EXECUTIVE SUMMARY

According to the International Union of Pure and Applied Chemistry (IUPAC), the rare earth elements (REE) are a set of seventeen elements in the periodic table, specifically the fifteen lanthanides plus scandium and yttrium. The availability and application of particular rare earths are key to the unique performance of rare-earth magnets, modern lighting, catalysts used in petrochemical production, etc. Rare earths are vital for a variety of clean-energy technologies, for example wind turbines and hybrid and electric vehicles. Demand for rare earths is expected to continue to increase, particularly in the rare earth magnet area.

The International Organization for Standardization (ISO) Technical Committee (TC) 298 (hereinafter ISO/TC 298 Rare Earth) aims to establish standards based on market and industry needs. Standards should address issues faced by the industry and support the position of legitimate and responsible rare earth producers on scientific evidence and consideration. Standards should aid in ensuring all rare earths entering the supply chain are sourced from legal miners, who abide by best practice on environmental stewardship. Standards should bring value to the industry by supporting growth of markets through outcomes which broaden the fields of application for rare earths or which grow volumes in existing markets. Standards should not impose restrictions or impediments on trade, but facilitate free and fair global trade. Any new standards should not bring a significant transactional burden, cost or complexity to the responsible production and use of rare earths. The adoption of standards is voluntary, but it is expected that these standards would provide a basis for communication and standardization within the industry towards a sustainable and harmonized society.

ISO/TC 298 Rare Earth was created in September 2015, and the ISO member body of Standardization Administration of China was appointed to be the Secretariat. The scope of ISO/TC 298 is standardization in the fields of rare earth mining, concentration, extraction, separation and conversion to useful rare earth compounds/materials (including oxides, salts, metals, master alloys, etc.) that are key inputs to manufacturing and further production processes in a safe and environmentally sustainable manner.

This business plan includes a brief overview of the rare earth industry and discusses the development of rare earth standards. It also outlines work plans to be carried out by ISO/TC 298.
1. INTRODUCTION

1.1 ISO technical committees and business planning

Development of a business plan is an important part of the work of an ISO Technical Committee. The aim of the Business Plan (SBP) is to align the ISO work program with business needs and trends, to enable ISO/TCs to prioritize among different projects, and to identify the benefits that flow from International Standards. The SBP is also intended to ensure that adequate resources are available for ISO/TC projects to meet their assigned tasks.

1.2 International standardization and the role of ISO

The key aim of international standards is to facilitate the exchange of goods and services, through the elimination of overly complex or inconsistent technical barriers to trade.

Three bodies are responsible for the planning, development and adoption of International Standards: ISO (International Organization for Standardization) is responsible for all sectors excluding electrotechnical, which is the responsibility of IEC (International Electrotechnical Committee), and most of the telecommunications technologies, which are largely the responsibility of ITU (International Telecommunication Union).

ISO is a legal association, the members of which are the National Standards Bodies (NSBs) of some 163 countries (organizations representing social and economic interests at the international level), supported by a Central Secretariat based in Geneva, Switzerland.

The principal deliverable of ISO is International Standards.

An International Standard embodies the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in an ISO Technical Committee (ISO/TC), representative of all interested parties, supported by a public comment phase (the ISO Technical Enquiry). ISO and its Technical Committees are also able to develop the ISO Technical Specifications (ISO/TS), the ISO Public Available Specifications (ISO/PAS) and the ISO Technical Reports (ISO/TR) as solutions to market needs. These ISO products represent lower levels of consensus and therefore do not have the same status as an International Standard.

The International Workshop Agreement (IWA) is also available as a deliverable which aims to bridge the gap between the activities of consortia and the formal process of standardization represented by ISO and its national members. An important distinction is that the IWA is developed by ISO workshops and fora, comprising only participants with direct interest, and so it is not accorded the status of an International Standard.
2. BUSINESS ENVIRONMENT OF THE ISO/TC298

2.1 Description of the Business Environment

Political, economic, technical, regulatory, legal and social dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of ISO/TC 298 Rare Earth. These factors may significantly influence how the relevant standards development processes are conducted and the content of the resulting standards.

