NASA
National Aeronautics and Space Administration

Honor Award Nomination

(See Instructions on Reverse)

TITLE OF NASA MEDAL OR GROUP AWARD

Public Service Medal

NAME OF NOMINEE OR GROUP	INSTALLATION/ORGANIZATION *(Include mailing address)*
Mr. Milfred E. Thomas	Science and Technology Corporation 101 Research Drive Hampton, VA 23666
POSITION TITLE Instrument Development Engineer	BUSINESS TELEPHONE *(Include area code)* (804) 865-1894

INDIVIDUAL ACCEPTING AWARD ON BEHALF OF GROUP

SUGGESTED CITATION *(25 words or less)*

For Significant Contributions to NASA's Advanced Optoelectronics Development Programs for Use in Spaceborne Remote Sensing.

JUSTIFICATION *(Cite specific examples of significance of accomplishment, exceptional performance, and personal impact that are widely recognized and appreciated as contributions to the NASA mission.)* DO NOT ATTACH ADDITIONAL SHEETS.

Mr. Thomas' contributions to technology advancements in tunable optical filters, advanced lasers, damage resistant high energy optics, and dimensionally stable optical platforms will enable major improvements in future instruments for atmospheric research.

In support of LaRC engineers, Mr. Thomas developed tooling, fabricated hardware, and set up experiments to evaluate the performance of an ultra-high efficiency, very narrow passband, tunable optical filter. Test results on the filters he fabricated and assembled indicate optical throughput efficiencies of greater than 90% and bandwidths of less than 10 picometers at a 532 nanometer center wavelength. Such filters have the potential to improve the signal-to-noise performance of optical receivers for radiometers and lidar systems by an order of magnitude. They also promise to increase the information carrying capacity of optical communication links that use wavelength division multiplexing, which has important commercial application. Plans are in progress to field test these filters in land based atmospheric lidar systems at LaRC prior to developing a flight prototype. A U.S. patent disclosure for this device has been submitted.

Mr. Thomas recovered an effort in demonstrating the feasibility of an innovative diode-pumped Cr:LiSAF laser by incorporating novel micro-lenses in the diode pump array. This laser will be used as a transmitter for future differential absorption lidar atmospheric sensors. A solid-state laser such as this will be significantly less complex and therefore more reliable than currently used flashlamp pumped lasers. These lasers also require less than a third of the input power of a flashlamp pumped laser.

A high energy optics damage laboratory has been set up at LaRC by Mr. Thomas in order to create standards and procedures for measuring laser damage thresholds of optical materials and components. Optical damage from high power lasers is a critical concern for spaceborne atmospheric lidar sensors. No industry or NASA standards currently exist to guide the specification or certification of optical components for use in such instruments. Mr. Thomas recently conducted successful damage threshold certification testing on optical components that will be flown on the Lidar Atmospheric Sensing Experiment (LASE) in 1994.

Optical measurement techniques are required in order to test a new ultra-low coefficient of thermal expansion (CTE) optical bench prototype developed at LaRC. Mr. Thomas led the design and development of an ultra-high vacuum test chamber and interferometric test setup utilizing narrow linewidth ultra-stable lasers. This equipment will be used by Mr. Thomas to measure nanometer scale variations in the optical bench as it is subjected to wide thermal variations in a space like environment.

Mr. Thomas is highly recommended for the NASA Public Service Award.

NOMINATING OFFICIAL *(Typed name and signature)*	DATE
Frank Allario	10/12/93

RECOMMENDED HEADQUARTERS REVIEWING OFFICE(S)

National Aeronautics and
Space Administration

Langley Research Center
Hampton, VA 23681-0001

Reply to Attn of: 231

August 2, 1999

To whom it may concern:

I am writing in support of Mr. Milfred E. Thomas's application for position in your organization.

I have known Mr. Thomas for over six years. During that time Mr. Thomas has worked as an on-site contractor on a number of critical projects being pursued by the Nondestructive Evaluation Sciences Branch, National Aeronautics and Space Administration, Langley Research Center, Hampton, Virginia. Mr. Thomas's direct supervisor has been with the contracting company, however, I have been able to observe his performance throughout those years and provide input into the overall evaluations of contracting performance.

Mr. Thomas, currently is the lead technician for managing the operation of NASA's Integrated Vehicle Health Monitoring fiber optic draw tower. This system was installed and tested with Mr. Thomas supervision. This system is unique in the world and is used to produce the optical fiber hydrogen, strain, and temperature sensors installed in the Space Shuttle and the X-33 fuels tanks. The fiber optic sensor fabrication system represents a complicated integration of advanced electronics, fabrication machinery, instrumentation, heat treatment protocols, coating chemistry, and category IV Lasers.

