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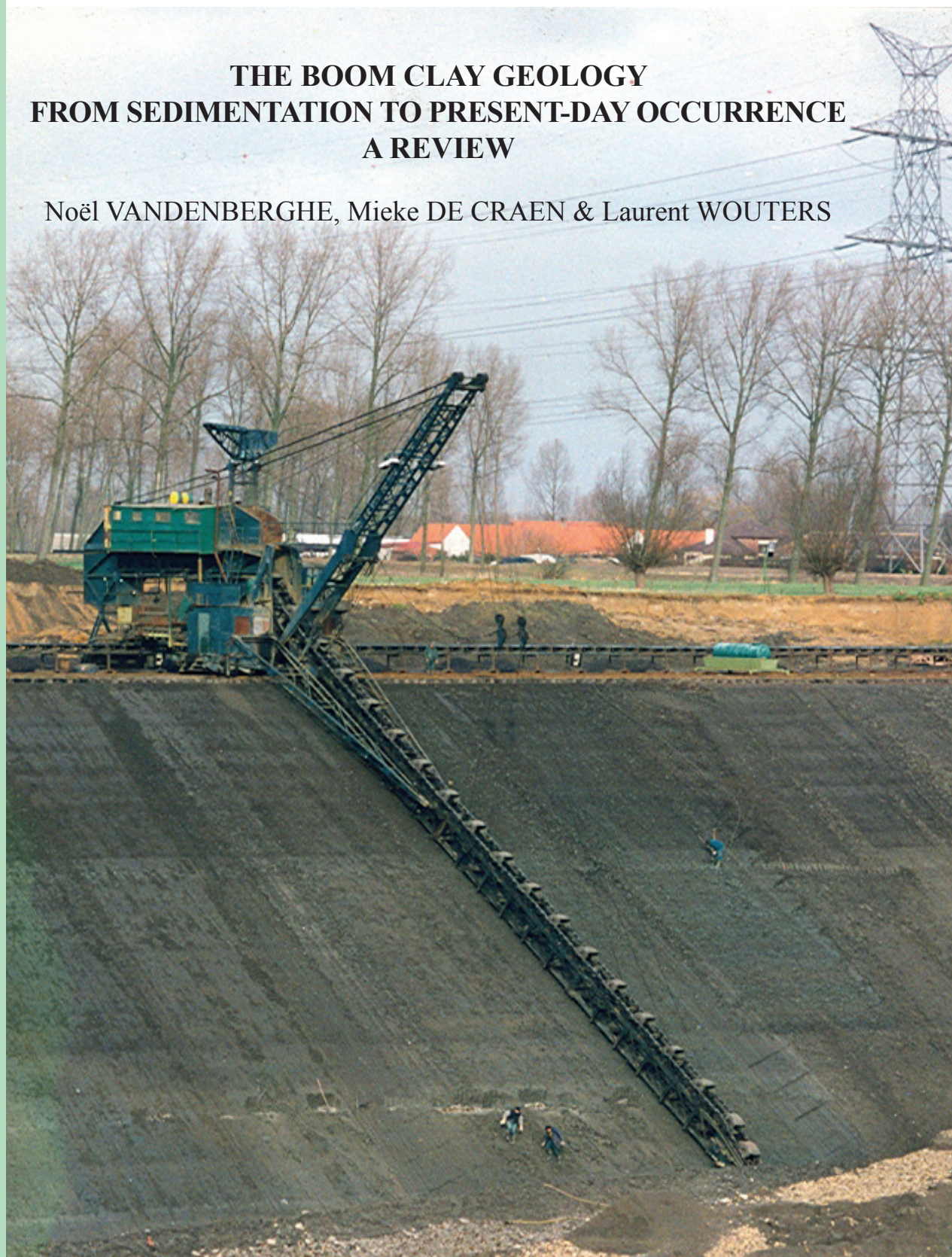
**MEMOIRS OF THE GEOLOGICAL SURVEY OF BELGIUM
N. 60 - 2014**

**THE BOOM CLAY GEOLOGY
FROM SEDIMENTATION TO PRESENT-DAY OCCURRENCE
A REVIEW**

Noël VANDENBERGHE, Mieke DE CRAEN & Laurent WOUTERS

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A review

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(76 pages, 70 figures)

Cover : KU Leuven doctoral students studying Boom Clay in the Schelle-Niel pit, between Boom and Antwerp, in the early nineties (© KU Leuven).