REE are currently the subject of much attention, as they are critical to the development of new technologies, particularly technologies focused on the efficient production and use of energy e.g. wind power, hybrid and electric vehicles, high-efficiency electrical machines, communications and computing, as well as medical applications and materials with unique properties, etc.

The rare earth industry, and its supply chain, faces some challenges. There are issues with rare earths entering the supply chain from unregulated and/or illegal mining activities in an unpredictable fashion. There is a poor understanding from a life-cycle perspective of the rare earth value chain, from mine to product, and the overall efficiency of the supply chain.

Rare earth ores are treated in complex, multi-stage processes to produce high purity RE metals, oxides, and composites with very specific chemical and physical specifications necessary for the high value-added products, demanded by sophisticated end-users. The production process, or more broadly value chain, from mine to product typically involves:

- Mining
- Mineral processing (beneficiation, leaching, separation) to produce rare earth mineral concentrates
- Chemical processing (extraction and separation) to yield a mixed rare-earth chemical concentrates
- Separating and purifying to yield individual rare-earth oxides and salts
- Smelting and purifying to produce rare earth metals and alloys
- Manufacturing (including, but not limited to)
  - Magnets (Nd₂Fe₁₄B, SmCo₅, Sm₂Co₁₇)
  - Hydrogen storage alloys (AB₅)
  - Luminescent materials (Trichromatic phosphors, LED phosphors)
  - Catalysts (Automotive exhaust catalyst, fluid-cracking catalyst)
  - Polishing materials
  - Ceramics
  - Glass products
  - Application in agriculture(fertilizers)
  - Additives
  - Other rare earth-containing manufacturing products

- Recycling, Remanufacturing and Reuse

Other important dimensions related to the REE processing value chain include:
Environmental management, including:
Naturally Occurring Radioactive Materials (NORM) management
Hazardous waste (solid, liquid and gas)
Energy efficiency and greenhouse gas (GHG) management

Source traceability
Transportation, packaging, handling, labelling and storage of rare earth containing materials

Health and safety

The stakeholders engaged in this value chain include mining companies, processing plants, manufacturers, recycling firms; governments; regulators, investment institutions, trading organizations, material handling and transportation companies, equipment suppliers and contractors, consumers, relevant associations and academic institutions, non-governmental organizations (NGO), and the general public.

2.2 Quantitative Indicators of the Business Environment

The following sections describe the business environment in order to provide background information to support the actions of ISO/TC 298 Rare Earth.

Resources
According to estimates by the U.S. Geological Survey (USGS), global REO reserves are about 130 million metric tonnes in 2015. The following table illustrates the estimated rare earth reserves as of 2015 by country, reported as metric tonnes of rare earth oxides (REO), according to statistics published by USGS, Mineral Commodity Summaries 2016.

<table>
<thead>
<tr>
<th>Country</th>
<th>Reserves in metric tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>1,800,000</td>
</tr>
<tr>
<td>Australia</td>
<td>3,200,000</td>
</tr>
<tr>
<td>Brazil</td>
<td>22,000,000</td>
</tr>
<tr>
<td>China</td>
<td>55,000,000</td>
</tr>
<tr>
<td>India</td>
<td>3,100,000</td>
</tr>
<tr>
<td>Malaysia</td>
<td>30,000</td>
</tr>
<tr>
<td>Russia</td>
<td>(2)</td>
</tr>
<tr>
<td>Thailand</td>
<td>NA</td>
</tr>
<tr>
<td>Other countries</td>
<td>41,000,000</td>
</tr>
<tr>
<td>World total (rounded)</td>
<td>130,000,000</td>
</tr>
</tbody>
</table>

1 For Australia, Joint Ore Reserves Committee-compliant reserves were about 2.2 million tonnes. Geoscience Australia (GA) currently records Australia’s reserves (EDR) as 3.44 Mt REO+ Y₂O₃, slightly more than the USGS data in the above table.
2 Included in other countries.
3 Based on imports from China.

