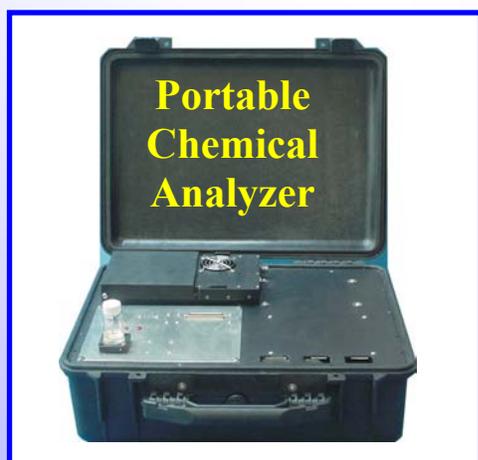


REAL-TIME ANALYZERS

Providing Chemical Information When & Where You Need It

An Investment Opportunity

One Technology Serving Three Major Markets



Objective

Real-Time Analyzers seeks a \$2 million Angel Investment to deliver its portable analyzers to the Department of Defense, the Homeland Security, and the Pharmaceutical Industries.

Mission Statement

Real-Time Analyzers designs, manufactures, and markets patented Raman chemical analyzers. The mission of Real-Time Analyzers is to provide analyzers that detect, identify and quantify chemicals faster and at lower cost in any setting, be it in the laboratory, a production facility or in the field.

Vision

Real-Time Analyzers will become a dominate supplier of Raman analyzers through its superior products and understanding of chemical analyses needed by its customers. Market share will be captured by using these capabilities to provide customers with the best analyzer for the required measurement. Current and future products are being developed through federally funded R&D. The development and sales of these products will fuel Real-Time Analyzers' corporate growth.

Core Technology

Real-Time Analyzers' products employ Raman spectroscopy to measure chemical composition. Every chemical (fuels, drugs, anthrax hoax materials, etc.) can be identified by its unique Raman spectrum, and quantified based on the intensity of the spectral bands. RTA's base product, the *Industrial Raman Analyzer*, is designed specifically to perform in any setting.

In 1997, Professor M. Bonner Denton, considered a foremost authority on Raman instrumentation, stated:

“Improvements in optics, lasers, detectors, and data analysis techniques have turned Raman spectroscopy into an industrial tool used in even the harshest settings. Raman spectroscopy is certainly a technique whose greatest possibilities lie in the next decade.” (*Photonics Spectra*, January 1997)

Not only is the next decade here, Professor Denton recently referred to *our* analyzers in stating:

“[Advances in technology] have created a new class of high sensitivity, versatile Raman spectrometers (**Farquharson** et al).” (*Aust. J. Chem*, March 2003)

Real-Time Analyzers' products are being designed around the *Industrial Raman Analyzer (IRA)* designed to perform “point-and-shoot” chemical analysis (e.g. identification of fuel types, drug raw materials, even anthrax hoax materials).

The *Industrial Raman Analyzer* is composed of a laser, interferometer, detector, sampling probe, and computer with analysis software. The interferometer, the part that separates the light into its component wavelengths, is immune to temperature changes and vibrations, yielding exceptional optical stability. A detector with proprietary electronics improves sensitivity by 25 times over competing Raman products. **These features not only yield an analyzer that outperforms all competing Raman analyzers, but it can make measurements other analyzers cannot.** Furthermore, by simply changing sampling probe optics, the *IRA* can be used for virtually any chemical analysis. This includes laboratory, production facility or field applications.

Since its formation in September 2001, through January 2006, Real-Time Analyzers has been awarded \$5.1 million in federal funding to continue *IRA* product and application development.

Department of Defense

The Customer's Need:

Military



Since 2002, the United States has been involved in two major war efforts, Afghanistan and Iraq. The most important supply required for sustained warfare is adequate fuel. The United States Marine Corps is responsible for evaluating captured fuel: “use it or burn it”, while the Army is responsible for distributing fuel to all US Forces in a theater of operation. The US Marine Corps needs a portable analyzer to determine fuel type, while the US Army needs a portable analyzer to determine fuel quality.

