in brief

Review of rare-earth elements in Australia

Geoscience Australia has recently released a comprehensive review of Australia's rare-earth elements (REE) which describes their distribution, geological characteristics, and potential. Dramatically increasing prices for the REE reflect an expanding portfolio of applications and a narrow global supply base. Consequently, the REE are increasingly becoming more attractive commodity targets for the minerals industry. *The major rare-earth-element deposits of Australia: geological setting, exploration, and resources* will provide valuable information for mining companies, explorers, and investors.

Figure 1. Mount Weld in Western Australia is one of the richest rare-earth-element deposits in the world, with significant additional resources of niobium, tantalum, and phosphate. This aerial view shows the mine workings, in laterite developed above a ~2025 million year carbonatite intrusion. This image was kindly provided by Lynas Corporation Limited (http://www.lynascorp.com/index.asp).

Strategic importance

REE are a group of seventeen metals that comprise the lanthanide series of 15 elements and two closely related elements scandium and yttrium. The REE have unique catalytic, metallurgical, nuclear, electrical, magnetic, and luminescent properties. Their strategic importance is indicated by their use in a number of emerging and diverse technologies that are becoming increasingly more significant in today's society. Currently applications range from traditional (such as lighter flints, glass polishing mediums, car alternators) to high-technology (lasers, magnets, batteries, fibre-optic telecommunication cables). They are also important for developing technologies crucial to our future (including high-temperature superconductivity, safe storage and transport of hydrogen for a post-hydrocarbon economy, monitoring climate change and energy efficiency). Consequently, over the last two decades, the global demands for REE have significantly increased.

REE are relatively abundant in the Earth's crust, but discovered minable concentrations are less common than for most other exploited metals. In 1992 China surpassed the United States of America as the world's largest producer of rare-earth oxides and was responsible for 95.5 per cent of the world's output in 2009.

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Production in Australia

Small-scale production of REE has taken place in Australia in the past with yttrium-rich minerals (gadolinite) first mined in 1913 from a pegmatite vein in the Cooglegong region of Marble Bar, Western Australia. Australia's REE industry attained a higher international profile when REE-bearing heavy minerals (monazite and xenotime) were obtained as by-products from beach sand mining activities in Western Australia, New South Wales, and Queensland. During the 1970s and 1980s, Australia's annual production was about 12 000 tonnes of monazite and 50 tonnes of xenotime. Australia became the world's largest producer of monazite when production peaked in 1985 with 18 735 tonnes of monazite.

During the past decade there has been increasing industry interest in hard-rock REE deposits as the demand and global prices for these strategic metals have significantly increased. A number of deposits with significant resources (such as Mount Weld in Western Australia, Nolans Bore in the Northern Territory, and Toongi in New South Wales) in different geological settings are now at advanced stages of development. Their planned production contributions (2011 for Mount Weld, around 2013 for Nolans Bore) are likely to have a discernible impact on the global supply of REE.

Scope and objectives of review

This monograph, which is the first national synthesis of the REE since 1997, has compiled public information and data from a range of domestic and international sources as well as the latest information held by Geoscience Australia and the state and territory geological surveys. An important component of this information was derived from various mining companies operating in Australia and elsewhere. Using a mineral-systems framework, the monograph examines the elements considered important for the formation of REE deposits and it should stimulate future research into the geological characteristics of REE in Australia. It also provides suggested exploration guidelines relevant to Australia. There is also a compilation of recent products and national databases produced by Geoscience Australia that could assist the exploration for REE deposits. The publication can be downloaded through the Geoscience Australia website and is also available in a DVD format from the Geoscience Australia Sales Centre.

For more information

email ausgeomail@ga.gov.au

Related articles/websites

The major rare-earth-element deposits of Australia: geological setting, exploration, and resources by Dean M Hoatson, Subhash Jaireth & Yanis Miezitis

https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=71820

Hydrocarbon seepage survey in northern Perth Basin

Between mid-September and mid-October scientists from Geoscience Australia will be exploring the continental margin off Western Australia. The survey area is west of Geraldton in the vicinity of petroleum exploration acreage release area W11-18 in the northern Perth Basin (see article in this issue). The marine survey (SS05-2011) will be using the Australian Government's Marine National Facility, the RV *Southern Surveyor* (figure 1) and is part of the agency's Basin Studies and Marine research programs. Collaborators on this survey include representatives from CSIRO in Perth as well as marine researchers from the Royal Netherlands Institute for Sea Research and the University of Ghent in Belgium.

The aim of the survey is to investigate and sample potential natural hydrocarbon seepage sites in the offshore northern Perth Basin. Detecting sites of natural hydrocarbon seepage will help petroleum explorers assess the prospectivity of release area W11-18, as seeps are direct evidence of an active petroleum system. Since natural hydrocarbon seeps also support rich and diverse biological communities on the seafloor, the survey will assist in understanding the distribution of marine benthic communities along this part of Australia's continental shelf.

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The survey will supplement techniques developed during previous surveys undertaken as part of Geoscience Australia's Seeps and Signatures Project (see below). It will utilise a hydrocarbon sensor array (which detects oil in seawater) and a remotely operated vehicle (ROV). Within selected survey areas the morphology (or shape) of the seabed will be mapped with multibeam swath and sidescan sonar while sediments below the seabed will be visualised with a sub-bottom profiler. The hydrocarbon sensor array will help determine if any interesting features on the seabed are potential seeps. Those features interpreted to be likely seeps will be targeted using precision underwater video and sediment sampling with the ROV. Sediment from these areas will also be collected with cores and grabs for post-survey assessment in Geoscience Australia's geochemisty laboratories.

Figure 1. The Australian Government's Marine National Facility the RV *Southern Surveyor* which will be used for the survey.

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Related articles/websites

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