NEX QC SERIES

Elemental Analysis by X-ray Fluorescence

Affordable EDXRF Elemental Analyzers

Rigaku

Applied Rigaku Technologies

Superior Performance in a Rugged Package




Energy dispersive X-ray fluorescence (EDXRF) is a routinely used analytical technique for the qualitative and quantitative determination of major and minor atomic elements in a wide variety of sample types. The heart of its versatility stems from the ability to provide rapid, non-destructive, multi-element analyses — from low parts-per-million (ppm) levels to high weight percent (wt%) concentrations — for elements from sodium (Na) through uranium (U).

The versatile Rigaku NEX QC Series EDXRF spectrometers deliver routine elemental measurements across a diverse range of matrices — from homogeneous liquids of any viscosity to solids, thin films, alloys, slurries, powders, and pastes.

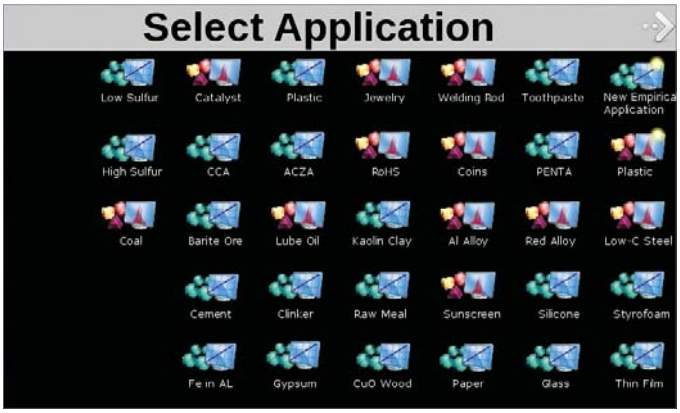
Elemental Analysis in the Field, Plant, or Lab

Specially designed and engineered for heavy industrial use, whether on the plant floor or in remote field environments, the superior analytical power, flexibility, and ease of use of NEX QC Series analyzers add to their broad appeal for an ever-expanding range of applications, including exploration, research, RoHS inspection, and education, as well as industrial and production monitoring applications. Whether the need is basic quality control (QC) or its more sophisticated variants — such as analytical quality control (AQC), quality assurance (QA), or statistical process control like Six Sigma — NEX QC Series are the reliable choice for routine elemental analysis.

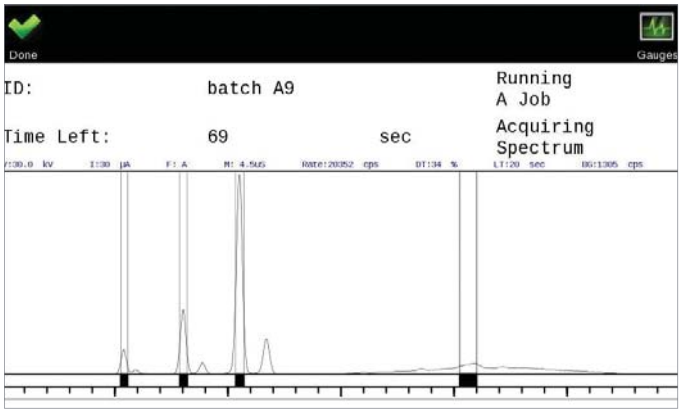
Easy-to-use Touchscreen Interface

Modern Design & Functionality

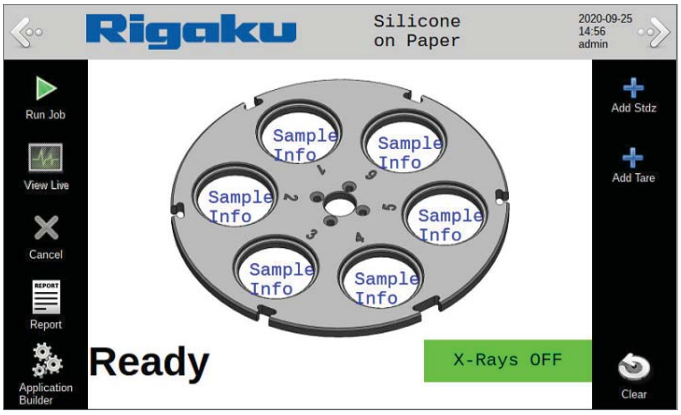
The availability of hardened high-resolution touchscreen displays has allowed Rigaku to redefine the user interface experience for the 21st century. Membrane keyboards and primitive screens are now a thing of the past. Operating NEX QC Series elemental analyzers is a familiar experience, with icon-driven menus guiding users through routine analysis operations. Touchscreen interface technology lowers the cost of ownership because it simplifies operator training and reduces operator error.



