

Key words: The Primary Laboratory; Crude Oil Contained Water; Comparison Samples; The Test Data Dispersion
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INTRODUCTION

For the management of oilfield, water cut of crude oil is a very important basic parameter, is directly related to the oil business decision and the transmission error of the output of crude oil, but also related to the cost benefit classification accounting, and therefore must be accurate measurement and control water cut crude oil rate [1]. Water content of the oil well is the production of oilfield development relatively important parameters; calculation of comprehensive water cut oil is an important basis for evaluation of development effect.

SAMPLE PREPARATION

Emerging from the crude oil (water content less than 0.3%) as the standard oil, packed crude oil in the sampling barrel and sealed, then filled out the label to the laboratory. In the laboratory, using distilled water preparation of different standard samples of containing water in the range of 5%-90%. According to the proportion of the sample of crude oil and distilled water into the beaker, use mixing spoons to toss until combined, oil and water after fully mixing, that loads into the wide-mouth bottle and seal, write the label and put into an avoid light storage room in low temperature for storage. Fill out label samples of encryption, then the name of sample input computer. The distribution of the sample to the oil of various oil production plant. Oil management department is responsible for organizing the production factory of issuance of samples, factory laboratory center for each receive a sample mineralization laboratory send a man to supervise the entire process, and be responsible for audit inspection report [2], [3]. The unit of organization level personnel on-site inspection detection. Through the field detection method, the absolute error is less than 1%, so the test results the absolute error is less than 1% of the sample for the comparable results, more than 1% of the non-comparable results.

DATA ANALYSIS

The comparison of standard reference technical standards of the internal field, namely the well fluid sampling and watertest method [4]. To accomplish the detection period for provisions to recover the full test results within 1 working day. Compared with previous years data characteristics of this intercomparison results, In 2007 and 2011 data as an example：In 2007 a total of 96 samples of preparation，moisture between 35 - 55%；In 2011 a total of 120 samples of preparation，moisture between 5 - 90%. In 2007, the comparison results of the absolute error which is less than 1% , that the ratio increased substantially, increased from 14.58% to 46.67%, contrast ratio increase 3.2 times; the comparison results of the absolute error which is more than 4% , that the ratio decline substantially, dropped from 59.37% to 15%, the ratio increased exponentially, accuracy substantially rise.
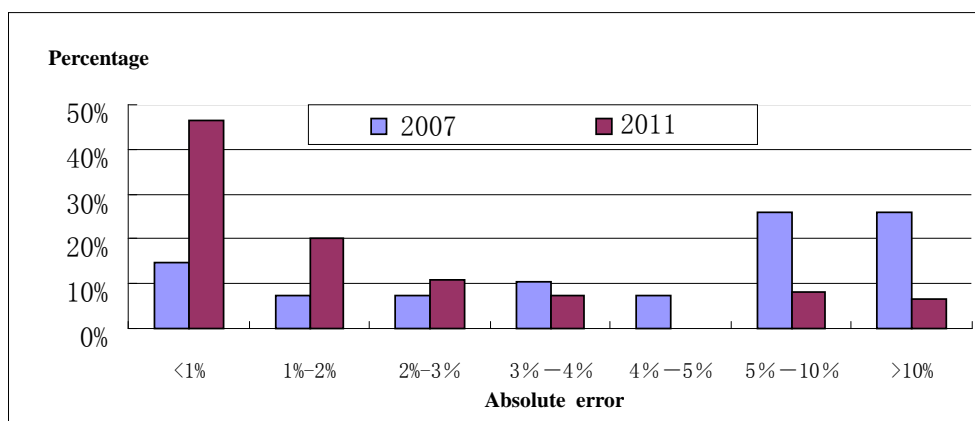

Fig. 1 Comparison results of absolute error distribution diagram of containing water

