Jack-in-the-Stox: Holmium, The Critical Rare Earth in the Operating Room

written by Jack Lifton | November 18, 2026

In his ongoing *Jack-in-the-Stox* series, Jack Lifton comments on public companies, technologies, capital markets, supply chains and geopolitics. He is not a licensed investment adviser, and his views are provided for informational purposes only. Nothing in this column constitutes investment advice or a recommendation to buy, sell or hold any security.

When Americans hear about rare earths, they are almost invariably told about permanent magnets, electric vehicles, wind turbines, and military weapons. The discussion has become so narrowly focused on these applications that we have nearly forgotten that rare earths are also essential to some of the most sophisticated instruments used in modern medicine. I want to discuss one such application today because I believe it shows how little attention we pay to the industrial supply chains our technological civilization depends on.

The element is holmium, atomic number 67, one of the heavy rare earths. Its application is in a surgical laser used to treat one of the most common medical conditions affecting aging men: benign prostatic hyperplasia, or BPH, the noncancerous enlargement of the prostate gland. As men age, this condition becomes increasingly common, and in some cases the enlargement obstructs the flow of urine to such a degree that surgical

intervention becomes necessary.

One of the most effective modern surgical procedures for treating this condition is called holmium laser enucleation of the prostate, or HoLEP. In this procedure, the surgeon uses a precisely controlled laser beam to separate the obstructing prostate tissue from the surrounding tissue, after which the excess tissue is removed. The procedure has become an important alternative to conventional transurethral resection of the prostate, commonly known as TURP. HoLEP is particularly useful because it can be employed across a wide range of prostate sizes. It is not the only available treatment, but it is an established and important one.

What interests me is not the medical procedure itself, but the industrial technology that makes it possible.

The holmium laser is a solid-state device. Its active material is generally a crystal of yttrium aluminum garnet into which a controlled quantity of holmium has been incorporated. Depending upon the laser design, other elements, including thulium and chromium, may also be incorporated into the crystal. The holmium ions enable the generation of laser radiation at approximately 2.1 micrometers, a wavelength strongly absorbed by water and therefore particularly suitable for controlled surgical treatment of soft tissue.

The holmium is not burned up or consumed during the procedure. It remains in the crystal. Nevertheless, without the holmium, the laser could not operate as designed. A small quantity of a relatively obscure element enables a medical instrument of considerable value.

This raises a question that I have not seen discussed in the American debate about critical minerals: Who manufactures these lasers, who manufactures the crystals they use, and where do the

crystal manufacturers obtain their holmium?

The answers are instructive, although our investigation has also revealed some important gaps in publicly available information.

At least one American manufacturer of holmium surgical lasers exists. Convergent Laser Technologies, located in Alameda, California, manufactures the Odyssey family of holmium laser systems and states that it designs and manufactures its products in the United States. Its equipment has been used principally in urological applications, including the fragmentation of urinary stones. Its participation in the prostate enucleation market is a separate question.

Among the important suppliers of holmium laser equipment to American hospitals is Boston Scientific Corporation (NYSE: BSX), an American medical device company that acquired the surgical business of the Israeli company Lumenis. Its product line includes the Lumenis Pulse 120H holmium laser system. Regulatory and manufacturer documentation identifies Lumenis Ltd. of Yokneam, Israel, as the legal manufacturer of that instrument. Another important manufacturer is Quanta System S.p.A. of Italy, which produces the Cyber Ho family of surgical lasers. German and Chinese manufacturers also participate in this specialized market.

Thus, the United States is not entirely dependent upon foreign manufacturers for the finished laser equipment. But the country of incorporation of a medical device company, or even the country where its equipment is assembled, tells us very little about the origin of the critical materials in that equipment.

The next stage of our investigation was to determine who actually manufactures the holmium-bearing laser crystals.

We found that the United States possesses at least one

established industrial capability to manufacture such crystals. Northrop Grumman (NYSE: NOC) operates a specialized laser-crystal manufacturing business, SYNOPTICS, in Charlotte, North Carolina. The company has published technical specifications for chromium-thulium-holmium-doped yttrium aluminum garnet crystals, including dopant concentrations and the optical characteristics required for laser operation. This is not merely a proposed capability. It is an established American manufacturing operation.

We also identified CRYTUR, spol. s r.o., a manufacturer in the Czech Republic, which grows holmium doped yttrium aluminum garnet crystals using the Czochralski process. CRYTUR publicly describes its capabilities in crystal growth, machining, and optical coating, and offers Ho crystals in a range of compositions and dimensions.

These findings matter because they show that the industrial capability to manufacture holmium bearing laser crystals is not confined to China. American and European manufacturers possess at least some of the required technology.

However, we have not established that Northrop Grumman or CRYTUR supplies the crystals used by Boston Scientific, Quanta System, or Convergent Laser Technologies. Nor have we identified the actual crystal supplier to any of these three manufacturers through publicly available procurement documentation.

