International Standard

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Biotechnology — Biobanking — Requirements for deep-sea biological material

Biotechnologie — Biobanking — Exigences relatives aux matériaux biologiques d'eau profonde

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Foreword

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This document was prepared by Technical Committee ISO/TC 276, *Biotechnology*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The collection and accession management of deep-sea biological material is concerned with the scientific research of deep-sea genetic resources. Organisms living in deep-sea environments are commonly reported as extremophiles that inhabit deep-sea extreme conditions and play an important role in both research and industry. In addition to exploring the biological origin and evolution of these organisms, this work has led to innovations in material science, pharmacology, and energy generation. Deep-sea biological materials have many distinctive characteristics encompassing a wide variety of organisms and complex living environments.

The collection of deep-sea biological material requires the use of special pressure-resistant deep-sea equipment. Such equipment is usually deployed into the deep-sea through a variety of platforms such as landers, and human-occupied or unoccupied submersibles. The procedure of material collection varies depending on the nature of the deep-sea biological material. In some cases, deep-sea biological material is collected using special equipment such as pushcores and slurp guns, where the deep-sea biological material remains in the equipment. In other cases, deep-sea biological material is collected directly using a manipulator and placed properly in equipment such as a biobox for temporary storage. The processing and preservation of deep-sea biological material is carried out when the platform and equipment are recovered to the research vessel.

Deep-sea biological material can be associated with water, sediments, rocks, living organisms and complex habitats. Collection techniques, processing, transportation, and storage methods and needs for these deep-sea biological materials vary greatly according to their types and uses. Biological collections can include frozen deep-sea biological material, deep-sea biological material preserved in liquid (such as cetyltrimethylammonium bromide, ethanol or other preservatives), or extracted biomolecules. Standardized biological material processing and storage approaches are needed to maintain high-quality collections and ensure fit-for-purpose deep-sea biological material and associated data.

The implementation of this document will improve the quality and utilization of deep-sea biological material for biomolecular analysis and accelerate the related scientific research and industry use.

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Biotechnology — Biobanking — Requirements for deep-sea biological material

1 Scope

This document specifies requirements for the biobanking of deep-sea biological material including the collection, processing, transportation and storage of deep-sea biological material.

This document is applicable only to deep-sea biological material that can be used for biomolecular processing, e.g. nucleic acids, proteins, and metabolites.

This document is applicable to all organizations performing research and development on deep-sea biological material.

This document does not apply to the collection of deep-sea biological material intended for environmental impact assessment for sea floor mining.

NOTE International, national or regional regulations or requirements or a multiple of these can also apply to specific topics covered in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19493, *Water quality — Guidance on marine biological surveys of hard-substrate communities*

ISO 20387, *Biotechnology — Biobanking — General requirements for biobanking*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19493, ISO 20387 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
deep-sea
deep sea
ocean area with the water depth equal to or greater than 200 m

3.2
deep-sea biological material
any substance that is derived or in part obtained from an organic entity from the *deep-sea* (3.1) such as animals, fungi, prokaryotes (archaea and bacteria), protists, acellular organisms, and viruses

EXAMPLE *Macroscopic organism* (3.3), microorganisms or any part or derivative thereof.

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3.3
macroscopic organism
biological entity that is visible without magnification equipment (≥1 mm)

3.4
marine sediment
substances under the action of crustal surface geology, where the original products such as weathered rocks, metamorphic rocks and pre-existing sedimentary rocks of the parent rocks (i.e. magmatic rocks, metamorphic rocks and *sedimentary rocks* (3.6)) are transported, settled or precipitated by biogenic, volcanic and cosmic phenomena as loose unconsolidated deposits on the sea floor

[SOURCE: ISO 23040:2021, 3.1]

3.5
risk
effect of uncertainty on objectives

Note 1 to entry: An effect is a deviation from the expected — positive and/or negative.

Note 2 to entry: Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and process).

Note 3 to entry: Risk is often characterized by reference to potential events and consequences, or a combination of these.

Note 4 to entry: Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence.

Note 5 to entry: Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of an event, its consequence, or likelihood.

Note 6 to entry: Risk can include the potential for dual-use research of concern (DURC) describes research that is intended to provide a clear benefit, but which could easily be misapplied to do harm.

[SOURCE: ISO Guide 73:2009, 1.1, modified — Note 6 to entry added.]

3.6
sedimentary rock
one of the three major types of rocks that make up the lithosphere (the other two are magmatic rocks and metamorphic rocks), which are formed from the weathering products of a parent rock (or any pre-formed rock), biogenic materials, volcanic material, cosmic material and other original material, and sedimentation after the formation of rock diagenesis

[SOURCE: ISO 23040:2021, 3.2]

4 General requirements

ISO 20387 shall be followed. The collection of deep-sea biological material should be conducted in accordance with relevant guidance such as ISO 22787.

The biobank shall ensure that biorisk management procedures (e.g. ISO 35001, WHO guidance[10]) for collecting deep-sea biological material are established, documented, implemented and maintained, as appropriate.

The personnel for collecting, sampling and processing deep-sea biological material shall be competent and have the necessary professional qualifications.

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