



BSI Standards Publication

Traceability of rare earths in the supply chain from mine to separated products

National foreword

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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Traceability of rare earths in the supply chain from mine to separated products

*Traçabilité des terres rares dans la chaîne d'approvisionnement de la
mine jusqu'aux produits séparés*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 298, *Rare earth*.

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.

Introduction

The adoption of a traceability system is a strategic decision for an organization that can help provide a sound basis for a sustainable supply chain. A traceability system is a useful tool to assist an organization operating within a rare earth supply chain to achieve defined goals and objectives within their overall management system(s). The choice of how a traceability system is defined is influenced by regulations, product characteristics and end user expectations. The complexity of the traceability system can vary depending on the nature of the product(s) within the supply chain, the sources of inputs and the objectives to be achieved.

The implementation of a traceability system by an organization depends on:

- technical limits inherent to the supply chain organization and products (i.e. nature of the raw materials, size of the lots, collection and transport procedures, processing and packaging methods);
- the cost benefits of applying such a system;
- the characteristics of mining and processing;
- the environmental impact, waste treatment and disposal processing.

The potential benefits of implementing the traceability system defined in this document are:

- the ability to trace rare earth materials and products between mine and separated products;
- reduction and prevention of pollution;
- promotion of environmentally responsible and sustainable production of rare earths throughout the supply chain;
- to align a rare earth supply chain with sustainable development goals;
- to provide better service for users/customers by supplying quality products.

This document can be used by all participants in the rare earth supply chain. However, this document does not specify the need for:

- complete uniformity in the structure of traceability systems for different rare earth supply chains;
- alignment of documentation to the clause structure of this document;
- use of specific terminology within the rare earth supply chain.

In this document, the following verbal forms are used:

- “shall” indicates a requirement;
- “should” indicates a recommendation;
- “may” indicates a permission;
- “can” indicates a possibility or capability.

Information marked as “NOTE” is intended to assist the understanding or use of the document. “Notes to entry” used in [Clause 3](#) provide additional information that supplements the terminological data and can contain provisions relating to the use of a term.

This document describes a traceability system covering the rare earth supply chain between the originating mine and separated rare earth products. This document is intended to give supply chain members the ability to access information relating to rare earth materials or products as they pass through the supply chain. This information will include the identity of each business in the supply chain which has handled the rare earth material or product shipment. This makes it possible for the purchasers and suppliers of separated rare earth products to identify the business in the chain.

chain that process a given shipment of rare earth material, and the location of that rare earth material as it passes between supply chain nodes.

The following types of businesses in the rare earth supply chain are considered in this document.

- a) Mines, in which rare earth-bearing minerals are:
 - 1) extracted as ore from the ground in solid form by underground, open-pit or dredge mining methods;
 - 2) extracted as a rare earth-bearing solution from the ground using in situ leaching/recovery methods, or as a solution using heap or vat leaching methods;
 - 3) extracted from tailings or other wastes that contain rare earths.
- b) Recycling operations, in which waste, scrap, tailings or end-of-life materials containing rare earths are reprocessed to produce a rare earth containing material suitable as input to a beneficiation, hydrometallurgical or separation plant.
- c) Beneficiation plants, in which solid ore containing rare earth minerals is processed to concentrate the rare earth minerals into one or more mineral concentrates.
- d) Hydrometallurgical plants, in which either:
 - 1) rare earth mineral ore or beneficiation plant product are dissolved, and the solution processed;
 - 2) an in situ or heap leach or vat leach solution, is processed.

NOTE In either case, the hydrometallurgical plant produces a relatively pure precipitated solid, salt or concentrated solution, containing mixed rare earths and suitable as feed to a separation plant.
- e) Separation plants, in which mixed rare earth products from hydrometallurgical plants are separated into one or more relatively pure products each containing one or more specific rare earths to the substantial exclusion of other rare earths. Separation plant products are further processed into alloys, magnets, catalysts and other materials in downstream operations outside the rare earth supply chain considered in this document.
- f) Traders, brokers and wholesalers: entities that handle rare earths, generally the products of hydrometallurgical and separation plants, possibly re-package or blend material, but otherwise do not change the chemical or physical nature of the rare earth-bearing material.
- g) Transporters: businesses that move rare earth products between different businesses in the rare earth supply chain.

