

A Complete Guide to

# Californium-252 Solutions at Frontier Technology Corporation





## About Frontier Technology Corporation

Founded in 1984 in Xenia, Ohio, Frontier Technology Corporation (FTC) has since established itself as the global leader in the supply and shipment of californium-252 (Cf-252). We offer a broad selection of products—including high-integrity neutron sources, nuclear reactor start-up rods, and much more. Available in over 200 countries, all of our products are produced and shipped in compliance with rigorous industry standards, including the Nuclear Regulatory Commission, Ohio State Department of Health, ISO-2919, ASTM, and ANSI. Equipped with over three decades of experience, our team offers extensive knowledge and expertise to deliver high-quality Cf-252 solutions to our customers.

# Our Californium-252 Sources

Since its discovery in 1950, our californium-252 sources have found application in a wide range of industries. Cf-252 is commonly used as a tool for composition analysis within the gold and silver prospecting and oil industries, and its radioactivity makes it a particularly well-suited neutron source for nuclear reactors, neutron spectroscopy equipment, and other neutron-based systems.

Our Cf-252 sources are composed of three components: the source itself, an inner capsule, and an outer capsule. These capsules are composed of 304L stainless steel, zircaloy-2, and a mixture of other alloys. In order to ensure absolute safety, functionality, and quality, the sources are put through a series of testing and inspection services – including a pressurized helium leak test, an alpha, beta, gamma wipe, and a double-blind inspection.

At FTC, our [neutron source solutions](#) include:

- **Model 10 series sources:** single-encapsulated with Zircaloy-2 or 304L stainless steel capsule material and primarily used within multi-encapsulated sources
- **Model 100 series sources:** double-encapsulated with a Model 10 series source used as the primary encapsulation and Zircaloy-2 or 304L stainless steel outer capsule material
- **Custom sources:** available in unique configurations for highly specific applications

All of our Cf-252 sources are fully NIST-traceable, with certification available upon request.



# Our Type-A Shipping Containers

In addition to californium-252, we also provide shielded shipping containers that facilitate safe transport and delivery of the sources. These containers—referred to as Type-A shipping containers—allow for the shipment of large quantities of radioactive material between production facilities and the end site without risks of damage to the source or contamination of the surrounding environment.

Our Type-A shipping containers are designed and constructed in-house to the highest quality standards. They are available in a variety of sizes, configurations, and shielding capacities. Depending on the needs of the customer, we offer them for purchase or rental.

These containers are designed specifically for neutron shielding and comply with all applicable international shipping regulations, as well as requirements for USA DOT Type-A and Specification 7A packages.

The key to our containers' superior performance is their water-extended polyester (WEP) resin. This proprietary material features several advantageous characteristics for neutron shielding, such as high mechanical strength and water content, excellent fire resistance, and superior manufacturability. Today, we are the only Cf-252 supplier that incorporates WEP materials in our containers.



# Industries Served

## Nuclear



Our core clientele consists of nuclear industry customers. For nuclear applications, we offer californium-252 neutron sources, nuclear reactor start-up rods, and Type-A shipping containers, all of which are assembled and shipped to the strictest quality and safety standards.

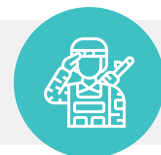
## Coal & Cement



In the coal and cement industries, Cf-252 plays a critical role in a non-destructive measurement and composition analysis method—PGNAA. Prompt-gamma neutron activation analysis (PGNAA) uses Cf-252 to irradiate a sample with neutrons, providing detailed insights about its makeup. The on-site and quick results of the analysis can then be used to determine the presence of desirable materials—or lack thereof. In the latter case, the on-site team may opt to move on to a new location. Ultimately, using Cf-252 in coal and cement operations saves a significant amount of time and resources.



## Military & Defense



Californium-252 also serves as a key component of portable isotopic neutron spectroscopy (PINS) systems in the military and defense sector. PINS systems – which typically take the form of bulk material analyzers – are able to detect a variety of explosives, hazardous chemicals, nerve agents, and blister agents (including sarin gas and mustard gas). Cf-252 is an ideal fit for PINS systems due to its strong neutron emissions, deep material penetration, broad material detection, portability, and durability.

Having assisted in the design and development of the first PINS systems, the FTC team possesses a vast understanding of our military and defense customers' needs. Since their initial introduction in 1992, PINS systems have helped detect and destroy over 70,000 chemical weapons.

## Oil & Petrochemical



The oil and petrochemical industry uses Cf-252 as a neutron source for detection and analysis equipment. For the latter group, the neutron source can be applied to sonar echo instruments, which measure various aspects of a sample—including hydrocarbon presence, permeability, and porosity—to determine whether desirable materials such as oil and gas are present.

Our Cf-252 sources are designed and constructed to meet and exceed the requirements needed to withstand the harsh operating conditions (e.g., extreme temperatures and excessive stresses). We also work with customers to manufacture and encapsulate sources with durable holders tailored to accommodate their unique instruments.

## Private Industry, Government, & Academic Research



Research into neutron emission holds vast potential, which is why we also provide product research support to the academic, government, and private sectors. Our experts offer design and fabrication assistance for a wide range of radioactive products, including neutron and PINS sources, Type-A shipping containers, shielding walls, and reactor start-up rods.

## Our Complete Turnkey Solutions

At FTC, we serve as a single-source provider of complete turnkey solutions for radioactive product needs. Our full-range of services includes:

- Project management
- Product design and development
- Prototyping
- Manufacturing, including precision turndown, welding, and assembly
- Testing and inspection with NIST-traceable documentation
- Reverse engineering
- Integration
- Technical support

With our extensive list of services, our expert team is able to guide clients' projects from start to finish.

# Our Fee-Free Depleted Neutron Source Return Program

Although it is not required by law, we consider it our responsibility to help customers safely dispose of depleted Cf-252 sources that were fabricated at our facilities. Our fee-free depleted [neutron source return program](#) allows them to return depleted sources to us for disposal at no cost to them except for shipment. This program is part of our commitment to moving the nuclear industry forward in a safe and responsible manner. Customers are able to refresh their source supply with efficiency, as well.

## Expanding Our Global Reach

We are fully committed to global growth in 2020 and beyond. Our worldwide shipping already extends to over 200 countries, apart from those on the Embargo List. Beyond those exceptions, regardless of where your operations are centered, we will find a way to meet and deliver upon your Cf-252 source needs.

## Californium-252 Solutions at Frontier Technology Corporation

Frontier Technology Corporation is the premier supplier of californium-252 sources and Type-A shipping containers, offering complete turnkey solutions to customers across a diverse set of industries. We set ourselves apart by providing reliable and responsible neutron sources that meet and exceed regulatory guidelines. For additional information about our products and services, [contact our team](#) today.





## About Us

Frontier Technology Corporation (FTC) is the world leader in californium-252 neutron source manufacturing and design, and is the foremost expert in logistics and shipping of radioactive material.

Founded in 1984 by Treva Janzow and the late Edward Janzow, Frontier Technology is located in Xenia, Ohio. Frontier Technology has over 40 years industry experience in providing the highest-quality neutron sources, PINS sources, nuclear start-up rods, TYPE-A shipping containers, WEP shielding, and antimony-beryllium pellets.

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