Commercial



The quality of jet fuel is a concern when refueling in developing countries (e.g. China), where below standard fuel effects flying range and routes. For example, pilots add 10% extra fuel due to sub-standard fuel energy content and avoid polar routes due to sub-standard fuel freezing points. The cost of these “safety factors” is as much as \$5000 per flight. As the cost of a barrel of oil continues to increase, so will this cost (\$60/barrel June 27, 2005). A tarmac analysis of the fuel’s energy content would allow cutting this expensive precaution in half.

The Product: *Portable Fuel Analyzer*

The *Portable Fuel Analyzer* is an *IRA* that can determine if a fuel is gasoline, diesel or jet within 1 minute. More importantly, it can also determine the following chemical and physical properties of these fuels (as needed): acid, aromatic, olefin, and sulfur content, cloud, distillation, flash, freeze and pour points, density (API gravity), cetane index or octane rating, heat of combustion, and viscosity. These measurements do NOT require sample preparation and can be performed in less than 1 minute. RTA's *Portable Fuel Analyzer* will replace some 12 chemical and physical measurement analyzers used in the military's Tactical Petroleum Laboratory, a mobile chemical laboratory in a tractor trailer truck.



All fuels are a distilled fraction of crude oil. Such fractions are not pure, but consist of numerous hydrocarbon components that boil at similar temperatures. Consequently, the performance properties of fuels are the sum total of all these hydrocarbon components, and can not be predicted by measuring a single component. Fortunately, a method known as chemometrics can be used to correlate the entire Raman spectrum of a fuel to its various properties. This is possible if the entire Raman spectrum is used to develop these correlations. This is accomplished by measuring the Raman spectra of large set of fuel samples and using chemometrics to identify the combination of spectral features that correlate to a property. RTA has developed these correlations by measuring hundreds of fuel samples from around the world using the *Portable Fuel Analyzer*. The *Portable Fuel Analyzer* is the only portable Raman analyzer that employs 1064 nm laser excitation to avoid fluorescence interference (almost all fuels fluoresce) and a rugged interferometer that provides 0.1 cm^{-1} wavenumber (x-axis) accuracy to guarantee accurate correlations.

The Market Size:

In February 2003, Congress passed one of the largest National Defense budgets in history, raising the 2002 budget from \$351 billion to \$397 billion for 2003. This budget calls for continued increase to \$448 billion in 2006 (\$470 billion in 2007). In 2003 nearly \$70 billion was invested in R&D to build new equipment.

The jet fuel *portion* of the military fuels market is estimated at 550 analyzers. This is based on the Air Force and Navy, which have 2500 and 800 jets in their fleets, respectively, while the US Army has over 1000 helicopters, as well as some 1200 Abrams tanks that also use jet fuel. Since the quality of jet fuel is critical, it is reasonable to assume that the required number of analyzers for refueling operations is 1 in 10 aircraft or tanks, or 550 analyzers. Similarly, the commercial market can be estimated at 1000 analyzers, based on FAA 2004 statistics that indicate that the jet fleet size of the major carriers in that year was over 10,000. It is worth noting that the *Portable Fuel Analyzer* can easily be configured to analyze other fuels, such as gasoline and diesel.

Real-Time Analyzers has demonstrated the fuel analyzer capabilities at several military meetings, as well as at Goodrich's Fuel and Utility Systems Division in Vergennes, VT. RTA plans to capture 20% of the military and 10% commercial markets in the next five years, or \$8.25 million and \$7.5 million, respectively (110 and 100 *IRA* sales at \$75,000 each, respectively).

Homeland Security

The Customer's Need:

Since the distribution of anthrax through the US Postal System in 2001, there have been more than 20,000 cases of suspicious powders (hoax materials) found in mail or on sorting equipment. These hoax materials cause expensive shutdowns, particularly for financial institutions that can be fined for not performing transactions in a timely fashion.