Table.1 The year 2011 the difference betweenthe preparation of water and detection of water of each basic unit (108 basic laboratories data)
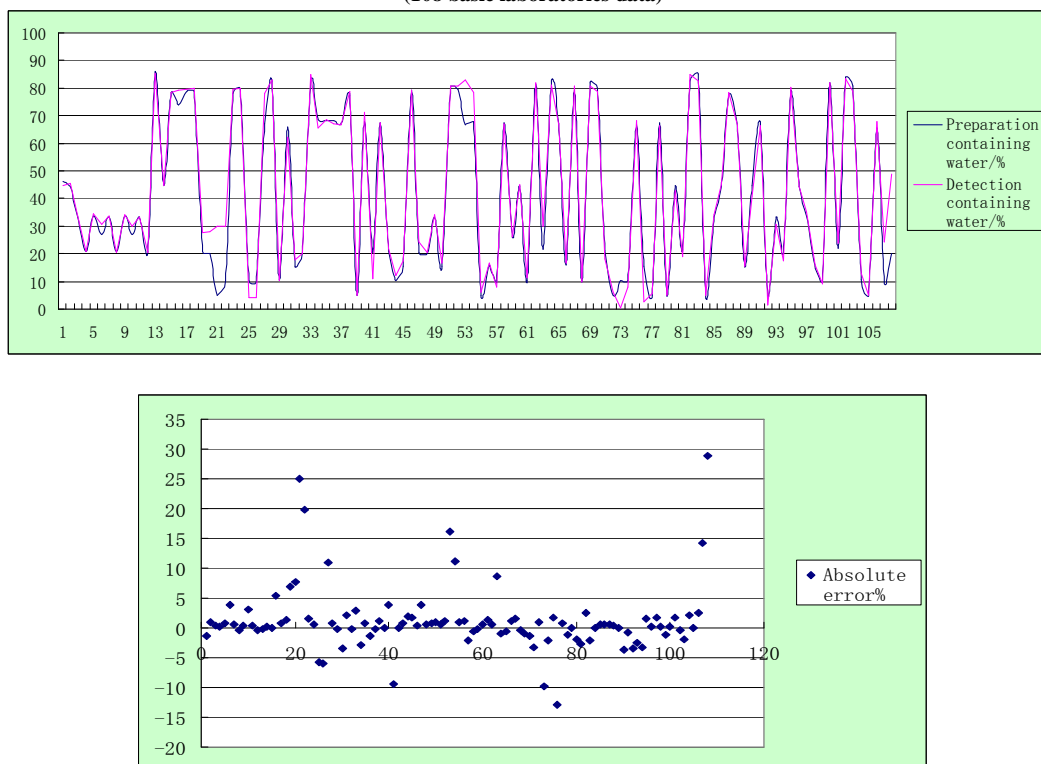

Fig. 2 The year 2011 discrete distribution maps of absolute error comparative data(108 basic laboratories data)

DISCUSSION

First, too much ofcentrifuge model(TMCM). By the statistics, in this alignment, were used in the centrifuge 13 types of 7 manufacturers, centrifuge technology parameters are also larger difference between them, the requirements of

technical standard test centrifuge speed control in "3000r/min-3500r/min", but because the instrument have many models and verification and other objective factors,at present, centrifuge speed cannot determine whether meet the standard requirements,it is difficult to guarantee the centrifugal effect, cause data deviation.

Second,details of the operation is not standard(DQNS). In the course of the operation of any small mistake will introduce error,affecting the accuracy of data. Mandatory condensation,uneven mixing and so on,emulsified water particles caused by uneven distribution of water, affecting the accurate [5].

Third, quality and quantity of demulsifier(QAQD). Demulsifier currently tests used for centrifugal No.1, centrifugal No.2, there are some differences between the quality of individual units use demulsifying agent,in the process of demulsification effect of centrifugal tests are affected,thus affecting the final data accuracy. Demulsifier dosage requirements in standards are "To the centrifuge tube with 3 drops 4 drops of Demulsifier". Due to the difference of the operators and the dropper size,the amount of demulsification does not unified,the demulsification effect affected. Forth, Control of temperature difference(COTD). There are three standard relates to the technical details of the constant temperature control,any one place temperature control does not accord with a standard, will effect later test results.

Fifth,the use of non-certified equipment(UNCE). Because in the balances for inspection, no checking balance backup, result of large deviation.