However, care should be taken when comparing rare earth resources and reserves country to country as a variety of resource classification schemes are used. For example, it is known that Malaysia is an important rare earth producer by sourcing concentrates from Lynas Corp in
Australia, but there are few reports on the rare earth resources in the country yet. Also USGS REO data excludes most scandium.

Some rare earths, for example, light rare earth such as lanthanum and cerium, are not particularly rare, but some heavy rare earths are very rare. There is the potential for significant changes in the future to the resource profile.

**Production of concentrates and separation**

As reported by Roskill, a UK-based consultancy which focuses on the metals and materials market, China produces more than 80% of the world's rare earths. In 2015, China was the top producer, followed by Australia, the United States (though the Mountain Pass mine closed in 2015) and Russia.

The following table shows the global rare earth mine production in 2014 and 2015, by country, in metric tonnes of REO, based on USGS data.

<table>
<thead>
<tr>
<th>Country</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>5,400</td>
<td>4,100</td>
</tr>
<tr>
<td>Australia</td>
<td>8,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Brazil</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>China</td>
<td>105,000</td>
<td>105,000</td>
</tr>
<tr>
<td>India</td>
<td>NA¹</td>
<td>NA¹</td>
</tr>
<tr>
<td>Malaysia</td>
<td>240</td>
<td>200</td>
</tr>
<tr>
<td>Russia</td>
<td>2,500</td>
<td>2,500</td>
</tr>
<tr>
<td>Thailand²</td>
<td>2,100</td>
<td>2,000</td>
</tr>
<tr>
<td>Other countries</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>World total(rounded)</td>
<td>123,000</td>
<td>124,000</td>
</tr>
</tbody>
</table>

*Estimated. NA not available. –Zero.

¹Significant quantities are contained in stockpiled monazite tailings, but quantitative data are not available.

²There is no production of separated REE or REE compounds in Australia(as yet) as Lynas hydrometallurgical facilities are based in Malaysia. There is no other rare earth facility in Malaysia.

**Consumption**

Furthermore, Roskill reports that the global rare earth industry is expected to undergo significant changes, as new sources of supply are scheduled to be commissioned and supply in China consolidates under six state-owned enterprises. Production currently outside of China is reported at 25,000 tonnes and is expected to remain unchanged until 2020.

Chinese domestic consumption is expected to increase, total market growth is estimated by Roskill to average at 5.0% per year overall between 2015 and 2018.

According to the China Rare Earth Association, world rare earth consumption was estimated at 154,000 metric tonnes in 2015 and is expected to exceed 200,000 tonnes in 2020. The greatest demand for rare earths is from the permanent magnet segment of the market, driven by expanding production of neodymium-iron-boron rare earth magnets for energy applications, in particular wind turbines and hybrid and electric vehicles.

**Price**

There currently is no open exchange for REE and the majority of rare earth products are sold under bilateral contracts. Accordingly, rare earth prices are usually the subject of confidential negotiations between producers and buyers, occasionally with the aid of traders. Estimates of rare earth prices, based on informal market surveys, are published periodically on sites like metalchina.com, mineralprices.com and metal-pages.com. Rare earths are usually quoted at a
grade of 99% or higher purity, in the form of oxides, metals or composites tailored for specific applications.