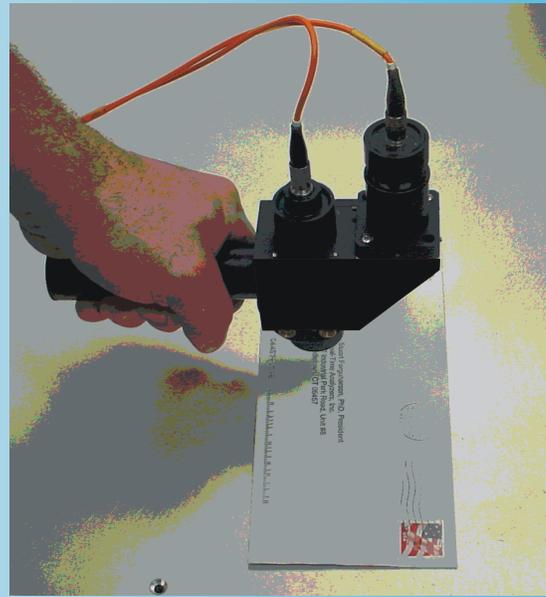
Although sophisticated systems have been installed at 380 regional post offices to identify anthrax spores, these systems cannot identify any hoax materials.



The Product: *Hoax Expor*

The *Hoax Expor* is a portable *IRA* that can be used to identify if a suspicious material on mail sorting equipment or in envelopes is anthrax spores or any of 14,000 common chemical powders. It is the only analyzer that can both identify anthrax spores AND hoax materials.

The *Hoax Expor* measures the Raman spectrum of any material within 5 minutes. Every material, including biological spores, has a unique Raman spectral signature that allows its positive identification. The Raman signature of any suspicious material is matched to one of thousands of signatures stored in memory in less than 1 second. The *Hoax Expor* is the only portable Raman analyzer that employs 1064 nm laser excitation to avoid fluorescence interference (e.g. all natural substances) and a rugged interferometer that provides 0.1 cm^{-1} wavenumber (x-axis) accuracy to guarantee spectral matches.



The Market Size:

The Department of Homeland Security (HS) was formed in direct response to the 9/11 and anthrax mailing terrorist attacks of 2001 (Executive Order 13228). The budget for this department has increased from \$22.1 billion in 2002 to \$36.2 billion in 2004, and \$40.7 is appropriated for 2005. The initial HS budget included \$5.6 billion for Bioshield, \$500 million of which was used to develop devices to detect anthrax in mail. Unfortunately, these systems can only analyze 20% of the mail, require ~1 hour per measurement, cost \$130 million per year to maintain, and cannot identify any hoax materials.

Bioshield II, introduced by Senator Joseph Lieberman in April 2005, will develop new technologies that measure threats more accurately and definitively. According to Lieberman:

“The best way to combat the very real and serious threat of bioterrorism is to utilize our greatest strength—the entrepreneurial talent of our nation...” (C&E News May 30, 2005).

Bioshield II is expected to provide \$5-10 billion in funds. There are over 2500 major postal operations in the US, including the regional US Post Offices, the Military Postal Service, Federal Express, United Postal Service, and major office buildings. At 10% market capture this represents \$18.75 million in *IRA* sales.

Pharmaceutical Industry

The Customer's Need:

The Pharmaceutical Industry is fueled by the public's need for medicine to improve health. A new drug typically generates \$500 million per year until its 20 year patent protection expires and it is replaced by generics. However, it typically takes 12 years of study to reach the market, and every day that market introduction is delayed represents more than \$1 million in lost revenue.



In 2000, the Food and Drug Administration (FDA) launched the **Process Analytical Technology (PAT) initiative** that urges the Pharmaceutical Industry to employ real-time analyzers during production to ensure safe drugs.

The Product: *Controller*

The *Controller* is an *IRA* equipped with a fiber optic sample probe optically interfaced through a sampling “bar” to a production chemical reactor, and designed to monitor and control reactions during processing.



According to Ajez Hussain, Deputy Director of FDA’s Center for Drug Evaluation and Research, the PAT Initiative is “a system for designing, analyzing, and controlling manufacturing through timely measurements (i.e., during processing) of critical quality and performance attributes of raw and in-process materials and processes, with the goal of ensuring final product quality.” The *Controller* is the PAT analyzer of choice. It can measure Raman spectra continuously, and can use the spectral peak heights to calculate reactant, intermediate, and product concentrations every minute. These measurements allow monitoring reactions, control reaction pathways, and producing high purity drugs.