The connections between the businesses are illustrated in [Figure 1](#).

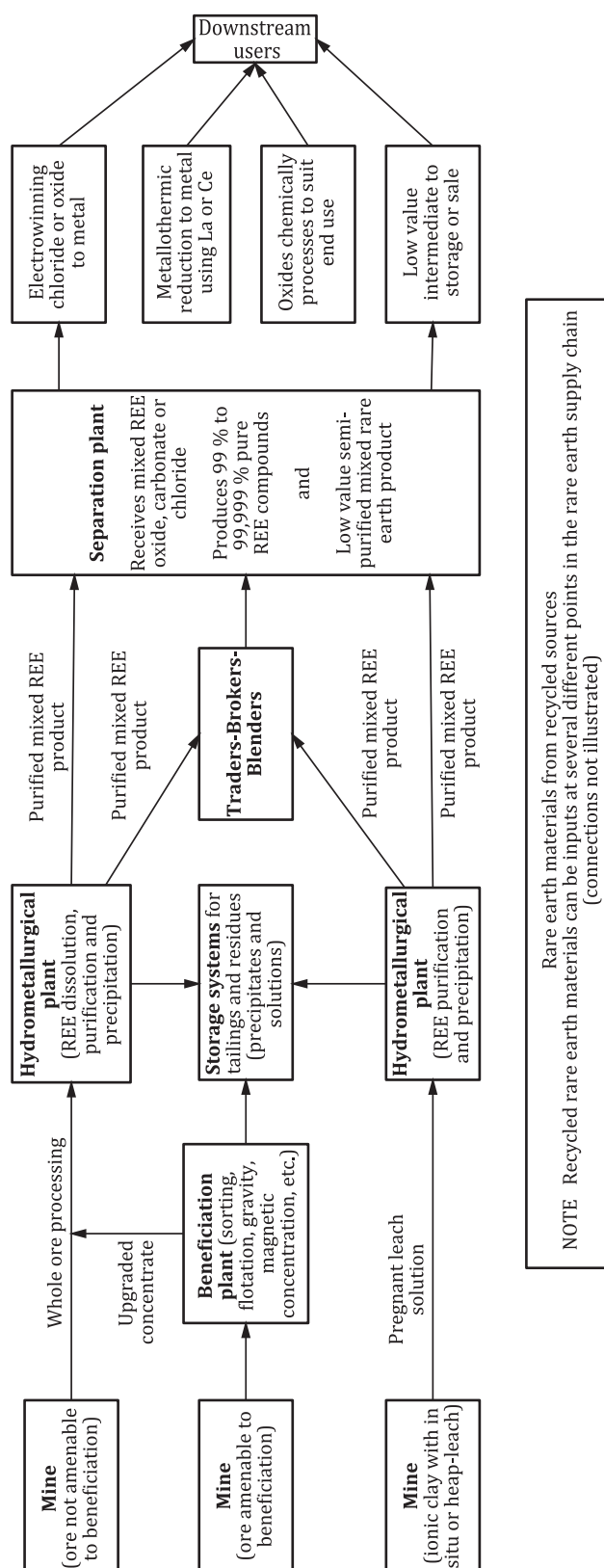


Figure 1 — Overview of rare earth supply chain — Mine to separated products

Some business entities conduct more than one of these activities either at a single site or at two or more sites. For example, it is common for a mine to own and operate a beneficiation plant, so its product is an upgraded concentrate rather than whole ore. It is also common for a mining company to own and operate a hydrometallurgical plant to process its ore or mineral concentrate and then ship a purified