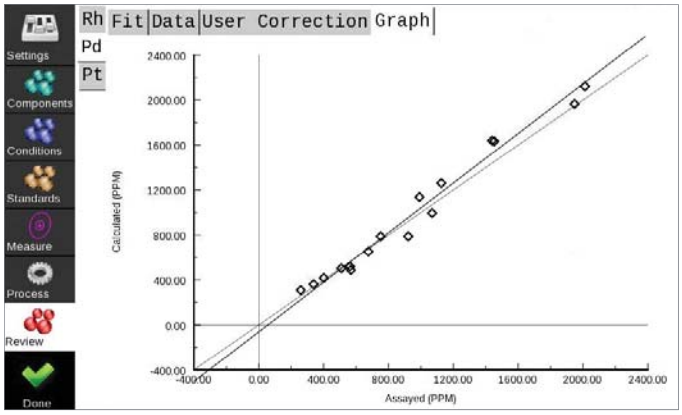
The icon-driven top-level menu allows the operator to select the desired analysis with the touch of a finger.



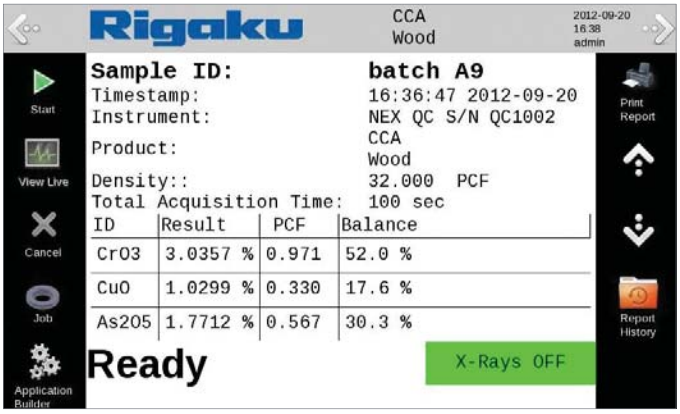
Live spectrum acquisition with the NEX QC showing Cr, Cu, and As peaks from a treated lumber sample.



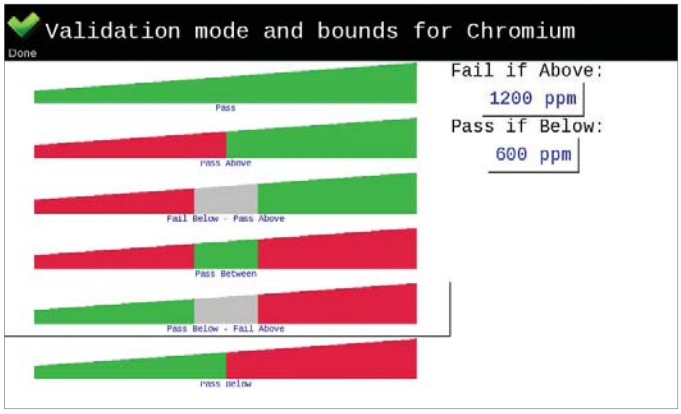
With an autosampler, enter the sample identification for each sample tray position and touch the "Run Job" icon.



Calibration curves and statistics are readily accessible with icon-driven menus.



The results screen is easy to read, and paper copies are conveniently available from the front-mounted thermal printer.