Mr. Thomas has always been an outstanding performer on every task the he has undertaken. Not only are the tasks that he undertaken complete, but they are often done ahead of schedule in a cost-effective manner with complete documentation. It is the understanding of the colleagues that Mr. Thomas works with that if you have a complex project that is only at the conceptual level and you only have one chance to get it done right, then you hope that Mr. Thomas gets assigned to the job.
Mr. Thomas's ability to develop, coordinate, and execute the detailed tasks required to get a complex job done are exceptional. Mr. Thomas's skills and abilities are in the upper 1% of all technicians that I have supervised.

Without reservation, I highly endorse Mr. Thomas's application as an exceptional candidate for your organization.

Sincerely,

Edward R. Generazio
Head
Nondestructive Evaluation Sciences Branch

National Aeronautics and
Space Administration
Langley Research Center
Hampton, VA 23681-0001

Reply to Attn of:

Christyl C. Johnson
Mail Stop 468
5 N. Dryden Street
Hampton, VA 23681-0001

May 9, 1997

To Whom It May Concern:

I have had the privilege of working with Milfred E. Thomas since 1995, and as the Lead Engineer for the Cr:LiSAF Tunable Laser Development Program, I have been in the position to observe several commendable characteristics in him. During a critical stage in the laser system design, Milfred was introduced to me as one who had impeccable mechanical expertise. I described the laser system requirements and my concerns with Milfred, and asked for any input that he could offer. A few days later, Milfred came to me and proposed a mounting system for the laser rods, for which he had already produced computer generated mechanical drawings. He also suggested possible solutions for temperature control issues that we were experiencing with our thermo-electric coolers. I was also particularly impressed by the responsibility that Milfred took to see that the approved changes were successfully implemented and explained to the rest of the team.

Milfred's demonstration of initiative, creativity, and independence, providing solutions to critical issues without close attendance and guidance, was tremendously valuable to me and the whole Cr:LiSAF team.

Sincerely,

Christyl C. Johnson

Christyl C. Johnson
Aerospace Technologist

National Aeronautics and
Space Administration
Langley Research Center
Hampton, VA 23681-0001

Reply to Attn of: 472

October 24, 1997

Mr. Milfred E. Thomas
Science and Technology Corporation
Mail Stop 468
Hampton, VA 23681

Dear Mr. Thomas:

It is with great pride that we send to you, the NASA Group Achievement Award Certificate for your participation on the Lidar Atmospheric Sensing Experiment (LASE) Experiment Team. Your efforts have made a major contribution to the successful development and demonstration of the LASE system. LASE is a world-class instrument, and it is being used to make significant contributions to important atmospheric science investigations. Some of the recent accomplishments of LASE are mentioned below.

LASE is the first fully-engineered, autonomous Differential Absorption Lidar (DIAL) system for the remote measurement of water vapor, aerosols and clouds across the troposphere. It was designed to fly aboard a NASA Ames ER-2 aircraft (a modified U-2 spy plane) and operate at altitudes from 58,000 to 70,000 feet. Since its first flight (May 11, 1994), it has flown 28 times on board the ER-2 during the development of the instrument, the validation of the science data, and a radiation science mission (Tropospheric Aerosol Radiative Forcing Observational Experiment (TARFOX)) last summer. The LASE instrument has been validated with results showing an accuracy better than the initial requirement for vertical profiles of water vapor in the troposphere. No other instrument in the world can provide the spatial coverage and accuracy of LASE.

Water vapor is the most radiative active gas in the troposphere and the lack of understanding about its distribution provides one of the largest uncertainties in modeling climate change. LASE has demonstrated the necessary potential in providing high resolution water vapor measurements that can advance the studies of tropospheric water vapor distributions in support of NASA's Office of The Mission To Planet Earth (MTPE).

This pass July, the LASE instrument made several flights aboard the Wallops P-3 to provide water vapor profiles over Oklahoma during a joint hydrology and atmospheric dynamics mission with several other agencies. The Instrument is now being prepared for a hurricane mission aboard the Ames DC-8 aircraft for flights during the summer of 1998. The high quality design of LASE has allowed the instrument to be flown on aircraft other than the ER-2 which increases the options to collect data in supporting MTPE. Eventually LASE will lead the way to a space instrument to support MTPE on a global scale.

You should be proud of these significant achievements and the role you have had in developing the LASE Instrument.