**Recycling & Reuse**
Recycling of REE comes mainly from such sources as phosphors, magnets, polishing powders and spent catalysts.
Typically hundreds of millions of fluorescent lamps are now sold and disposed every year worldwide. Viewed as a whole, these products contain tonnes of phosphor powder including, among other compounds, high amounts of mercury and significant quantities of rare earth materials. According to Roskill, Solvay/Rhodia's plant at La Rochelle in France has a capacity to process 1,000 tonnes per year of spent phosphor powder, of which rare earths form a minor portion of potential output. It is understood that the process is not yet economically attractive. There is little commercial recycling of used rare earth magnets, although processes are being developed to produce new rare earth magnets from hard disk drives and/or electric machines. Recycling of shaf that is ‘new’ scrap produced during magnet manufacturing has been undertaken for some years. Polishing materials are collected and reused internally at the majority of plants outside of China. The ready availability of rare earth polishing powders within China has reduced installation of recycling circuits in that country. Fluid catalytic cracking (FCC) catalysts and vehicle catalysts both contain about a portion of rare earth elements (about 2%, primarily cerium), mainly in the oxide state. Research has been conducted on recycling of rare earth from these ‘wastes’ or potential secondary sources, but there is no commercial-scale production yet.

**Environmental and radioactive issues**
Whilst in some localities, there are growing social and environmental concerns regarding the mining and processing of REE. REE materials are produced through long and complicated processes, from mining, physical concentration, extraction, separation to refining. Along these processing chains, a variety of chemical reagents are used and large volumes of water are consumed. Therefore, the treatment of fluids, effluent water and gas emissions (such as sulphuric and hydrofluoric acid and sulphur dioxide) is an important task for rare earth refineries and smelters, according to internationally accepted best practice, is of paramount importance.

Furthermore, rare earth minerals, including bastnasite and monazite, typically contain significant concentrations of thorium (Th) and a lesser amount of uranium (U). In order to ensure REE products are free of Th- and U-based radioactivity, these elements and their “decay daughters”, e.g. radium, need to be isolated in the solid wastes generated during REE production. Solid wastes include mineral process tailings and metallurgical/chemical wastes from chemical processing. Frequently, the metallurgical/chemical wastes contain higher concentration of radioactivity and these wastes themselves need to be stabilized in a secure waste management facility. Management of these types of risks are not specific to rare earth processing and much can be adopted from current industrial practice with strict adherence to international accepted standards.

The presence of radioactivity in REE ores and in process wastes can generate public concerns and resistance to mine and process development, although radiation doses to workers and to the public can be demonstrated to be very low, well below internationally accepted criteria. REE
separation plants prefer to receive RE concentrates that are essentially free of Th- and U-based radioactivity to avoid the challenges of radioactive waste disposal.

However, public concerns related to environmental and radioactive issues are major challenges faced by existing and proposed rare earth enterprises. This is specifically relevant to those in remote areas of rare earth producing regions in China, where some illegal plants remain in operation.


ISO/TC 298 Rare Earth is a technical committee focused on addressing industry needs and spans the value chain from mining of the ore to the production of the high value-added products. Global harmonized standards will improve communication on technology, facilitate technology transfer and application of equipment both in production and testing, reduce trade barriers, accelerate large scale trade, and improve and validate environmental management practices, and ensure the provenance of all rare earths entering the supply chain.

ISO/TC 298 Rare Earth will work to develop relevant rare earth standards, and this process may be aided with the grouping of related standards that can generally fall into six categories, which are listed as follows:

First category: Basic Standards, addressing the following:
- Terms and definition (glossary of terms, industry conventions for reporting compositions etc.) (see footnote)¹
- Designation system
- *****

Second category: Testing and Analysis Standards
- Sampling requirements for ore, intermediate mixed concentrates, precipitates, and refined and separated products
- Chemical and radionuclide analysis of rare earth concentrates, metals and materials, and waste products
- Determination of particle size and specific surface area of rare earth compounds
- Determination of moisture content/loss of ignition
- *****

Third category: Recycling, Remanufacturing and Reuse
- Recycling indications on rare earth elements in by-products and industrial wastes
- Measurement method of rare earth elements in by-products and industrial wastes
- Secondary rare earth products
- *****