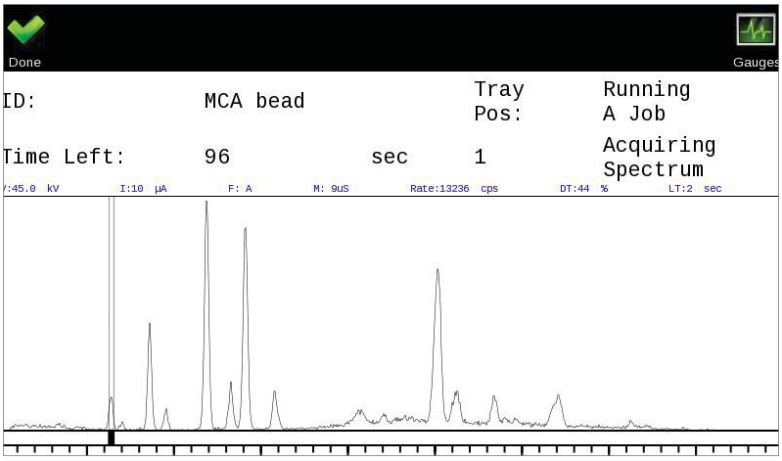
Set desired upper and lower bounds and use the validation feature for pass/fail interpretation of analytical results.

NEX QC SERIES

Exceptional Spectral Resolution and Throughput

NEX QC Series multi-element analyzers combine superior performance capabilities with affordability and serve a broad range of applications. The intuitive touchscreen interface and built-in printer make these instruments easy to use, convenient, and ideal for routine quality control.

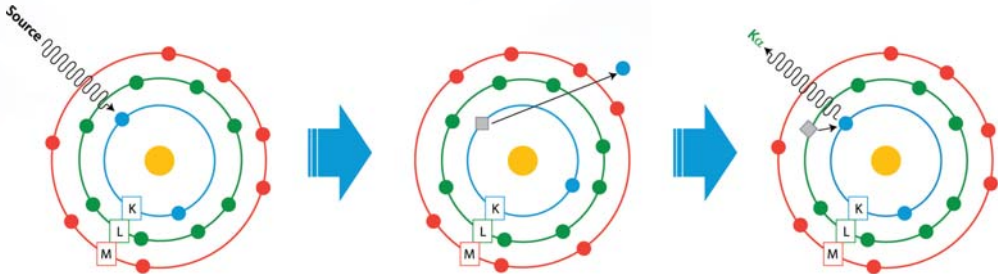
The 50 kV X-ray tube and solid state detectors offer exceptional spectral resolution and throughput. The high voltage capability, along with multiple automated tube filters, provides enhanced sensitivity and low limits of detection. They are available in either a NEX QC or NEX QC+ model for more demanding applications or for situations where analysis time is critical. NEX QC+ significantly improves elemental peak resolution and counting statistics, resulting in superior calibrations and precision for the most challenging measurements.



Live spectrum acquisition with the NEX QC+ spectrometer featuring the high-resolution SDD detector

How it Works

EDXRF is a primary type of X-ray fluorescence (XRF). In XRF, an electron can be ejected from its atomic orbital by the absorption of X-rays (photons) from an X-ray tube. When an inner orbital electron is ejected (illustration in the middle), a higher energy electron transfers to fill the vacancy. During this transition, a characteristic photon may be emitted (illustration on the right) with a unique energy for each type of atom. The number of characteristic photons per unit time (counts per second or cps) is proportional to the amount of that element in a sample. Thus, qualitative and quantitative elemental analysis is achieved by determining the energy of X-ray peaks in a sample spectrum and measuring their associated count rates.



