



INSTITUTE FOR DEFENSE ANALYSES

Rare Earth Elements in Namibia and South Africa: Considerations for U.S. Investment

Dorina A. Bekoe
Stephanie M. Burchard
Sydney N. Deatherage
Erin L. Sindle

July 2022

Approved for public release;
distribution is unlimited.

IDA Document NS D-33189

Log: H 22-000322

INSTITUTE FOR DEFENSE ANALYSES
730 East Glebe Road
Alexandria, Virginia 22305-3086



The Institute for Defense Analyses is a nonprofit corporation that operates three Federally Funded Research and Development Centers. Its mission is to answer the most challenging U.S. security and science policy questions with objective analysis, leveraging extraordinary scientific, technical, and analytic expertise.

About This Publication

This work was conducted under the IDA Systems and Analyses Center Central Research Program, project C55AV, “The Implications of Democratic Backsliding for Security Assistance in Africa.” The views, opinions, and findings should not be construed as representing the official position of either the Department of Defense or the sponsoring organization.

For More Information

Dorina A. Bekoe, Project Leader
dbekoe@ida.org, 703-845-2510

James R. Marrs, Director, Intelligence Analyses Division
jmarrs@ida.org, 703-845-6993

Copyright Notice

© 2022 Institute for Defense Analyses
730 East Glebe Road, Alexandria, Virginia 22305-3086 • (703) 845-2000.

This material may be reproduced by or for the U.S. Government pursuant to the copyright license under the clause at DFARS 252.227-7013 (Feb. 2014).

Executive Summary

Rare earth elements (REE), 17 metals and alloys, are considered critical supply-chain inputs in the production of military equipment; the civilian economy, including medical equipment and television technologies; and in clean technologies that reduce carbon emissions.¹ Currently, China produces 58% of the global total of REEs—rendering many countries, including the United States, vulnerable to supply-chain disruptions.² America’s dependence on imported REEs—particularly from China, a strategic competitor—has engendered a review of all available market options. As a result, the U.S. Department of Energy recommends diversifying the U.S. supply chain of critical minerals, to reduce the country’s reliance on a single source.³

Africa’s nascent REE sector can emerge as a stable and predictable source for critical minerals for the United States. As of January 2022, Burundi is the only African country with an REE mine that has produced commercial quantities, but other countries, like Namibia and South Africa, show commercial promise. Notably, compared to other African countries, Namibia and South Africa have the largest amounts of mineral deposits that contain REEs.

Namibia is a politically stable country, with an established mining sector and a strong relationship with the United States. Its REE mining landscape has potential for opportunities for U.S. investors. The government welcomes foreign investment, ranking relatively higher than other countries in terms of ease of doing business and some best practices. However, there are signs that some tenets for good governance—and good resource management—may be weakening. In particular, concerns have arisen around respect for business contracts.

South Africa ranks higher than other African countries in terms of ease of doing business, although there has been some deterioration recently. Moreover, while there is a mature mining industry, recent increases in violence and corruption have resulted in the departure of some foreign mining firms. Still, South Africa’s REE mines are positioned to begin commercial production in the near future, making it the second REE producing country in Africa, behind Burundi.

Overview of Rare Earth Elements

Rare earth elements (REEs), 17 metals and alloys, are considered critical supply-chain inputs for the production of military equipment; the civilian economy, including medical equipment and television technologies; and in clean technologies that reduce carbon emissions.⁴ Despite their name, REEs are abundant—in some cases, even more so than the more familiar copper, lead, gold, and platinum. Their categorization as “rare earth elements” stems from the small quantities in which they are found. Moreover, transforming REEs into a usable state requires a complex and costly extraction process for rare earth-bearing minerals.⁵ Currently, China produces 58% of the global total of REEs—rendering many countries, including the United States, vulnerable to supply-chain disruptions.⁶ America’s dependence on imported REEs—particularly from China, a strategic competitor—has engendered a review of all available market options. As a result, the U.S.

Department of Energy recommends diversifying the U.S. supply chain of critical minerals to reduce the country's reliance on a single source.⁷

Africa's nascent REEs sector creates a stable and predictable source for critical minerals for the United States. The preponderance of mining companies exploring or producing REEs operate outside Africa; however, as global powers turn to African markets to cultivate influence, the mining of the continent's REEs will likely increase. As of January 2022, Burundi is the only African country with an REE mine that has produced in commercial quantities, but others, like Namibia and South Africa show commercial promise. Notably, these three countries contain xenotime, a mineral that bears yttrium, a heavy REE—considered more commercially viable than light REEs.⁸ Moreover, REEs are found within other minerals (so-called rare earth-bearing minerals), and Namibia and South Africa contain the two largest amounts of rare earth-bearing mineral deposits in Africa. This document provides a snapshot of the state of the REE sector in each country, the business and investment climate, good governance practices, and relations with the United States.

The most recent data from the U.S. Geological Survey indicates that Namibia contains 27 rare earth-bearing minerals, while South Africa contains 23 such minerals. Equally important, a significant number of the minerals in Namibia and South Africa bear REEs greatly demanded by the products defining the green economy, defense-related sectors, and growing industries. Notably, both Namibia and South Africa have relatively larger deposits of monazite and bastnasite, which are considered among the most common rare earth-bearing minerals.⁹ Other important rare earth-bearing minerals in Namibia and South Africa also promise economic viability, as they are used in lasers and semiconductors: Namibia contains deposits of parisite, florencite, and ancylite; South Africa contains deposits of allanite, fergusonite, apatite, and euxenite.¹⁰

Namibia: Overview of Mining Industry

Namibia has 10 known mineral deposit sites containing 27 different types of rare earth-bearing minerals, located mainly in the Erongo region. Other regions with rare earth-bearing minerals include the Otjozondjupa, Kunene, and Karas regions (see Map 1). Among these four regions, the Erongo region contains 5 of the 10 sites (Table 1).