Note the sharp boundary between upper black Putte Member and lower grey Terhagen Member.

The half-metre-scale layering observed in the clay is obliquity driven.

The pale layers are carbonate septaria levels. Septaria fragments cover the floor of the excavation.

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ABSTRACT. In this Memoir, a review is presented of the present knowledge on the geology of the Rupelian Boom Clay, in particular its sedimentation history and diagenetic evolution. A synthesis of the following items is given: the present occurrence of the deposit, the paleogeographical context of its formation, the stratigraphical position and subdivisions with their correlation potential, the lithology and the sedimentation model, the characteristic occurrence of septaria, the paleoclimatic conditions, the tectonic influences on the sedimentation and the post-Rupelian evolution of the clay mass.

KEY-WORDS: Boom Clay, Rupelian, Belgium, sedimentology, diagenesis, septaria, paleoclimate, tectonics.

PREFACE

The current synthesis report on Boom Clay geology has been written in the framework of the Belgian program on the long-term management of high-level and/or long-lived radioactive waste management. In the geological disposal option of radioactive waste, as a final solution for the management of the waste, the host formation is considered to be the main barrier in order to ensure the passive long-term safety. Understanding of this main barrier as part of the disposal system is of primary concern. In Belgium, the Oligocene Boom Clay is considered as one of the potential host formations. Two major poles of fundamental and applied research on the Boom Clay are distinguished, on the one hand the laboratory of Applied Geology and Mineralogy of the KU Leuven, and on the other hand the research conducted in the framework of radioactive waste management by SCK•CEN and ONDRAF/NIRAS (the Belgian Agency for Radioactive Waste and Enriched Fissile Materials). Beside applied research aiming at supporting safety cases directly, ONDRAF/NIRAS also financially supports fundamental research at universities with the objective of maintaining a know-how resulting from decades of knowledge gathering.

The compilation of the geological knowledge on the Boom Clay and its boundaries is needed with respect to the safety functions the geosphere must fulfill. Man and the environment need protection by isolating the nuclear waste through engineered containment, by preventing inadvertent human intrusion, and by limiting the contaminant release rates. A synthesis compilation is needed because the many existing topical reports are written in a variety of formats for different objectives, from internal notes to papers published in international scientific journals. A coherent, consistent and comprehensive summary document is needed demonstrating that a clear understanding exists of the intrinsic characteristics of the host formation and its geological environment, in time and space. Such understanding forms the foundation of the bridge to the long-term safety strategy.

In this volume, the state-of-the-art knowledge gathered over the years on Boom Clay is presented, with regard to its depositional area, present-day occurrence, stratigraphy and geology. It represents our current vision and understanding of the challenging world of the smallest sedimentary particles that constitute the body of the Boom Formation, unravelling its sedimentation conditions and paleogeography, its diagenesis and changes with time, its perturbations and evolution.

Although already in the 19th century, the Boom Clay has been used as a reference section in the geological time scale, geologists have been attracted only relatively late by the study of its sedimentological details. The reason for this must be sought in the limited geological tools available for studying such fine-grained sediments and sedimentary rocks during most of the 20th century. As today we have a variety of powerful tools and this document shows how the detailed study of the sedimentology of clay and clay minerals has contributed to the fundamental understanding of the behavior of the Boom Clay as a barrier.

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The series, which started in 1955, welcomes papers dealing with all aspects of the earth sciences, with a particular emphasis on the regional geology of Belgium and adjacent areas. Submitted papers should present the results of syntheses of original studies (e.g. PhD theses, cartography). High scientific standards are required. Papers written in English are preferred.

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