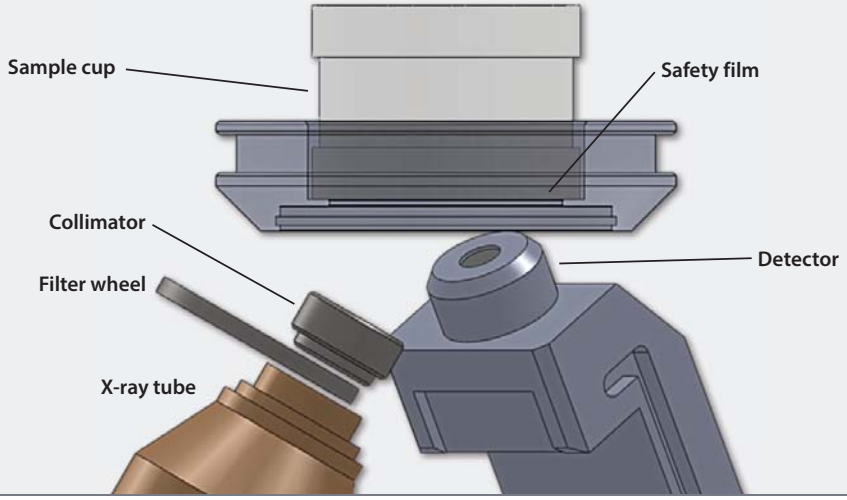
X-ray fluorescence schematic

Computational Dexterity

NEX QC Series analyzers are powered by sophisticated software running on an embedded computer. Empirical calibration curves may be linear, quadratic, or hyperbolic fits. In addition, to compensate for the presence of other elements, intensity-based or concentration-based alpha (α) corrections may be enabled (automatically calculated given sufficient standards). C/H correction is also available to compensate for light element matrix changes and/or changes in average atomic number. All calibration functions are accessible via intuitive icons at the touch of a finger.

State-of-the-art X-ray Optics

The 50 kV X-ray tube and Peltier-cooled semiconductor detector technology deliver exceptional short-term repeatability and long-term reproducibility with excellent elemental peak resolution. The high voltage and multiple automated X-ray tube filters provide multi-element analysis capability for unmatched performance with low limits of detection (LOD). The optical kernel is protected by a safety film that users can change without tools, and the X-ray tube only operates during data collection, lowering operating costs.



NEX QC SERIES

✓ Analyze Sodium (Na) to Uranium (U)

Exceptional versatility. Non-destructive analysis of sodium to uranium in solids, liquids, powders, coatings, and thin films.

✓ Touchscreen Interface

High-resolution, modern, user-friendly touchscreen navigation and instrument control with angle adjustment for glare-free viewing and designed for heavy industrial use.

✓ Installation Made Easy

Designed to be user-installed and maintained.

✓ No Tools Safety Film

No tools are required to change the safety film protecting the optical kernel, enabling easy and rapid replacement.

✓ Built-in Printer

The thermal printer provides fast hard copy results when and where you need them.

✓ X-ray Tube Conservation

By operating only during data collection, X-ray tube wear and tear is minimized — lowering operating costs.

✓ Detector Protection Mechanism

An easily changeable plastic film is positioned in the sample holder to protect the instrument in the event of leaks or spills.

✓ Up to 38 Calibrations

At the touch of a finger, many calibrations are available to support various applications and sample types.

Single position sample holder showing "easy snap" leak protection mechanism.

✓ Single Position or Autosampler

Supplement the standard single position configuration with an optional automatic sample changer.

✓ Removable Sample Trays

Interchangeable optional autosampler trays can be pre-loaded, and swapped in and out, to increase efficiency or where throughput is important. Supports 32 mm and 40 mm cups.

✓ Digital Data Output

Ethernet RJ-45 jack and USB port for output to LIMS or memory stick. Data is available in either CSV or PDF format.

Applications Span Global Industries

Catalysts

EDXRF analysis of heterogeneous and homogeneous catalysts can determine heavy metal content or stoichiometry and quantify poisoning agents. Determination of the value of precious metals content in recycled automotive catalysts is a cost-effective application for the NEX QC+.

Cement

NEX QC Series analyzers are reliable, rugged, and affordable systems for quality control measurements at cement plants. They are ideal tools throughout production and as a backup for WDXRF systems. NEX QC Series analyzers are applicable to clinker and raw meal and may be used to measure gypsum (SO3) in finished cement.

Coatings

Controlling coating thickness or composition is vital for the release, metal finishing, and automotive industries. EDXRF has long been a standard technology for release coatings, converters, vacuum-formed plastics manufacturers, and other sectors using silicone oils as barrier layers, release coatings, or denesting agents. Metallic coatings, either electroplated or sputtered onto a substrate material, may also be quantified with NEX QC Series.

Cosmetics

Since many additives in cosmetics are minerals or inorganic compounds, EDXRF is ideal. Applications include Ti and Zn oxides as UV blockers, Fe, Ti, and Zn oxides, and metallic dyes as pigments. NEX QC Series analyzers can also screen cosmetics for toxic metals and inspect incoming raw materials.

Education

Understanding the basics of atomic spectroscopy is one of the key tenets underpinning the core sciences of physics and chemistry. NEX QC Series analyzers are ideal for giving students instrumentation time in the lab to support their classroom instruction. Unlike AA or ICP, no routine maintenance or consumables are required.