More information on the LASE Instrument can be found by looking on the following web site: http://asd-www.larc.nasa.gov/lase/ASDlase.html

With sincere appreciation and best wishes,

Edward V. Browell
LASE Principal Investigator

Alvah S. Moore, Jr.
LASE Project Manager

Newport

September 18, 1991

To Whom It May Concern:

Re: Mr. Milfred E. Thomas

I have been associated with Mr. Thomas as a fellow employee at Newport Corporation for approximately the past five years. During that time I have had the pleasure of working with him on several product development projects to which we were jointly assigned - myself as Responsible Engineer, and Mr. Thomas as Senior Manufacturing Engineer.

Mr. Thomas is a self-motivated, practical, and skilled manufacturing engineer whose services I sought above all others. I found him eager to learn new skills and more than willing to accept difficult challenges. His expertise in laser electro-optics combined with his knowledge of manufacturing methods assured success of the projects in which he was involved.

His recent departure from Newport due to internal restructuring in an unfortunate business climate presents an excellent opportunity for another organization wishing to expand its staff.

Sincerely,

Thomas J. Kujawa

Thomas J. Kujawa
Senior Staff Scientist
Bio-Instruments Products Group

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Newport Corporation
18235 Mt. Baldy Circle
Fountain Valley, CA 92708
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FAX: (714) 963-2015
Tele: (714) 963-9811

October 23 1991

To Whom It May Concern:

Milfred Thomas has been a member of the Manufacturing Engineering staff at Newport Corporation from February 9, 1987, to August 26, 1991. In this capacity he contributed to product development and the improvement of manufacturing processes for the company's scientific products. During this time he displayed a conscientious attitude towards his work and contributed creative suggestions for improvements.

Several products are developed off site by Newport sponsored research staff. Mr. Thomas worked with one of these researchers and was effective in serving as a coordinator to transform the "Super Cavity" Spectrum Analyzer prototype into a producible product.

Mr. Thomas possess a good knowledge of tooling design, procedures, training and industrial engineering applied to high tech products involving mechanical and optics.

Milfred left Newport as a result of a reduction in force created by reduced business.

Sincerely,

Tom Galantowicz
President

November 14, 1994

FY94 Optics Damage Laboratory Accomplishments

Objective:

Perform research leading to the development of NASA Technical Standards for performing laser-induced damage threshold and pass/fail certification tests.

Accomplishments:

- Ruggedness testing[1] is a procedure used to identify sources of experimental bias in data due to changes in the test procedure employed. During FY94, ruggedness evaluations were performed to identify critical parameters associated with the performance of the laser-induced damage threshold (Lidt) test. These evaluations were performed on both coated and uncoated materials to ensure that the procedure derived from these studies was applicable to both types of optics.
  Once all the test were complete, test criteria were successfully established so that Lidt data could be reproducibly obtained. Furthermore, data can now be obtained which possesses no inherent variability attributable to the test procedure employed. Based on these results, a standard is currently being drafted for consideration as a NASA Technical Standard. At present, no other standards exist for performing Lidt test.

- A Ti:Al_2O_3 laser was constructed to perform Lidt testing at specific wavelengths. An experiment was developed and conducted using this source to diagnose the thermal lensing phenomena experienced with the LASE instrument[2].

- In an effort to improve efficiency and ergonomics associated with performing Lidt testing, specific equipment was automated such as pneumatically actuated detector head, motorizing the attenuator and X, Y, translation stage for sample manipulation. Developing these automated features establishes the real modelling necessary for a feasibility study on long exposure life testing of optical materials for space missions.

- Completed a design for a variable (*200 - 600 μsec*) pulse length Ho:Tm:Er:YLF 2μm laser source for conducting Lidt testing versus pulse length on various materials. At present, no Lidt data exist at 2.06μm.

Publications:

M.W. Hooker, M.E. Thomas, S.A. Wise, and N.D. Tappan, "A Ruggedness Evaluation of Procedures for Damage Threshold Testing Optical Materials," submitted for publication as a NASA-Technical Memorandum, July, 1994

N.P. Barnes, M.E. Thomas, G.J. Koch, W.D. Marsh, "Atmospheric Thermal Lensing in Laser Resonators", submitted for publication to IEEE Journal of Quantum Electronics, October 1994

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[1] "Standard Guide for Conducting Ruggedness Evaluations", ASTM Standard E1169-89.

[2] "Atmospheric Thermal Lensing in Laser Resonators", Submitted to IEEE Journal Quantum Electronics, October 1994.