¹ the constituents of a Rare Earth product can be reported according to different bases. LaCe Carbonate is typically a moist product that is shipped at approx. 45% REO content, and impurities may be described according to: REO basis e.g. %, Al₂O₃/REO Total material basis e.g. % Al₂O₃ as is, or % Al as is. It is common for 10 or more impurity elements to be reported for a RE product, and a producer may work with a number of reporting formats for each product depending on the individual preference of customers. A standard reporting convention for the common rare earth materials (carbonates, oxides, metals) would simplify the reporting work flows for producers and probably be helpful for customers when comparing products from different suppliers.
Fourth category: Product Standards

- Radioactivity - measurement, assessment and comparison to internationally accepted standard (IAEA, REACH, and other international standards)
- Standardization of rare earth products (standard reference materials), from the upstream of concentrates to the downstream of manufactured materials including reuse and recycling products inclusive.

Fifth category: Environmental Stewardship

- Environmental management
- Solid waste management
- Effluent (gaseous and liquid) management
- Radioactivity
- Facility reclamation

Sixth category: Source & traceability of materials

- Provenance and traceability
- Packaging, handling, labelling, marking, transport and storage

With only seven P members as of 2016, resources are limited, so ISO/TC 298 will initially focus on the first, second and third categories in the nearer term, as an established and shared understanding of definitions and common testing methods will be helpful for producers, users and traders to reduce ambiguity and avoid trade disputes. The adoption of Basic and Testing Standards can serve as the basis for the development of other types of standards. From the lifecycle perspective, the supply of REEs is going to be limited due to geological, economic and political reason, necessity of recycling is increasing. Recycling indications on rare earth-contained products and suitable measurement method for recycled rare earth-contained products will be significantly helpful to increase the recycling rate of rare earth and be a good approach to maintain sustainable development of world rare earth industry, especially in those countries that are lack of natural rare earth resources.

4. REPRESENTATION AND PARTICIPATION IN THE ISO/TC

4.1 Membership

Participating (P) and Observing (O) countries in the ISO/TC 298 Rare Earth are defined on the following internet page --

Countries/ISO members bodies that are P and O members of ISO TC 298

4.2 Analysis of the participation

Considering that ISO/TC 298 Rare Earth is a new technical committee, the representation of P members in the TC should be relevant to the industry. Among the P members, in terms of rare earth production currently, Australia, China, India, Canada, and the United States (though the Mountain Pass mine ceased operation in 2015) are all mining and/or producing countries with rare earth companies at varying stages of operation, and/or developing operations. It is
recognized that other countries, such as Russia, Brazil, etc., are potential producers. Additional P members will be sought from this group.

In terms of consumption, China, Japan, United States, and Korea are the large consuming countries, in terms of incorporating REE-containing products in their manufacturing/industrial sectors. Notably, all countries rely on REE as part of their infrastructure, energy, communication, and transportation systems and therefore have a vested interest in the proposed standards.

Observing member nations include Malaysia, Vietnam, and South Africa.

5. **OBJECTIVES OF THE ISO/TC AND STRATEGIES FOR THEIR ACHIEVEMENT**

5.1 *Defined objectives of the ISO/TC*

The major objectives of the ISO/TC 298 Rare Earth are:

- to prepare standards for the relevant stakeholders in industry on scientific evidence and consideration
- to make standards to address market needs and expand demand for rare earth
- to develop standards that can be used globally as a basis for fair trade and
- to publish standards that enable companies to reduce barriers to trade and help to move towards a sustainable and harmonized society

The Committee's efforts will be focused on developing standards required by the rare earth industry in a timely fashion. As such and where applicable, existing national standards may be used as a basis for discussion.

5.2 *Identified strategies to achieve the ISO/TC's defined objectives*

ISO/TC 298 Rare Earth has clear objectives and will work diligently to accelerate the development of rare earth standards, by meeting clearly set goals.