Some REE-bearing minerals are considered especially commercially viable.¹¹ In Namibia, monazite is the most common REE-bearing mineral. Monazite, prevalent in many African countries as well, is found in nine sites in Namibia. It is highly sought for the REEs of cerium and lanathan that it contains, as they are used in “catalysts, lighters, lamps, optics, alloys, polishing, colorant, and turbine blade coating.”¹² Other rare earth-bearing minerals in Namibia, which may hold commercial promise, include: bastanite (3 sites); xenotime (3 sites); fergusonite (1 site); allanite (1 site); ancylite (1 site); and parisite (1 site). The location of these commercially viable rare earth-bearing minerals, the REEs they contain and their uses, and mining companies operating on site, are listed in Table 1.¹³

Table 1. Rare Earth Elements in Namibia, by Region

Rare earth-bearing mineral, by deposit sites (*commercially viable)	Commercially viable rare earth-bearing mineral, main REE present, and uses	Mining companies present
Erongo Region Amis Complex (yttrium fluorite; monazite*; xenotime*; bastnäsite*; fergusonite*) Brandberg Complex (allanite*; chevkinite; monazite*) Eureka (monazite*) Kalkfeld (Etaneno) (eudidymite; monazite*) Ondurukurme Complex (monazite*; ancylite*; cerianite; carbocernaite)	<i>Ancylite, Allanite:</i> REE: cerium Uses: Alloys, polishing, colorant, catalyst, lighters, turbine blade coating¹⁶ <i>Fergusonite, Xenotime</i> REE: yttrium Uses: Lasers, TVs, superconductors, LEDs, light bulbs, cancer treatment¹⁷ <i>Monazite, Bastnasite:</i> REEs: cerium and lanthanum Uses: Catalysts, lighters, lamps, optics, alloys; Alloys, polishing, colorant, catalyst, lighters, turbine blade coating¹⁸	
Karas Region Marinkas Quellen (synchysite; monazite*; yttrium fluorite)	<i>Monazite:</i> REEs: cerium and lanthanum Uses: Catalysts, lighters, lamps, optics, alloys; Alloys, polishing, colorant, catalyst, lighters, turbine blade coating¹⁹	
Kunene Region Agate Mountain (bastnäsite*) Toscanini (monazite*) Lofdal-Bergville (xenotime*; bastnäsite*; monazite*; parisite*)	<i>Monazite, Bastnasite:</i> REEs: cerium and lanthanum Uses: Catalysts, lighters, lamps, optics, alloys; Alloys, polishing, colorant, catalyst, lighters, turbine blade coating²⁰ <i>Parisite:</i> REE: neodymium Uses: Lasers, magnets, computers, electric motors, generators, lighting, alloys²¹ <i>Xenotime:</i>	Lofdal (Namibia Critical Metals, Inc., Canada)²³

	REE: yttrium Uses: Lasers, TVs, superconductors, LEDs, light bulbs, cancer treatment²²	
Otjozondjupa Region Okorusu Complex (synchysite; monazite*; yttrium fluorite; xenotime*)	<i>Monazite:</i> REEs: cerium and lanthanum Uses: Catalysts, lighters, lamps, optics, alloys; Alloys, polishing, colorant, catalyst, lighters, turbine blade coating²⁴ <i>Xenotime:</i> REE: yttrium Uses: Lasers, TVs, superconductors, LEDs, light bulbs, cancer treatment²⁵	Otjiwarango Rare Earths & Gold (Namibia Rare Earths, Inc., Canada)²⁶

Namibia: Business Climate

Namibia's business climate is strong. It is less corrupt than most African countries; it is highly regarded for its enforcement of the rule of law, generally independent judiciary, and respect for property rights—all of which contribute to a conducive business environment for investing in REE extraction.²⁷ In that regard, it ranks higher than other countries in Sub-Saharan Africa (SSA) on most measures related to operating commercial enterprises, according to the World Bank's "Doing Business" report, which ranks Namibia at 104 out of 190 countries (see Table 2).²⁸

Table 2. World Bank's "Doing Business" Scores (out of 100): Namibia versus SSA

Namibia: Scores above SSA	Namibia: Scores below SSA
Construction permits: 70.0 Regional score: 58.5	Starting a business: 72.2 Regional score: 80.1
Getting electricity: 78.3 Regional score: 50.4	Registering a property: 40.6 Regional score: 53.6
Getting credit: 60 Regional score: 45.2	
Protecting minority investors: 56.0 Regional score: 38.5	
Paying taxes: 74.5 Regional score: 57.8	
Trading across borders: 61.5 Regional score: 53.6	
Enforcing contracts: 63.4 Regional score: 49.6	
Resolving insolvencies: 36.9 Regional score: 31.3	

Source: World Bank 2020.

By all accounts, Namibia exhibits an openness to foreign direct investment—creating a hospitable climate with respect for property rights and rule of law, reliable infrastructure, and encouraging social responsibility by foreign investors.²⁹

Namibia: Natural Resource Management and Governance

Mining is Namibia's most important industry; with its contribution of 25% to the Namibian economy, it is the largest sector of the economy.³⁰ In fact, the main exports from Namibia to the United States are diamonds and uranium ore.³¹ However, the Canada-based Fraser Institute's "Annual Survey of Mining Companies" ranks the country toward the bottom half in terms of investment attractiveness. While Namibia ranks in the top third regarding policy perception, it falls short in the best practices category; one company executive complained of a lengthy permitting process.³² The 2021 rankings represent a declining resource governance environment; in 2019, the Fraser Institute survey ranked Namibia as the "best jurisdiction in the region" in the mining sector.³³ Notably, Namibia is a member of the State Department's Energy Resource Governance Initiative, which pledges to promote "sound mining sector governance," despite not having joined the Extractive Industries Transparency Initiative (EITI).³⁴ While joining EITI does not guarantee that governments will manage resources well, a growing body of evidence suggests that members of EITI tend to adopt practices that lead to improvements in resource management.³⁵

There are a number of foreign companies operating in Namibia's mining sector. South African companies primarily operate diamond mines; Canadian companies have investments in gold, zinc, and lithium mining; and China controls all of the uranium mines in Namibia.³⁶ In fact, most of China's uranium mines in Africa are located in Namibia—and Chinese investors operate the majority of all active Namibian mines.³⁷ For Namibians living near the uranium mines—especially members of ethnic minorities—there are concerns that it will hurt their communities' small-scale farming and herding, while the government focuses on the revenues from the mine. Communities have also noted adverse health consequences with the expansion of the uranium mining.³⁸ Following the negative sentiments surrounding the Chinese-owned uranium mines, the Chinese embassy issued guidance to its nationals in Namibia, instructing them to improve their behavior and treatment of Namibian employees.³⁹