Table.2 The year 2007the difference betweenthe preparation of water and detection of water of each basic unit (95 basic laboratories data)

Fig. 3 The year 2007discrete distribution maps of absolute error comparative data(95 basic laboratories data)

ANALYSIS OF THE EFFECT OF THE MODEL ERROR FACTORS

This paper selected to reflect the important indexes affecting error, through the acquisition and processing of the original data, using factor analysis method to carry on the factor analysis on the factors influencing the error, found the key factors that affect the error, and provides a theoretical basis for the factor analysis model.

The general model of factor analysis is:

$X_1=a_{11}f_1+a_{12}f_2+\ldots\ldots+a_{1m}f_m+e_1$

$X_2=a_{21}f_1+a_{22}f_2+\ldots\ldots+a_{2m}f_m+e_2$

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$X_k=a_{k1}f_1+a_{k2}f_2+\ldots+a_{km}f_m+e_k$

In this model, f_j is the common factor, between them is two two orthogonal; e_i is a special factor, only play the role of the corresponding X_i; a_{ij} is the common factor which is the load, load variable i in the factor of j, that is the correlation coefficient [6].

Through grasping the details and fine operations, the ascension of the whole operation level, realize the standardization work. Unified use of reagents, which used in the experiment, such as demulsifier,to avoid errors due to the quality of medicament,in addition, standard dosage,establish the relationship between the dosage of medicament and the object of analysis, analysis of the sample volume, ensure efficacy [7]. The data standardization, the data file type to realize centralized management, test data is accurate and provides the powerful guarantee. Unified technical specification, standard of laboratory personnel of publicizing, to truly grasp the standards, through the detection of a project, all standard involve implementation, to ensure that every instrument is in use, each step according to the standard.
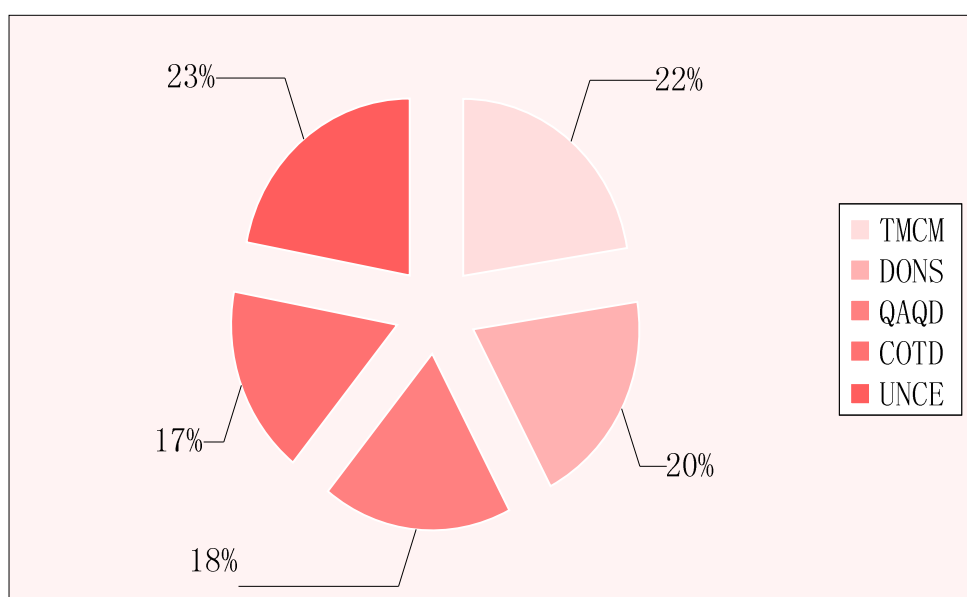

Fig. 4 The model of error effect factors

CONCLUSION

The innovation of management mode in order to improve the analysis quality lay the foundation. The experiment staff quality improving. After the concentration of the primary laboratory and the implementation of professional management, in the competition for the optimum test operator, through the innovation of labor organization formed optimization of test systems of human resources.

Improving the quality of the instrument. After the concentration of the primary laboratory, extended service and serious damage to the device out of production process, in improving the equipment used in the quality, ensure the accuracy of the results improve. Unified allocation of instruments, the instrument is one of key steps which affect the test data comparability, the introduction of the error is large, the human is not controllable, hence the need for a unified manufacturers of detection equipment, specifications and models, to ensure the material basis of comparable data.

Acknowledgements

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