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**ENERGY INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

NB/T 10238-2019

**Code for Design of Natural Material Source Selection and
Exploitation for Hydropower Projects**

水电工程料源选择与料场开采设计规范

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Foreword

This document was issued on 4 November 2019 by the National Energy Administration of the PRC and takes effect on 1 May 2020.

It is a NB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

It is classified under ICS 27.140, Chinese classification P59.

This code was formulated by the drafting group in accordance with the requirements of the Notice of the National Energy Administration on Issuing the Second Batch of Energy Sector Standard Development (Revision) Plans for 2011 (Guo Neng Ke Ji [2011] No. 252), through extensive investigation and research, careful summarization of practical experience and wide solicitation of opinions.

The main technical contents of this code are: basic requirements, selection and planning of natural material sources, quarry exploitation, soil borrow area exploitation, natural sand and gravel borrow area exploitation, slope design of borrow areas and quarries, and safety monitoring and post-processing.

The National Energy Administration is in charge of the administration of this code. China Renewable Energy Engineering Institute proposed this code and is responsible for its routine management, and the Energy Sector Standardization Technical Committee on Hydropower Survey and Design is responsible for the explanation of specific technical contents. Comments or suggestions arising during implementation should be sent to China Renewable Energy Engineering Institute (Address: No. 2 Liupukang Beixiaojie, Xicheng District, Beijing; Postal code: 100120).

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The National Energy Administration approved 384 energy sector standards including Technical Code for Electrical Prospecting of Hydropower Projects (Annex 1), 48 English versions of energy sector standards including Technical Guide for Rock-Filled Concrete

Dams (Annex 2) and Amendment No. 1 to 7 energy sector standards including Technical Code for Environmental Impact Assessment of Wind Farm Projects (Annex 3), and abolished 5 energy sector standards and plans including Charging Standard for Survey and Design of Wind Farm Projects (Annex 4), all of which are hereby issued. National Energy Administration, 4 November 2019.

In the Catalogue of Sector Standards attached to the announcement, NB/T 10238-2019 Code for Design of Natural Material Source Selection and Exploitation for Hydropower Projects is listed as item 15, with approval date 2019-11-04 and implementation date 2020-05-01, and with no standard superseded.

1 Scope

NB/T 10238-2019 is the Chinese design code for selecting natural material sources and planning their exploitation on hydropower projects. A large dam is built from what the site provides: rockfill and filter materials for an embankment, aggregate for concrete, impervious clay for a core. Choosing where those materials come from, and in what order the quarries and borrow areas are worked, decides a large part of the cost, the programme and the environmental footprint of the project, and a wrong choice cannot easily be reversed once excavation has started. The code sets the general provisions and defined terms, then the basic requirements on material demand and the balance between excavated materials that can be reused and materials that must be won from dedicated sources. It covers the selection of material sources - the comparison of quarries, borrow areas and the reuse of structural excavation against quality, quantity, haul distance, cost and environmental impact - and the planning of quarry and borrow area exploitation, including the layout, the benches and slopes, the stripping and the treatment of overburden. The code then sets out the design of the quarry itself: drilling and blasting, loading and haulage, the processing of aggregate, the stockpiles and the balance of supply and demand over the construction programme. Slope stability and support, drainage, safety, the monitoring of quarry slopes and deformation, and the rehabilitation of worked areas close the code.

1.0.1 This code is formulated with a view to standardizing the design of material source selection and borrow area exploitation of natural construction materials for hydropower projects.

1.0.2 This code is applicable to the design of material source selection and borrow area exploitation of natural construction materials for hydropower projects.

1.0.3 The design of material source selection and borrow area exploitation shall follow the principles of rational use of natural construction materials, effective saving of land resources, ensuring safety, and attention to environmental protection, soil and water conservation, and energy saving and consumption reduction.

1.0.4 In addition to this code, the design of material source selection and borrow area

exploitation for hydropower projects shall also comply with the current relevant national standards.

2 Terms

2.0.1 design demand quantity: the quantity of natural construction materials, measured in bank (in-situ) volume, calculated during material source planning on the basis of the design work quantities after accounting for losses in exploitation, transportation, stockpiling, processing and working face construction, and for volume conversion.

2.0.2 planned exploitation quantity: the quantity of natural construction materials required after considering the geological and construction factors of the material source on the basis of the design demand quantity.

2.0.3 exploitable reserve: the reserve of usable natural construction materials of all kinds that can be exploited, calculated through exploitation planning based on the exploitation conditions, sequence and process of the material source and on the technical performance of the exploitation equipment.

3 Basic Requirements

3.0.1 The material sources and borrow areas of natural construction materials for hydropower projects shall include project excavated materials, quarries, soil borrow areas and natural sand and gravel borrow areas. The data required for the design of material source selection and borrow area exploitation should comply with the relevant requirements of Appendix A of this code.

3.0.2 The quality and reserves of natural construction materials shall comply with the relevant requirements of the current sector standard NB/T 10235 Code for Investigation of Natural Construction Materials for Hydropower Projects.

3.0.3 Project excavated materials shall be given priority as material sources. According to the quality, quantity and supply intensity requirements of natural construction materials, a comprehensive analysis shall be made of the distribution of material sources, the exploitation and transportation conditions of borrow areas and the exploitation planning of borrow areas; environmental impacts shall also be considered, land occupation and resettlement shall be reduced, mutual interference with project construction shall be avoided as far as possible, and the basic principles of high quality, economy, environmental protection and energy saving shall be followed. The material sources shall be selected after technical and economic comparison.

3.0.4 The direct utilization rate of project excavated materials shall be increased, and the recovery rate of stockpiled materials shall be increased.

3.0.5 Borrow areas should be selected in a concentrated manner, avoiding the exploitation