Good governance practices impact natural resource management.⁴⁰ Namibia is generally considered politically stable; well governed; and "free" with respect to political rights and civil liberties, where political parties can organize freely and elections take place regularly.⁴¹ Yet, there are some worrying trends. In particular, there have been concerns about the extent of Chinese involvement in Namibia's politics and the ties with Namibia's political elite.⁴² By some accounts, China is Namibia's key partner, prompting President Hage Geingob to call China, Africa's "best friend."⁴³ Corruption also concerns ordinary Namibians: while Namibia is among the least corrupt African countries on the Corruption Perception Index (CPI)—scoring below only Rwanda, Botswana, Cape Verde, Seychelles, and Mauritius⁴⁴—Namibians still perceive corruption as a problem in their day-to-day lives and in business. Most Namibians (85.1%) think that some or most civil servants are involved in corruption.⁴⁵ Nearly three-quarters (74%) of Namibians say that corruption has increased a lot or somewhat since the last year.⁴⁶ Such perceptions find their roots in Namibia's weak enforcement of anti-corruption laws. Over the last few years, there have been several high-profile cases of corruption involving politicians who have not been punished.⁴⁷

The lack of transparency in government affairs has also raised concerns—particularly in the country’s extractive industry.⁴⁸

Namibians’ trust in government institutions has also declined within the last decade. According to Afrobarometer, a public opinion survey, particular declines have occurred in Namibians’ trust in the president (from 80% to 60%); national assembly (from 74% to 47%); law and order institutions (from 75% to 58%); and the electoral commission (from 74% to 54%).⁴⁹ Not surprisingly, most Namibians (81%) felt that the country was going in the wrong direction.⁵⁰ The most cited problem in Namibia (by 30%) was unemployment; the second problem identified (by 10.5%) was drought.⁵¹ Seventy-three percent thought that Namibia’s economic conditions were fairly or very bad; accordingly, 64% described their own living conditions as fairly or very bad.⁵² Recently, concerns arose over police brutality, abuses of same-sex couples, discrimination against women and minority ethnic groups, and gender-based violence.⁵³

U.S.-Namibia Relations

Namibia and the United States have good bilateral relations, dating to the support the United States provided to Namibia’s independence efforts.⁵⁴ Because it is ranked as an upper-middle-income country, it does not receive a significant amount of assistance from the United States. In 2020, Namibia received \$76 million in foreign assistance, compared to an average of \$210 million in SSA.⁵⁵ Namibia is a focus country of the President’s Emergency Plan for AIDS Relief (PEPFAR), an initiative of the George W. Bush Administration; it received approximately \$35.5 million through the program in 2020.⁵⁶ In 2014, Namibia also successfully fulfilled a 5-year Millennium Challenge Account Compact, to reduce poverty and encourage economic development.⁵⁷

South Africa: Overview of the Mining Industry

South Africa has a relatively mature mining industry, with approximately 549 active mines.⁵⁸ It is the world’s largest producer of platinum and produces sizable quantities of coal, gold, and diamonds as well. On average, the mining sector contributes between 7% and 10% of the country’s gross domestic product per year and constitute upwards of 25% of the country’s annual exports. The vast majority of mining projects are generally expansions of existing projects and not new explorations.⁵⁹



Map 2. South Africa

According to the U.S. Geological Survey, South Africa has 11 known mineral deposit sites containing at least 23 different types of rare earth-bearing minerals.⁶⁰ Most of these mines are in the west and the north of the country (see Map 2). As in neighboring Namibia, South Africa has deposits of monazite; it also has deposits of apatite and euxenite. As Table 2 shows, apatite can be used in television screens and nuclear reactors, among other things; and euxenite can be used in lasers, superconductors, and some cancer treatments. See Table 2 for the location of commercially viable rare earth-bearing minerals, the REEs they contain and their uses, and mining companies in operation.⁶¹

Table 2. Rare Earth Elements in South Africa, by Region

Rare earth-bearing mineral, by deposit sites (<i>*Commercially viable</i>)	Commercially viable rare earth-bearing mineral, main REE present, and uses	Mining companies
Northern Cape Sandkopsdrif (Zandkops Drift) – churchite; goyazite		
KwaZulu-Natal Wangu Hill – alkalic igneous Richards Bay – monazite*	Monazite: REEs: cerium and lanthanum Uses: Catalysts, lighters, lamps, optics, alloys; Alloys, polishing, colorant, catalyst, lighters, turbine blade coating ⁶²	
Limpopo Palabora (Phalaborwa) – apatite*; synchysite; monazite* Buffalo Fluorspar – monazite*; allanite*; bastnasite* Glenover – fergusonite*; euxenite*; loparite; samarskite; synchysite Nooitgedacht (Gelukshoek, Nooitgedagt) – monazite*	Apatite: REE: neodymium Uses: Lasers, magnets, computers, electric motors, generators, lighting, alloys ⁶³ Allanite: REE: cerium Uses: Alloys, polishing, colorant, catalyst, lighters, turbine blade coating ⁶⁴ Monazite, Bastnasite: REEs: cerium and lanthanum Uses: Catalysts, lighters, lamps, optics, alloys; Alloys, polishing, colorant, catalyst, lighters, turbine blade coating ⁶⁵ Fergusonite: REE: yttrium Uses: Lasers, TVs, superconductors, LEDs, light bulbs, cancer treatment ⁶⁶ Euxenite: REE: yttrium	Glenover Complex (Glenover Pty, South Africa; Galileo Resources, South Africa) ⁶⁸

Rare earth-bearing mineral, by deposit sites (*Commercially viable)	Commercially viable rare earth-bearing mineral, main REE present, and uses	Mining companies
	Uses: Lasers, TVs, superconductors, LEDs, light bulbs, cancer treatment ⁶⁷	
North West Welgevonden – carbonite Pilansberg Complex (Pilanesberg, Pilaan's berg) – britholite; eudidymite; pyrochlore; allanite*; mosandrite Goudini – xenotime*	<i>Xenotime:</i> REE: yttrium Uses: Lasers, TVs, superconductors, LEDs, light bulbs, cancer treatment ⁶⁹	Zandkopsdrift (Frontier Rare Earths Ltd, Luxembourg). Korea Resources Corp owns 10%. ⁷⁰
Western Cape Steenkampskraal – neodymium; dysprosium; praseodymium; terbium; gadolinium; cerium; lanthanum; yttrium; holmium; erbium; lutetium; samarium; thulium; ytterbium; and europium		Steenkampskraal (Steenkampskraal Monazite Mine (Pty) Limited, South Africa) ⁷¹