Geology

In studying Earth, geologists routinely analyze the composition of rock and mineral samples. Rapid elemental analyses can be accomplished with NEX QC Series without sample digestion. Typical industrial geological applications include the analysis of limestone, kaolin clay, and silica sand.

Metals and Alloys

Elemental analysis is typically used to classify metals and alloys, control their production processes, or verify their designation. NEX QC Series analyzers are specifically designed for routine QC applications, such as the non-destructive measurement of iron and other elements in aluminum alloys.

Mining and Refining

Foundries, smelters, and mills are characterized by having continuous production, demanding control of both the process and the quality of incoming and outgoing materials. NEX QC Series analyzers may be used to analyze ores, feeds, slags, and tails and make ideal, affordable backup analyzers.

Paint and Pigments

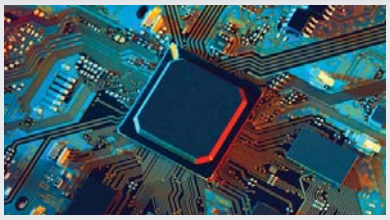
Many paints and pigments contain metal dyes, opacifiers, and other inorganic stabilizers that EDXRF can analyze. One specific application is titanium dioxide and lead chromate in white and yellow road paint. NEX QC Series analyzers are also an ideal low-cost solution for industrial quality control and forensic identification of paint chips.

Petroleum

From the quantification of heavy elements in crude oil to sulfur in fuels to a variety of elements in lubricating oils, EDXRF is a well-established technique for the petroleum and petrochemical industries. For sulfur in crude oil, bunker fuel, and ULSD, NEX QC Series help ensure compliance with ASTM D4294, ISO 20847 and 8754, IP 496 and 336, JIS K 2541-4, as well as ISO 13032.

Plastics

Plastics, polymers, and rubber are combined with different additives to afford specific properties. Commonly analyzed as beads, pressed or molded into plaques, typical applications include Br and Sb as fire retardants; stabilizers and lubricants such as P, Ca, Ba, and Zn, as well as Mg, Al, Si, Fe in fiberglass and S in polyurethane.



RoHS / WEEE

Restriction of Hazardous Substances (RoHS) directives require producers to recycle waste electrical/electronic equipment and remove certain heavy metal toxins, including Pb, Cd, Hg, and hexavalent chromium (Cr). NEX QC Series can help compliance by providing routine elemental analysis.

Wood

Processes undertaken to prevent wood rot fall under the definition of wood preservation or timber treatment. NEX QC can help control a number of different chemical preservatives and processes used to extend the life of wood and engineered wood products, including: CCA, IPBC, PENTA, copper (CA-B, CA-C), and ACZA.

Wovens and Non-wovens

Fabrics of all kinds are created with inorganic chemical additives or treated with compounds to modify the material's behavior. NEX QC Series analyzers are ideal for quantifying compounds such as fire retardants, UV stabilizers, anti-microbial treatments, and electromagnetic shielding.

Options

Sample Spinner

Coarse-grained, inhomogeneous, and rough-finished samples should be rotated during analysis to provide an averaged presentation and suppress diffraction peaks. Thus, a single-position 32 mm sample spinner is offered as an option. Extremely robust in design, the spinner is almost completely silent while rotating at its nominal speed of 32 rpm. It may be used in autosampler equipped models by replacing the automatic sample tray.

Helium Purge

Light element performance is dramatically improved by using a helium (He) environment during analysis. Helium flow rate is 0.2 liters per minute (SLM).

Autosampler

In addition to the standard single-position (32 mm) sample holder (right image) and large object adapter, two automatic sample changers are offered as options. A six-position changer (left image) accommodates 32 mm samples, while the five-position variation accepts 40 mm samples. Both autosampler trays take industry-standard XRF sample cups. Extra trays may be used to preload trays for easy batch analysis.

NEX QC+ QuantEZ

NEX QC+ QuantEZ is designed and engineered for heavy industrial use, from the plant floor to remote field environments. The superior analytical power, flexibility, and ease of use add to its broad appeal for an ever-expanding range of applications, including exploration, research, bulk RoHS inspection, education, and industrial and production monitoring applications. It features powerful QuantEZ® software that offers all the functionality required for calibration and routine operation, and an optional RPF-SQX Standardless Fundamental Parameters package is available.