The Market Size:

The World Wide sales for this industry of \$92 billion in 1998 grew to \$448 billion in 2004, in spite of the dotcom bust, the terrorist attacks of 2001, and corporate scandals, such as Enron Corp. The top eight US pharmaceutical companies had sales of \$190 billion in 2004, while the top five European companies had sales of \$145 billion. These US companies maintained R&D spending at a record pace, totaling \$27.3 billion for the top eight US companies or 14% of sales.

In 2003 the US (45%) and European (30%) portion of this market spent \$360 million on chemical spectrometers, and an estimated \$9 million on Raman analyzers (10% of total US and Europe Raman analyzer sales). The fastest growth of Raman analyzer sales is expected for the Pharmaceutical Industry reaching \$27 million in 2010 or 25% of the total Raman US and European market. The total Raman analyzer sales to the US and European Pharmaceutical Industry from 2006 through 2010, RTA’s initial growth period, is \$96 million. RTA expects to capture 15% of these sales or \$14.35 million.

The Company: Real-Time Analyzers, Inc.

Real-Time Analyzers, Inc. was launched September 1, 2001 with the award of two Small Business Innovative Research contracts. The National Science Foundation funded the development of a hybrid Raman analyzer that improved measurements sensitivity by 25 times, while the US Marine Corps funded the development of a compact portable Raman analyzer for fuel analysis. These two contracts matched Dr. Farquharson's areas of expertise, design of Raman analyzers and their applications. Initially, Dr. Farquharson was the only full-time employee with 4 part-time employees occupying 600 sq. ft. RTA has grown to 8 full-time employees, and 2 part-time employees, and in June 2005, RTA moved to new facilities in Middletown, CT to add manufacturing space. The new facilities include 5000 sq. ft. of office, lab, and manufacturing space. RTA also employs several consultants and subcontractors to meet their R&D and manufacturing needs.

Management Team

Real-Time Analyzers management team has the expertise to bring these high-technology products to market.

The Real-Time Analyzer's Management Team

Name	Age	Position
Dr. Stuart Farquharson	52	President and Chief Executive Officer
Alan Jonas, CPA	58	Partner, Brookside Tech, financial guidance
Dr. Melvin Koch	65	Advisor, providing market access
Dr. Peter Solomon	62	Advisor, providing investment guidance

RTA's scientists are world-class experts in the field of Raman spectroscopy and its applications. This includes over 65 years of experience and over 100 published scientific papers. RTA's engineers are experts in the design of rugged chemical analyzers, and have 55 years of experience designing instruments for various manufacturing companies.

Dr. Stuart Farquharson, the President and Chief Executive Officer of Real-Time Analyzers, has over 25 years experience developing Raman analyzers. He headed the Process Analytical Group for Dow Chemical's Texas Operations, the largest chemical plant in the world. In just 5 years at the helm of RTA, he has been awarded **\$5.1 million** in contracts to continue the development of Raman analyzers and their applications.

According to a National Institute of Health review panel:

"Dr. Farquharson is an experienced Raman spectroscopist, who has developed into one of the pre-eminent Raman experimentalists. He has performed research at a level comparable to the best academic researchers."

He has been an invited speaker and journal editor, served on the National Science Foundations' Nanotechnology Review Board (2004), and holds 9 patents with 8 pending. Dr. Farquharson holds a Ph.D. in Chemistry from the University of Texas.

Sustainable Competitive Advantage

A unique instrument design, analyzer hardware, extensive trade secrets and application knowledge protect the intellectual property of Real-Time Analyzers. The heart of RTA's *Industrial Raman Analyzers* is a rugged interferometer suitable for industrial applications. The interferometer is the culmination of more than 30 years and \$7 million invested in its design by three companies, and it became recognized as the best in the industry. The engineers that designed that interferometer are now employed by RTA and together have invested an additional 10 years and \$3 million in improvements, which includes a 25-fold increase in sensitivity. These design improvements, optical, mechanical and electrical, have not and will not be disclosed or published, but remain secret.

This intellectual property, previous R&D funding, and superior capabilities yields a multi-year market entry competitive advantage.

Contact Information

For more information concerning Real-Time Analyzers' products, license agreements, or partnering possibilities, please contact:

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