South Africa's most advanced REE project is the Steenkampskraal mine, located in the Western Cape Province, approximately 220 miles north of Cape Town. The mine was fully licensed and permitted in 2019. It is estimated that Steenkampskraal has 799,700 metric tons of ore and contains 69,400 metric tons of REEs including neodymium, praseodymium, dysprosium, terbium, and yttrium.⁷² Steenkampskraal's deposits are believed to be primarily the light rare earths, but are of a higher than average grade deposit.⁷³ The Steenkampskraal mine was formerly operated by the Angola American Corporation, but was abandoned in 1963 after global demand for thorium declined. Steenkampskraal is currently owned by South Africa's Steenkampskraal Monazite Mine, with Steenkampskraal Holdings and Steenkampskraal Worker's Trust holding 74% and 26% stakes, respectively.⁷⁴ Great Western Minerals Group, a rare earths processor headquartered in Saskatoon, Canada, announced in February 2022 that it would be starting a new drilling program at Steenkampskraal as well as exploring the area surrounding the mine.⁷⁵ It is anticipated that once mining begins, Steenkampskraal will produce approximately 30,000 tons of ore per year over the next 30 years.⁷⁶ In 2022, a rival company filed for a permit to develop the mine, causing a delay in production.⁷⁷

There are also a number of other projects in various stages of development. Zandkopsdrift mine, 60 miles north of Steenkampskraal, is owned by Frontier Rare Earths, which signed an agreement with the Korean-based Kores Resources Corporation in 2011 to develop the project. A pre-feasibility study was conducted in 2015, but no additional developments have been announced since.⁷⁸ In November 2020, Rainbow Rare Earths—which owns the only commercially viable rare earths mine in Africa, located in Burundi—announced the Phalaborwa Project, located in Limpopo Province, as a co-venture with Bosveld Phosphaates. Rainbow Rare Earths has a 70% share in the project. Also, in Limpopo Province, South African company, Afrimat, acquired the Glenover Rare Earth Project in December 2021. It was formerly owned by Galileo Resources, a British company.

South Africa: Business Climate

South Africa's business climate is generally good, as its institutions are particularly stable and its infrastructure relatively advanced. Notable strengths include its judiciary, free press, and robust financial and services sectors. Despite these strengths, corruption still weighs heavily on South Africa's economy. The tenure of former President Jacob Zuma (2009–2018) is largely considered to have contributed to a "lost decade,"⁷⁹ due to rampant public corruption and economic mismanagement. In 2020, South Africa adopted some of the world's strictest economic and social lockdowns to combat COVID-19, further affecting economic growth.⁸⁰

In terms of ease of doing business in South Africa, across all metrics measured by the World Bank, South Africa performs better than its continental counterparts. South Africa scores especially well in the process to start a new business, paying taxes, and protecting minority investors. The latter is a function of the post-apartheid approach to economic growth and its Black Economic Empowerment (BEE) initiatives. South Africa performs less well in contract enforcement, cross-border trade, and resolving insolvencies, although it is slightly higher in these

areas than the continental average.⁸¹ Relative to itself, however, scores have stagnated, and in some cases declined slightly, since the early 2010s.⁸²

Table 4. World Bank's "Doing Business" Scores (out of 100): South Africa versus SSA

South Africa: Scores above SSA	
Starting a business: 81.2	Regional score: 80.1
Construction permits: 68.3	Regional score: 58.5
Getting electricity: 68.8	Regional score: 50.4
Registering Property: 59.5	Regional score: 53.6
Getting credit: 60.0	Regional score: 45.2
Protecting minority investors: 80.0	Regional score: 38.5
Paying taxes: 81.2	Regional score: 57.8
Trading across borders: 59.6	Regional score: 53.6
Enforcing contracts: 56.9	Regional score: 49.6
Resolving insolvencies: 54.6	Regional score: 31.3

South Africa: Natural Resource Management and Governance

South Africa is a constitutional democracy, considered “free” with respect to political rights and civil liberties. Even though the ruling African National Congress has dominated each election since the end of apartheid in 1994, political parties and actors are not restricted. In recent years, the country has dealt with high profile corruption, implicating ministers, former president Jacob Zuma, and even current president, Cyril Ramaphosa.⁸³ Transparency International ranks South Africa in the middle one-third of all countries, at 70/180.⁸⁴

Mining has formed the backbone of South Africa's economy for more than 150 years, but presently faces many challenges. In addition to sizable coal, gold, and diamond reserves, South Africa is one of the world's largest platinum producers. However, over the past several years, South Africa's mining sector declined in terms of value, productivity, and jobs.⁸⁵ Indeed, despite the generally positive business climate score, the Fraser Institute ranked South Africa 75 out of 84 in terms of investment attractiveness, in its 2021 "Annual Survey of Mining Companies."⁸⁶ Of African countries surveyed, South Africa was near the bottom, ahead of only Mali, the Democratic Republic of Congo, and Zimbabwe.⁸⁷ The mining sector must contend with infrastructure degradation, market volatility, and a technological lag.⁸⁸ Furthermore, a noticeable decrease in investment in the mining sector is believed to be linked, at least in part, to regulatory uncertainty,⁸⁹ as illustrated by the ambiguity in enforcing the Mining Charter.

In 2004, the South African government released its 2004 Mining Charter, conceived as a social contract between the mining industry and local communities to ensure that citizens benefit from the country's natural resources.⁹⁰ The country's third Mining Charter, also called the Broad-based Socio-economic Empowerment Charter for the Mining and Metals Industry, passed in 2018, but questions remain about how to interpret specific sections. According to the charter, the Minister of Mineral Resources may cancel mining contracts if they do not adhere to its provisions.⁹¹ However, in September 2021, the country's Gauteng High Court ruled that the charter was a policy document and not legislation. Under the previous charter, and in line with the country's BEE initiatives, 26% of the company's shares must be held by black citizens.⁹² The new charter requires that these need to be held in perpetuity by black citizens. It also requires that mining companies purchase 70% of goods and 80% of services from black-owned companies.⁹³ Yet, the ruling by the High Court casts doubt on whether mining companies must abide by these requirements.