Based on the main priorities in the work of the committee seen in section 3 as well as discussions and resolutions at the first plenary meeting in Beijing in Oct.2016, the target for 2017 is:

- Identify and establish Working Groups on categories section in section 3, to develop concrete plans for the development of new standards, including the review of existing relevant national standards as the basis of discussion.
- Encourage the submission of, prioritize and establish well defined Preliminary Working Items (PWI) initiated by proponents, with established schedules and targets with a view to adopt at the June plenary meeting.
- Organize Working Group meetings (two in each identified area) and one formal Technical Committee (June 2017).
- Identify and engage additional P members, with the goal of increasing from present level of 7 to 10 members.
- Enhance communications between existing P and O members.

The target for the next six years (2017-2022):

- Build an industry standard framework, including engaging multi-country expertise on each Working Group and PWI.
- Develop standards of different types as required by the market.
- Encourage each of P member to organize plenary meeting of the TC (e.g. Canada in June 2017).
• Convene third & fourth plenary TC meeting over the subsequent 12 to 15 months so as to establish momentum, with meetings thereafter scheduled on minimum and annual basis.
• Continue to increase number of P member at least one per year with a focus on potential REE producers, processors and users.

All P members that are interested in proposing new items or wanting to contribute to the PWIs listed above, please don’t hesitate to contact Ms. Lan GAO, secretary of the TC. Ms. GAO will provide the necessary protocols and details in preparing proposals.

The Chairman and Secretary’s main roles are to manage and co-ordinate the ongoing technical activities, encourage new work items and maintain publications.

ISO/TC 298 intends to establish a Chair’s support team with a mandate to advise the ISO/TC 298 Chair by helping coordinate the activities of the TC. All P members are entitled to appoint one representative to the committee.

6. FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF ISO/TC298 WORK PROGRAMME

The Secretariat of ISO/TC 298 has been assigned to Standardization Administration of China (SAC) who is the original proposer for establishment of the Technical Committee. China ranks first for both supply and demand of rare earths in the world.

Overlapping of ISO/TC 298 activities with the activities of other TCs or SCs, and the scope of ISO/TC 298 is a potential concern. Rare earth elements are often added as alloying elements to metals such as magnesium, aluminium and iron/steel for alloys. Therefore ISO/TC 298 will liaise with ISO/TC 79 (Light metals and their alloys) and ISO/TC 132 (Ferroalloys) when developing alloy standards. Rare earth alloys covered by ISO/TC 298 will include master alloys, in which the proportion of rare earth contained is usually greater than 10-20%. The master alloy will be further added to metals (magnesium, aluminium and iron/steel) to make finished alloys, which contain only a lower proportion of rare earth, usually less than 5%. ISO/TC 298 will also create liaisons with IEC/TC 68 magnetic alloys and steels, ISO/TC 79 light metals and their alloys, ISO/TC 82 mining, ISO/TC 132 ferroalloys and ISO/TC 207/SC5 environmental management.

7. STRUCTURE, CURRENT PROJECTS AND PUBLICATIONS OF THE ISO/TC

In preparation for determining the structure of ISO/TC 298 Rare Earth, it is important, as the first step to establish several standards that are essential to production and trade of rare earth internationally. At the same time, it is necessary to build up standard developing frameworks with target Working Groups. According to ISO/IEC Directives, Part 1 (2.4.2, 2.4.3), when a new project is accepted, the secretariat may propose to the technical committee or subcommittee, either at a meeting or by correspondence, to create a working group to convenor of which will normally be the project leader. When the new project is finished, but P members and experts consider it is important to keep the working organization to develop similar type of standards, sub-committee is expected to be formed, as the second step. Anyway, structure of ISO/TC 298 can be updated time to time mainly on market and industry demands.
For the period from 2017 to 2019, the structure (seen in diagram 1) will mainly consist of working groups, corresponding to the categories listed in section 3 and targets for 2017 and for 2017-2022 seen in section 5. And the suitable leadership may come from across the P-member spectrum.