NEX DE Series

NEX DE Series high-performance analyzers provide rapid, non-destructive elemental analysis of sodium to uranium with small spot capabilities. They are equipped with a 60 kV, 12 W X-ray tube, single and multilayer tube filters, and a high-throughput SDD that supports count rates over 500K cps. Combined with the powerful QuantEZ software, these features provide unparalleled performance for both bulk (NEX DE) and bulk and small spot (NEX DE VS) analysis. An optional advanced RPF-SQX Fundamental Parameters package featuring Rigaku Profile Fitting technology and Scattering FP is available.

NEX CG II Series

Unlike conventional EDXRF spectrometers, NEX CG II Series are indirect excitation systems using secondary targets rather than tube filters. Their unique close-coupled Cartesian Geometry (CG) optical kernel employs monochromatic and polarized excitation from secondary targets to remove background noise, resulting in exceptionally low detection limits. They are ideal for measuring ultra-low and trace element concentrations up to percent levels. Advanced qualitative and quantitative analysis is powered by Rigaku's RPF-SQX Fundamental Parameters software, which features Rigaku Profile Fitting technology and Scattering FP.

Specifications

General
Energy dispersive X-ray fluorescence (EDXRF)
Analytical range Na to U
PPM to % levels

Excitation
X-ray tube, end window type with Ag anode
50 kV X-ray tube
4 W max power
6 tube filter positions
X-rays only on when analyzing

Detection
High-performance semiconductor detector
Peltier electronic cooling
User configurable shaping times for optimum balance of spectral resolution and count rate

Sample chamber
Large 190 x 165 x 60 mm sample chamber
Single-position 32 mm sample aperture with leak protection
17.5 mm ID flat sample ring for large samples

Environmental conditions
Ambient temperature 10 – 35°C (50 – 95°F)
Relative humidity ≤85% non-condensing
Vibration undetectable by human
Free from corrosive gas, dust and particles

Software
Icon-driven graphical user interface
Simple flow bar wizard to create new applications
Qualitative and quantitative analysis
Single or dual point standardization
6 pre-configured validation schemes with user defined bounds
User-configurable repeat analysis
Live results update
Analysis Complete Remove Sample warning feature
Data export function with LIMS capability
Application method export/import to USB or network folder
Password protection
Multi-language

User Interface
8" WVGA touchscreen interface
Embedded computer
LINUX® operating system
Internal thermal printer
USB and Ethernet connections

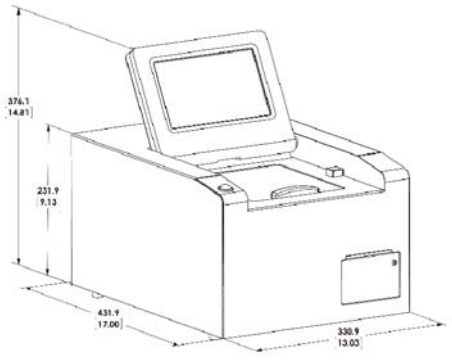
Backed by Rigaku

Since its inception in 1951, Rigaku has been at the forefront of analytical and industrial instrumentation technology. With hundreds of major innovations to their credit, the Rigaku group of companies are world leaders in the field of analytical X-ray instrumentation. Rigaku employs over 1,500 people worldwide in operations based in Japan, the U.S., Europe, South America, and China.

Warranty	
	**Our Guarantee** Applied Rigaku Technologies offers a 2-year warranty on all EDXRF spectrometers it produces. This industry-leading manufacturer's warranty shows our commitment to quality and displays our dedication to maximizing uptime for our customer's processes and applications.

Options	
Helium purge	Flow rate 0.2 L/min (during analysis only) Helium purity 99.95% Tubing 6 mm OD x 4 mm ID, 10 meters
Single-position 40 mm sample aperture	
Single-position 32 mm sample spinner	
6-position automatic sample changer (32 mm samples)	
5-position automatic sample changer (35 – 40 mm samples)	
Uninterruptible power supply (UPS) 865 W / 1500 VA battery backup / transient surge protection	

Spectrometer data	
Single phase AC	100 – 240 V, 1.4 A (50/60 Hz)
Dimensions	331 (W) x 432 (D) x 376 (H) mm (13 x 17 x 14.8 in)
Weight	16 kg (35 lbs)



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Affordable EDXRF Elemental Analyzers

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