A number of foreign firms are electing to leave South Africa due to increasing levels of violent crime, sometimes targeted against mining company employees and executives; increasing costs; and onerous and uncertain regulations.⁹⁴ Reportedly, in 2019 and 2020, 22 armed robberies of mining factories occurred.⁹⁵ In fact, South Africa's mining industry has a history of unrest and violence. Among the highest profile incidents, in 2012, South African police killed 34 striking mineworkers and injured 78 in the North West Province's Marikana Mine.⁹⁶ Referred to as the Marikana Massacre, the impact has reverberated throughout the country since. The government established a Commission of Inquiry, but its findings, released in 2015, resulted in very little conclusive evidence of wrongdoing. Several groups questioned the Commission's findings and accused the Commission of producing an "unsympathetic and severely limited report."⁹⁷ Victims' advocacy groups and human rights groups continue to complain about the lack of accountability for the perpetrators.⁹⁸ Even though the South African government has stated on numerous occasions that it would prosecute police members responsible for the massacre, it has failed to do so thus far.⁹⁹ The Marikana Massacre has implicated South Africa's current president, Cyril Ramaphosa, who at the time served as a non-executive director of Lonmin Platinum, the UK-based

company that owns Marikana. In June 2022, the South African High Court threw out a civil lawsuit filed by mineworkers and their families against Ramaphosa, although they left the door open for the plaintiffs to refile.¹⁰⁰

U.S.-South Africa Relations

South Africa is one of the largest recipients of U.S. health assistance. Through PEPFAR, the United States has provided more than \$7.25 billion in assistance, beginning in 2004; PEPFAR provided \$270 million in assistance in 2020.¹⁰¹ While the United States and South Africa enjoy robust economic ties, relations are fraught occasionally. South Africa, already a regional hegemon, aspires to be a continental leader and does not always agree with the U.S. perspective on conflict and instability. Specific diplomatic differences have arisen over the U.S.'s response to the governments of Zimbabwe and Sudan and the intervention in Libya.¹⁰²

South Africa's relationship with Russia and China has strained its relationship with the United States at times, with South Africa often unwilling to criticize either country. Most recently, in March 2022, South Africa was widely condemned for softening language in a draft resolution on the Russian invasion of Ukraine.¹⁰³ China is an important economic partner of South Africa, both in terms of trade and foreign direct investment; however, allegations of corruption have accompanied key infrastructure projects undertaken by the Chinese in South Africa, undermining public perceptions of the Chinese.¹⁰⁴ South Africa is also believed to have Africa's largest population of Chinese residents, at an estimated 350,000.¹⁰⁵

Conclusion

Both Namibia and South Africa have strong mining sectors and hold potential for rare earth mining. Namibia's government welcomes foreign investment, ranking relatively higher than other countries in terms of ease of doing business and some best practices. Recently, there are signs that some tenets for good governance—and good resource management—may be weakening. South Africa ranks higher than all other SSA countries with respect to ease of doing business. However, in South Africa, as well, there have been growing concerns about corruption and some uncertainty in the regulatory environment. Still, South Africa presents the most likely site for the continent's next commercially productive REE mine.

¹ REEs include the 15 lanthanides of the periodic table—lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium—plus yttrium and scandium (see: Marc Humphries, “Rare Earth Elements: The Global Supply Chain,” Congressional Research Services, December 16, 2013, <https://fas.org/sgp/crs/natsec/R41347.pdf>).

² “Rare Earths,” U.S. Geological Survey, Mineral Commodity Summaries, January 2021, <https://pubs.usgs.gov/periodicals/mcs2021/mcs2021-rare-earths.pdf>.

³ Executive Order 14017 of February 24, 2021, “America's Supply Chains,” *Federal Register* 86, no. 38, March 1, 2021, Presidential Documents, <https://www.federalregister.gov/documents/2021/03/01/2021-04280/americas-supply-chains>; U.S. Department of Energy, “Critical Materials Rare Earths Supply Chain: A Situational White