Diagram 1: ISO/TC 298 structure

**WG1: Terms and Definitions**  
Review of all existing standards  
Value chain

**WG2: Testing and Analysis**  
Focused on raw materials (oxides, salts and metals)  
Review of all existing standards

**WG3: Element recycling**

**WG4: Product**  
Including oxides, salts, metals, alloys, materials, etc  
Review of all existing standards

**WG5: Environmental Stewardship**  
Focused on mining, concentration, separation including oxides, salts and metals

**WG6: Source & traceability of materials**  
Focused on packaging, handling, marking, transport and storage

Topic and subject areas of each working group is to be agreed through CIB.

There are 5 NPWIs approved in the first plenary meeting in Beijing in Oct.2016 and will go through CIB ballots before the second plenary meeting in Canada in June 2017. These NPWIs are closed related to the target WG settings. Please see the list of the 5 NPWIs and corresponding target WGs in table 3.
Table 3: Approved NPWIs Information

<table>
<thead>
<tr>
<th>NO.</th>
<th>Title of the proposed deliverable</th>
<th>Deliverable type</th>
<th>Proposed Project Leader (name and e-mail address)</th>
<th>Proposer nationality</th>
<th>WG to belong to</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rare earth – Terms and definitions – Part one minerals, oxides and other compounds</td>
<td>International Standard</td>
<td>Tao XU, <a href="mailto:xuta630826@126.com">xuta630826@126.com</a>, <a href="mailto:984365640@qq.com">984365640@qq.com</a></td>
<td>China</td>
<td>WG1: Terms &amp; Definitions</td>
</tr>
<tr>
<td>2</td>
<td>Rare Earth-Terms and definitions - Part two rare earth metals and their alloys</td>
<td>International Standard</td>
<td>HUANG Xiaowei, <a href="mailto:hxw0129@126.com">hxw0129@126.com</a></td>
<td>China</td>
<td>WG1: Terms &amp; Definitions</td>
</tr>
<tr>
<td>3</td>
<td>Rare earth - Elements Recycling – Communication formats for providing recycling information on rare earth elements in industrial wastes and by-products</td>
<td>International Standard</td>
<td>Bum-Sung KIM, <a href="mailto:bskim15@kitech.re.kr">bskim15@kitech.re.kr</a></td>
<td>Korea</td>
<td>WG3: Element Recycling</td>
</tr>
<tr>
<td>4</td>
<td>Rare earth - Elements recycling – Measurement method of rare earth elements in industrial wastes and by-products</td>
<td>International Standard</td>
<td>Taek-Soo KIM, <a href="mailto:tskim@kitech.re.kr">tskim@kitech.re.kr</a></td>
<td>Korea</td>
<td>WG3: Element Recycling</td>
</tr>
<tr>
<td>5</td>
<td>Rare earth - Elements recycling – Method for exchange of information of rare earth elements in by-products and industrial wastes</td>
<td>International Standard</td>
<td>Bum-Sung KIM, <a href="mailto:bskim15@kitech.re.kr">bskim15@kitech.re.kr</a></td>
<td>Korea</td>
<td>WG3: Element Recycling</td>
</tr>
</tbody>
</table>

All P members are expected to contribute to this effort. In the process of standardization, we will be able to fully understand members’ needs, views, and expectations and form expert teams to consider the identified issues.

For the period from 2020 to 2022, structure of the TC might be further changed and there will likely be sub-committees set up with number of P member increasing, more standards to be developed and richer experience gained.

Consideration will be given to forming Working Groups (WGs) and Sub Committees (SCs) with suitable Chairs and secretariats.

**Information on ISO online**

The link below is to the TC’s page on ISO’s website: [ISO TC 298 on ISO Online](#)

Click on the tabs and links on this page to find the following information:
- About (Secretariat, Secretary, Chair, Date of creation, Scope, etc.)
- Contact details
- Structure (Subcommittees and working groups)
- Liaisons
- Meetings
- Tools
- Work programme (published standards and standards under development)
Reference information

Glossary of terms and abbreviations used in ISO/TC Business Plans

General information on the principles of ISO’s technical work