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Classifications for Petroleum Resources and Reserves

油气矿产资源储量分类

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Classifications for Petroleum Resources and Reserves

1 Scope

This Standard specifies the classification and release of mineral resources and reserves of petroleum, natural gas, shale gas and coalbed methane (hereinafter collectively referred to as petroleum).

This Standard is applicable to the statistics and release of total petroleum initially-in-place, the management and planning of petroleum mineral products, the policy formulation, the undiscovered petroleum initially-in-place and reserve estimation, the evaluation and the formulation of related technical standards.

2 Terms and Definitions

The following terms and definitions are applicable to this document.

2.1 Total Petroleum Initially-in-place

Total petroleum initially-in-place refers to available natural accumulations of petroleum formed by the geological processes in the earth's crust. It is characterized by quantity, quality and spatial distribution. Its quantity is expressed by ground conditions converted to 20 °C and 0.101 MPa. It may be further classified into two types: undiscovered petroleum initially-in-place and discovered petroleum initially-in-place.

2.2 Undiscovered Petroleum Initially-in-place

Undiscovered petroleum initially-in-place refers to the quantity of undiscovered and unverified petroleum calculated through the study of comprehensive petroleum geological conditions, geological laws and geological surveys.

2.3 Discovered Petroleum Initially-in-place

Discovered petroleum initially-in-place refers to the quantity of petroleum estimated in accordance with seismic, drilling, logging and testing data after the petroleum has been discovered in drilling. It includes possible petroleum initially-in-place, probable petroleum initially-in-place and proved petroleum initially-in-place. These three levels of geological reserves proceed from low to high in accordance with the degree of exploration and development, and the degree of geological understanding.

2.3.1 Possible petroleum initially-in-place

Possible petroleum initially-in-place refers to the estimated quantity of petroleum of

2.5.2 Remaining probable commercial recoverable reserves

Remaining probable commercial recoverable reserves refers to the probable commercial recoverable reserves minus the cumulative petroleum production.

2.5.3 Probed commercial recoverable reserves

Proved commercial recoverable reserves refers to the quantity of petroleum that can be commercially recovered in the probed technical recoverable reserves and estimated in accordance with the reasonably predicted economic conditions (such as: price, production allocation and cost, etc.).

2.5.4 Remaining proved commercial recoverable reserves

Remaining proved commercial recoverable reserves refers to the proved commercial recoverable reserves minus the cumulative petroleum production.

3 Classification of Exploration and Development Stage

3.1 Basis of Stage Classification

In accordance with the degree of work from low to high, the exploration and development stage is divided into three stages: pre-exploration stage, evaluation stage and development stage.

3.2 Pre-exploration Stage

Through seismic and other geophysical and geochemical exploration, and pre-exploration well drilling, delineate favorable petroleum-bearing zones and preferred favorable traps (sweet-hearts); basically, find out the characteristics of the structures, reservoir stratums, cap rocks and petroleum reservoirs; discover the petroleum reservoirs.

3.3 Evaluation Stage

After discovering the petroleum reservoirs in the pre-exploration stage, conduct seismic exploration and appraisal well drilling to find out the geological features, such as: structural morphology, reservoir distribution and changes in reservoir physical properties, as well as petroleum reservoir characteristics, reservoir types, driving types, fluid properties, distribution and production capacity characteristics; clarify the technical conditions of exploitation and economic value of development; complete the development concept design.

3.4 Development Stage

Formulate development schemes. In accordance with the development schemes, implement the development well pattern drilling; complete the production capacity

J---Probable Technical Recoverable Reserves;

K---Probable Commercial Recoverable Reserves;

L---Remaining Probable Commercial Recoverable Reserves.

Figure 1 -- Types and Estimation Flow Diagram of Undiscovered Petroleum Initially-in-place and Discovered Petroleum Initially-in-place

4.2 The undiscovered petroleum initially-in-place is no longer classified.

4.3 The discovered petroleum initially-in-place is classified into three levels: possible petroleum initially-in-place, probable petroleum initially-in-place and proved petroleum initially-in-place.

4.4 In the estimation of the possible petroleum initially-in-place, it is necessary to preliminary find out the structural morphology and the conditions of the reservoir stratum. The petroleum flow has been obtained, or the petroleum reservoir has been found through drilling, or it is in the vicinity of the zones with the proved petroleum initially-in-place and the probable petroleum initially-in-place. In addition, the existence of the petroleum reservoir has been predicted, and the value of further exploration is proved through comprehensive analysis. The degree of geological reliability is low.

4.5 In the estimation of the proved petroleum initially-in-place, it is necessary to basically find out the structural morphology, the changes of the reservoir stratum, the distribution of the petroleum reservoir, the types of the petroleum reservoir, the fluid properties and production capacity, etc. Or it is adjacent to the zones with the proved petroleum initially-in-place, with a moderate degree of geological reliability. It may be used as the basis for the evaluation of the petroleum reservoir and the formulation of the development concept design (development scheme).

4.6 In the estimation of proved petroleum initially-in-place, it is necessary to find out the structural morphology, the distribution of the petroleum reservoir, the type of the reservoir space, the type of the petroleum reservoir, the type of driving, the fluid properties and production capacity, etc.; the fluid interface or the bottom boundary of the lowest petroleum reservoir is confirmed by drilling, logging, testing or pressure data; there shall be a reasonable degree of drilling control or a well pattern deployment scheme for primary development. The degree of geological reliability is high.

4.7 In the estimation of technically recoverable reserves, estimate the probable technical recoverable reserves in the probable petroleum initially-in-place in accordance with the technical conditions of exploitation; estimate the proved technical recoverable reserves in the proved petroleum initially-in-place in accordance with the technical conditions of exploitation.

4.8 In the estimation of commercial recoverable reserves, estimate the probable commercial recoverable reserves in the probable technical recoverable reserves in

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