-
- Paper,” April 2020, <https://www.energy.gov/sites/prod/files/2020/04/f73/Critical%20Materials%20Supply%20Chain%20White%20Paper%20April%202020.pdf>.
- ⁴ REEs include the 15 lanthanides of the periodic table—lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium—plus yttrium and scandium (see: Marc Humphries, “Rare Earth Elements: The Global Supply Chain,” Congressional Research Services, December 16, 2013, <https://fas.org/sgp/crs/natsec/R41347.pdf>).
 - ⁵ Marc Humphries, “Rare Earth Elements: The Global Supply Chain.”
 - ⁶ “Rare Earths,” U.S. Geological Survey, Mineral Commodity Summaries, January 2021.
 - ⁷ Executive Order 14017 of February 24, 2021, “America’s Supply Chains”; U.S. Department of Energy, “Critical Materials Rare Earths Supply Chain: A Situational White Paper,” April 2020.
 - ⁸ C. Xu, J. Kynický, M. Smith, et al. “Origin of heavy rare earth mineralization in South China.” *Nat Commun* 8, 14598 (2017). <https://doi.org/10.1038/ncomms14598>; Zhiping Zheng and John E. Greedan, “Rare Earth Elements and Materials,” Editor(s): Robert A. Meyers, *Encyclopedia of Physical Science and Technology* (Third Edition), Academic Press, 2003, pp. 1–22, <https://doi.org/10.1016/B0-12-227410-5/00653-0>.
 - ⁹ Zheng and Greedan, “Rare Earth Elements and Materials.”
 - ¹⁰ “Rare Earth Elements,” Virginia Department of Energy, <https://energy.virginia.gov/geology/REE.shtml>
 - ¹¹ The Virginia Department of Energy has identified the following as holding particular commercial value: Bastnesite, Monazite, Xenotime, Parisite, Ancylyte, Florencite, Euxenite, Ferusonite, Apatite, and Allanite (“Rare Earth Elements,” Virginia Department of Energy).
 - ¹² “Rare Earth Elements,” Virginia Department of Energy; Karl A. Gschneidner, Jr. and Vitalij K. Pecharsky, “Rare-earth Element.” *Encyclopedia Britannica*, 17 Jan. 2019, <https://www.britannica.com/science/rare-earth-element>.
 - ¹³ Commercial viability determined from “Rare Earth Elements,” Virginia Department of Energy.
 - ¹⁴ “Rare Earth Elements,” Virginia Department of Energy; Gschneidner and Pecharsky (2019); John W. Anthony, Richard A. Bideaux, Kenneth W. Bladh, and Monte C. Nichols, Eds. *Handbook of Mineralogy*, “Parisite-Nd,” Mineral Data Publishing, 2001, [http://www.handbookofmineralogy.org/pdfs/parisite-\(Nd\).pdf](http://www.handbookofmineralogy.org/pdfs/parisite-(Nd).pdf).
 - ¹⁵ “Rare Earth Elements – Vital to Modern Technologies and Lifestyles,” U.S. Geological Survey, Fact Sheet 2014 – 3078, November 2014, <https://pubs.usgs.gov/fs/2014/3078/pdf/fs2014-3078.pdf>; “Rare Earth Elements,” Virginia Department of Energy; Gschneidner and Pecharsky (2019).
 - ¹⁶ Hao Cui, *Beneficiation of Rare Earth Elements Bearing Ancylyte*, Master of Science Thesis, Colorado School of Mines, 2015, https://mountainscholar.org/bitstream/handle/11124/166684/Cui_mines_0052N_10890.pdf?sequence=1&isAllowed=y; “Rare Earth Elements,” Virginia Department of Energy; Miloš René, “Allanite from Granitic Rocks of the Moldanubian Batholith (Central European Variscan Belt),” in Michael Aide and Takahito Nakajima, *Rare Earth Elements and Their Minerals*, 2020, <https://www.intechopen.com/chapters/67202>
 - ¹⁷ “Fergusonite: Properties and Occurrences,” MSR Blog, <http://www.msrblog.com/science/geographic-minerals/fergusonite-properties-and-occurrences.html>; “Rare Earth Elements – Vital to Modern Technologies and Lifestyles,” U.S. Geological Survey, Fact Sheet 2014 – 3078, November 2014, <https://pubs.usgs.gov/fs/2014/3078/pdf/fs2014-3078.pdf>; “Rare Earth Elements,” Virginia Department of Energy.
 - ¹⁸ “Rare Earth Elements,” Virginia Department of Energy; Gschneidner and Pecharsky (2019).
 - ¹⁹ Ibid.
 - ²⁰ Ibid.
 - ²¹ Anthony et al. (2001); “Rare Earth Elements,” Virginia Department of Energy.
 - ²² “Rare Earth Elements – Vital to Modern Technologies and Lifestyles,” November 2014.
 - ²³ Namibia Critical Metals, Inc. <https://www.namibiacriticalmetals.com/company-profile>
 - ²⁴ “Rare Earth Elements,” Virginia Department of Energy; Gschneidner and Pecharsky (2019).
 - ²⁵ “Rare Earth Elements – Vital to Modern Technologies and Lifestyles,” November 2014; “Rare Earth Elements,” Virginia Department of Energy.
 - ²⁶ Namibia Critical Metals, “Projects,” <https://www.namibiacriticalmetals.com/project-portfolio>.
 - ²⁷ Freedom House, “Namibia,” *Freedom in the World*, 2020, <https://freedomhouse.org/country/namibia/freedom-world/2020>.

-
- ²⁸ World Bank, “Doing Business 2020: Namibia,” Washington, D.C. p. 3
<https://archive.doingbusiness.org/content/dam/doingBusiness/country/n/namibia/NAM.pdf>.
- ²⁹ U.S. Department of State, “Namibia,” *Investment Climate Statement, 2021*, <https://www.state.gov/reports/2021-investment-climate-statements/namibia/>
- ³⁰ “Mining in Namibia,” BDO Namibia, <https://www.bdo.com.na/en-gb/industries/natural-resources/mining-in-namibia>.
- ³¹ U.S. Department of State, “U.S. Relations with Namibia,” <https://www.state.gov/u-s-relations-with-namibia/>
- ³² Fraser Institute, “Annual Survey of Mining Companies,” <https://www.fraserinstitute.org/sites/default/files/annual-survey-of-mining-companies-2021.pdf>
- ³³ U.S. Department of State, “Namibia,” *Investment Climate Statement, 2021*, <https://www.state.gov/reports/2021-investment-climate-statements/namibia/>
- ³⁴ U.S. Department of State, “Namibia,” *Investment Climate Statement, 2021*; “Nine Countries Join US Strategic Minerals Initiative,” *Reuters*, September 26, 2019, <https://www.reuters.com/article/usa-minerals-china/nine-countries-join-u-s-strategic-minerals-initiative-idUSL2N26G229>; Department of State, “ERGI Tools,” <https://ergi.tools/>.
- ³⁵ Elissaios Papyrakis, Matthias Rieger, and Emma Gilberthorpe “Corruption and the Extractive Industries Transparency Initiative,” *The Journal of Development Studies* 53 (2) (2017): 300, DOI: 10.1080/00220388.2016.1160065.
- ³⁶ U.S. Department of State, “Namibia,” *Investment Climate Statement, 2021*; Meredith DeBoom, Washington Post, 2021; “China takes over Namibian uranium mining,” July 17, 2019, *Agence de Presse Africaine*, <http://apanews.net/en/news/china-takes-over-namibian-uranium-mining>.
- ³⁷ Meredith DeBoom, Washington Post, 2021
- ³⁸ Ibid.
- ³⁹ Eric Olander, “China – Namibia: ‘Don’t shoot your employees’ and other recommendations to Chinese nationals,” *The Africa Report*, May 17, 2022, <https://www.theafricareport.com/204570/china-namibia-dont-shoot-your-employees-and-other-recommendations-to-chinese-nationals/>.
- ⁴⁰ See for example: David Aled Williams and Philippe Le Billion, eds., *Corruption, Natural Resources and Development: From Resource Curse to Political Ecology*, Cheltenham and Northampton: Edward Elgar Publishing, 2017, <https://www.elgaronline.com/view/edcoll/9781785361197/9781785361197.xml>.
- ⁴¹ Freedom House, “Namibia,” *Freedom in the World*, 2020.
- ⁴² Ibid.
- ⁴³ Selma El Obeid and John Mendelsohn, “Namibia’s Fair-Weather Friends and One All-Weather Friend,” IFRI, September 2021, https://www.ifri.org/sites/default/files/atoms/files/el_obeid_mendelsohn_namibia_2021.pdf.
- ⁴⁴ Transparency International, Corruption Perceptions Index, 2020, <https://www.transparency.org/en/cpi/2020/index/nam>
- ⁴⁵ Afrobarometer, “Summary of Results,” *Afrobarometer Round 8 survey in Namibia, 2019*, p. 57, <https://www.afrobarometer.org/publication/summary-results-afrobarometer-round-8-survey-namibia-2019-0/>
- ⁴⁶ Afrobarometer, “Summary of Results,” *Afrobarometer Round 8 survey in Namibia, 2019*, p. 58
- ⁴⁷ Freedom House, “Namibia,” *Freedom in the World*, 2020.
- ⁴⁸ Ibid.
- ⁴⁹ Afrobarometer, “Trust in political institutions is on the decline in Namibia, Afrobarometer survey shows,” *News Release*, March 23, 2020, <https://afrobarometer.org/press/trust-political-institutions-decline-namibia-afrobarometer-survey-shows#:~:text=Afrobarometer%20survey%20shows-Trust%20in%20political%20institutions%20is%20on,in%20Namibia%2C%20Afrobarometer%20survey%20shows&text=While%20a%20majority%20of%20Namibians,over%20the%20past%20five%20years>.
- ⁵⁰ Afrobarometer, “Afrobarometer Round 8 Survey in Namibia 2019,” p. 11.
- ⁵¹ Ibid.
- ⁵² Afrobarometer, “Afrobarometer Round 8 Survey in Namibia 2019,” p. 14.
- ⁵³ Freedom House, “Namibia,” *Freedom in the World*, 2020.