I want to be very clear about this distinction. The existence of a qualified crystal manufacturer does not prove that it supplies a particular medical device company. Similarly, domestic crystal-growing capability does not establish a domestic supply of the rare earth materials used to manufacture the crystals.

That brings us to the most important part of the investigation: the origin of the holmium itself.

According to the United States Geological Survey's *Mineral Commodity Summaries 2026*, China accounted for 100 percent of identifiable American imports of holmium compounds and metals from 2021 through 2024. The USGS also reported that the United States remained 100 percent import dependent for heavy rare earth compounds and metals as a group in 2025.

I think that is an extraordinary fact.

Here we have an advanced medical technology used to improve the lives of aging American men, and the United States has no demonstrated commercial-scale domestic supply of the particular rare earth element required to manufacture its essential laser material.

But there is another qualification, and it is an important one. At this time, we cannot identify a specific Chinese producer supplying the holmium used in the laser crystals manufactured by Northrop Grumman, CRYTUR, or any other potential supplier to the three medical equipment manufacturers we have examined. Indeed, we cannot establish that the holmium in any particular laser crystal originated in China.

The USGS figures describe American imports of holmium compounds and metals. They do not trace the origin of holmium incorporated into laser crystals manufactured in foreign countries and subsequently imported into the United States as components of finished medical instruments.

We therefore have evidence of overwhelming Chinese dominance in the identifiable American market for imported holmium materials, but not a verified chain of custody connecting a particular Chinese holmium producer to a particular surgical laser.

I regard that distinction as essential. An investigation into critical minerals supply chains should not replace missing

evidence with assumptions, however plausible those assumptions may appear.

Holmium is not produced from a mineral deposit dedicated to holmium. Like the other rare earths, it occurs in mixtures, and its commercial recovery depends upon the economics of mining and processing those mixtures. It is found in relatively small concentrations, particularly in mineral resources associated with the heavy rare earths.

The problem is therefore not simply whether the United States possesses holmium bearing mineral resources. It is whether we possess the industrial capability to recover holmium from those resources, separate it from the chemically similar rare earths accompanying it, purify it to the required specifications, and deliver it consistently to the manufacturers of laser crystals.

This is precisely the distinction between possessing a mineral resource and having a functioning industrial supply chain, which I have emphasized for many years.

I also want to make another distinction. Holmium is not necessarily an attractive investment opportunity simply because it is indispensable to a valuable medical device. The amount of holmium required in an individual laser crystal is small, and the holmium is not consumed during normal surgical use. The value of the finished instrument comes principally from the optical engineering, electronics, precision manufacturing, software, regulatory qualification, and medical functionality incorporated into it.

In other words, the economic importance of holmium in this application is not measured by the quantity consumed. It is measured by the consequences of its unavailability.

A hospital may purchase a surgical laser costing many times the

value of the rare earth material contained in its crystal. But the manufacturer cannot simply substitute an unqualified material if its established supply becomes unavailable. Nor can the manufacturer necessarily obtain a replacement crystal from another supplier without the appropriate engineering and regulatory evaluation.

This kind of industrial vulnerability cannot be understood by looking only at mining statistics or by adding together the announced capacities of proposed rare earth separation plants.

It is also why I have long argued that developing a domestic critical minerals industry must begin with the requirements of manufacturers of finished products. The medical equipment manufacturer knows what material it needs, in what chemical and physical form, to what purity, and with what supply consistency. Those requirements should determine which processing capabilities to develop.

A government program that finances the production of mixed rare earth concentrates without identifying a qualified customer for the individual separated products is not necessarily creating a supply chain. It may simply create another intermediate material for which downstream industrial capability does not exist.

The holmium laser illustrates a larger problem. We have concentrated our political attention and much of our public financing on the rare earths used in permanent magnets while largely ignoring the many smaller but technologically indispensable applications of other rare earths.

A supply chain does not become strategically important only when its annual consumption reaches thousands of tons.

A few kilograms of the right material, in the right chemical form, delivered to the right manufacturer at the right time, may

be far more important than thousands of tons of a material with no qualified domestic customer.

Our investigation has established that holmium surgical lasers are manufactured in the United States, Israel, Italy, and elsewhere; that American and Czech companies possess the technology to manufacture holmium bearing laser crystals; and that identifiable American imports of holmium compounds and metals have been supplied overwhelmingly, and in the USGS reporting period entirely, by China.

What it has not established is equally important. We have not identified the crystal suppliers to the three medical equipment manufacturers examined, nor have we identified the companies and countries supplying the holmium incorporated into those particular crystals.

These are not questions that can be resolved by examining mining announcements. They require examination of actual procurement relationships, materials specifications, supplier qualification records, and manufacturing practices.

The case of holmium reminds us that the critical minerals problem is not simply a mining problem. It is a problem of industrial organization, technical competence, materials qualification, and preserving manufacturing capability.

If we cannot determine where the holmium in an American hospital’s prostate surgery laser comes from, how can we claim to understand, much less secure, the critical minerals supply chains upon which our economy depends?

That, rather than another announcement of a proposed rare earth mine, is the question I think American industrial policy ought to be asking.