-
- ⁵⁴ Department of State, “U.S. relations with Namibia,” <https://www.state.gov/u-s-relations-with-namibia/>
- ⁵⁵ U.S. Foreign Assistance, <https://foreignassistance.gov/cd/namibia/>
- ⁵⁶ Ibid.
- ⁵⁷ Department of State, “U.S. relations with Namibia.”
- ⁵⁸ “Mines in South Africa.” Africa Mining iQ, <https://projectsiq.co.za/mines-in-south-africa.htm#:~:text=Mining%20Types&text=In%20South%20Africa%20there%20are,66%20surface%20Fundergro und%20combo>
- ⁵⁹ “Digging Beneath the Surface: An Exploration of the Net Benefits of Mining in Southern Africa,” The World Bank, 2019, <https://openknowledge.worldbank.org/bitstream/handle/10986/32107/Digging-Beneath-the-Surface-An-Exploration-of-the-Net-Benefits-of-Mining-in-Southern-Africa.pdf?sequence=1&isAllowed=y>, p. 11
- ⁶⁰ “Rare Earths,” U.S. Geological Survey, Mineral Commodity Summaries, January 2021.
- ⁶¹ Commercial viability determined from “Rare Earth Elements,” Virginia Department of Energy.
- ⁶² “Rare Earth Elements,” Virginia Department of Energy; Gschneidner and Pecharsky (2019).
- ⁶³ “Apatite Visible Spectra (350 - 1100 nm),” Mineral Spectroscopy Server, California Institute of Technology, Pasadena, California, <http://minerals.gps.caltech.edu/files/visible/apatite/index.html>; <https://energy.virginia.gov/geology/REE.shtml>
- ⁶⁴ Hao Cui, *Beneficiation of Rare Earth Elements Bearing Ancylyte*, Master of Science Thesis, Colorado School of Mines; “Rare Earth Elements,” Virginia Department of Energy.
- ⁶⁵ Rare Earth Elements,” Virginia Department of Energy; Gschneidner and Pecharsky (2019).
- ⁶⁶ “Fergusonite: Properties and Occurrences,” Rare Earth Elements,” Virginia Department of Energy.
- ⁶⁷ Jon K. King, “Rare Earth Elements and Yttrium in Wyoming,” Geological Survey of Wyoming, Mineral Report 91-3, September 1, 1991, Wyoming State Geological Survey, p. 30, <https://www.wsgs.wyo.gov/products/wsgs-1991-mr-03.pdf>; Gschneidner and Pecharsky (2019); Rare Earth Elements,” Virginia Department of Energy.
- ⁶⁸ Galileo Resources, <https://galileoresources.com/>
- ⁶⁹ “Rare Earth Elements – Vital to Modern Technologies and Lifestyles,” November 2014; “Rare Earth Elements,” Virginia Department of Energy.
- ⁷⁰ “Frontier Rare Earths confirms \$23.8 mln investment from Korea Resources for Zandkopsdrift,” *Proactive Investors*, July 2012, <https://www.proactiveinvestors.com/companies/news/87788/frontier-rare-earths-confirms-238-mln-investment-from-korea-resources-for-zandkopsdrift-31791.html>.
- ⁷¹ Steenkampskraal Monazite Mine (Pty) Ltd, <https://www.steenkampskraal.com/>
- ⁷² “Steenkampskraal Rare Earth Elements Mine,” *NS Energy*, n.d., <https://www.nsenergybusiness.com/projects/steenkampskraal-rare-earth-elements-mine/#>
- ⁷³ “Africa’s rare earth element opportunity,” *Gadget*, May 16, 2022, <https://gadget.co.za/africas-rare-earth-element-opportunity/>.
- ⁷⁴ “Steenkamp Rare Earth Elements Mine.” *NS Energy*.
- ⁷⁵ “Great Western Minerals shares rise as it announces new drill program at Steenkampskraal,” n.d, <https://www.proactiveinvestors.com/companies/news/92682/great-western-minerals-shares-rise-as-it-announces-new-drill-program-at-steenkampskraal-39925.html>.
- ⁷⁶ “Steenkamp Rare Earth Elements Mine.” *NS Energy*.
- ⁷⁷ Martin Creamer, “Rare earths mining marking time amid prospecting bid to explore on same site,” *Mining Weekly*, June 7, 2022, https://www.miningweekly.com/article/rare-earths-mining-marking-time-amid-prospecting-bid-to-explore-on-same-site-2022-06-07/rep_id:3650.
- ⁷⁸ “Frontier Announces Positive Pre-Feasibility Study for its Zandkopdrift Rare Earth Project in South Africa.” Cision, May 12, 2015, <https://www.newswire.ca/news-releases/frontier-announces-positive-pre-feasibility-study-for-its-zandkopsdrift-rare-earth-project-in-south-africa-517698331.html>
- ⁷⁹ U.S. Department of State, “South Africa,” *Investment Climate Statement*, <https://www.state.gov/reports/2021-investment-climate-statements/south-africa/>
- ⁸⁰ Ibid.

-
- ⁸¹ World Bank, “Doing Business 2020: South Africa,” Washington, D.C., <https://archive.doingbusiness.org/en/data/exploreconomies/south-africa>
- ⁸² Ibid.
- ⁸³ Freedom House, “Freedom in the World,” <https://freedomhouse.org/country/south-africa/freedom-world/2022>.
- ⁸⁴ Transparency International, “Corruption Perception Index,” <https://www.transparency.org/en/cpi/2021/index/zaf>
- ⁸⁵ “Putting the shine back into South African mining,” McKinsey&Company, February 2019, <https://www.mckinsey.com/~media/mckinsey/featured%20insights/middle%20east%20and%20africa/putting%20the%20shine%20back%20into%20south%20african%20mining/mck-putting-the-shine-back-into-south-african-mining-a-path-to-competitiveness-and-growth.pdf>, pp. 1–4
- ⁸⁶ Fraser Institute, *Annual Survey of Mining Companies, 2021*, <https://www.fraserinstitute.org/sites/default/files/annual-survey-of-mining-companies-2021.pdf>
- ⁸⁷ Ibid.
- ⁸⁸ “Putting the shine back into South African mining,” McKinsey&Company, February 2019.
- ⁸⁹ Heidi Vella, “Once empowered, always empowered: tensions rise in South African mining,” *Mining Technology*, January 17, 2022, <https://www.mining-technology.com/analysis/once-empowered-always-empowered-tensions-rise-in-south-african-mining/>
- ⁹⁰ Ibid.
- ⁹¹ Ibid.
- ⁹² Ibid.
- ⁹³ Ibid.
- ⁹⁴ Alexandra Wexler, “Violent Crime, Rising Costs Put South Africa’s Mining Industry in a Deep Hole,” *Wall Street Journal*, January 18, 2022, <https://www.wsj.com/articles/violent-crime-rising-costs-put-south-africas-mining-industry-in-a-deep-hole-11642517454>.
- ⁹⁵ Ibid.
- ⁹⁶ “Marikana Massacre 16 August 2012,” South Africa History Online, August 27, 2019, <https://www.sahistory.org.za/article/marikana-massacre-16-august-2012>
- ⁹⁷ Keaton Allen-Gessesse, “Who owns the story of South Africa’s Marikana massacre?” Ford Foundation, March 22, 2017, <https://www.fordfoundation.org/news-and-stories/stories/posts/who-owns-the-story-of-south-africa-s-marikana-massacre/>.
- ⁹⁸ “South Africa: Five years on, Marikana victims still wait for justice,” Amnesty International, August 14, 2017, <https://www.amnesty.org/en/latest/news/2017/08/south-africa-five-years-on-marikana-victims-still-wait-for-justice/>.
- ⁹⁹ “South Africa: Five years on.” Amnesty International, 2017.
- ¹⁰⁰ Zoleka Qodash, “President Ramaphosa has a case to answer in Marikana massacre: EFF,” *SABC*, July 5, 2022, <https://www.sabcnews.com/sabcnews/president-ramaphosa-has-a-case-to-answer-in-marikana-massacre-eff/>.
- ¹⁰¹ U.S. Department of State, “US Relations with South Africa,” January 19, 2022, <https://www.state.gov/u-s-relations-with-south-africa/#:~:text=Since%202004%2C%20the%20U.S.%20government, live%20longer%20and%20healthier%20lives.>
- ¹⁰² Anthony Carrol, “Forging a New Era in US-South African Relations,” *Atlantic Council*, November 28, 2017 <https://www.atlanticcouncil.org/in-depth-research-reports/report/forging-a-new-era-in-us-south-african-relations/>
- ¹⁰³ Louis Charbonneau, “Why Cozying Up to Russia Gets South Africa Nowhere,” *Human Rights Watch*, April 25, 2022 <https://www.hrw.org/news/2022/04/25/why-cozying-russia-gets-south-africa-nowhere>.
- ¹⁰⁴ Patrick Bond, “China’s Role in Amplifying Southern Africa’s Extreme Uneven Development,” Committee for the Abolition of Illegitimate Debt, 30 June 2021, https://www.cadtm.org/China-s-role-in-amplifying-Southern-Africa-s-extreme-uneven-development#5_conclusion_potentials_for_reviving_positive_chinese_sadc_relations.
- ¹⁰⁵ Kate Bartlett, “In Johannesburg, a Tale of Two Chinatowns,” *VOA News*, April 27, 2022, <https://www.voanews.com/a/6547327.html>.

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE July 2022		2. REPORT TYPE FINAL		3. DATES COVERED (From-To)	
4. TITLE AND SUBTITLE Rare Earth Elements in Namibia and South Africa: Considerations for U.S. Investment				5a. CONTRACT NUMBER HQ0034-14-D-0001	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Bekoe, Dorina A. Burchard, Stephanie M. Deatherage, Sydney N. Sindle, Erin L.				5d. PROJECT NUMBER CRP 55AV	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Institute for Defense Analyses Systems and Analyses Center 730 East Glebe Road Alexandria, VA 22305-3086				8. PERFORMING ORGANIZATION REPORT NUMBER IDA Document NS D-33189	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Institute for Defense Analyses Systems and Analyses Center 730 East Glebe Road Alexandria, VA 22305-3086				10. SPONSOR/MONITOR'S ACRONYM(S) IDA	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited (8 September 2022).					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Rare earth elements (REE), 17 metals and alloys, are considered critical supply-chain inputs in the production of military equipment; the civilian economy, including medical equipment and television technologies; and in clean technologies that reduce carbon emissions. America's dependence on imported REEs—particularly from China, a strategic competitor—has precipitated initiatives to diversify the U.S. supply chain of these critical minerals. Africa's nascent REE sector can serve as a stable and predictable source for critical minerals for the United States. Namibia and South Africa are of particular interest, as they are the countries in Africa with the largest amounts of mineral deposits that contain REEs. Moreover, both countries have strong business climates and robust mining industries. However, there are concerns surrounding some weakening tenets for good governance and good resource management.					
15. SUBJECT TERMS Africa; governance; Namibia; Rare earth elements; Resource management; South Africa					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 22	19a. NAME OF RESPONSIBLE PERSON Major, Philip L.
a. REPORT Uncl.	b. ABSTRACT Uncl.	c. THIS PAGE Uncl.			19b. TELEPHONE NUMBER (include area code) 703-845-2201