

Institute of Canada



DR. Aman Usmani, P.Eng., FCSME, CNS president (2020-21), Principal Consultant, Kinectrics INC. was recently inducted as a Fellow by the Engineering Institute of Canada. This prestigious distinction is awarded to individuals that have shown exceptional contribution to engineering and society in Canada. Aman is recognized for his work in the Canadian Nuclear Industry for over 40 years as well as involvement in the Canadian Nuclear

Mechanical Engineering (CSME), and Canadian

Society (CNS), Canadian Society for

Standards Association (CSA).

**WiN Canada Chapters Present:** 

**Registration now open** 



**CNS SCHOLARSHIPS** 

summer months.

**GRADUATE SCHOOL ENTRANCE SCHOLARSHIPS** (\$3,500) This scholarship is designed to encourage undergraduate students to enter a graduate

UNDERGRADUATE STUDENT RESEARCH SCHOLARSHIP (\$2,000) This scholarship is designed to encourage undergraduate students to participate in research

TRAVEL AND TRAINING SCHOLARSHIPS (up to \$1,000) These scholarships are awarded on a case-by-case basis to eligible students to allow them to participate in events related to nuclear science and technology. Events covered by this scholarship include conferences, workshops, and courses, although other activities may be considered

While CNS membership is required for eligibility, this membership is free for students, and CNS nonmembers should therefore be encouraged to apply as well.

Or email scholarships@cns-snc.ca





Deadline to apply is February 18th, 2022!

program related to Nuclear Science and Engineering at a Canadian university

in Nuclear Science and Engineering during the

# CNS SCHOLARSHIPS WEBSITE International Women's Day Panel Discussion

## **CNS Division's Corner**

# CNS - G4SR

**Generation IV and Small Reactors (G4SR)** 

G4SR-3 Virtual Summit in 2021 achieved great success with the





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## G4SR-3 Virtual Summit in 2021 achieved great success with the following results:

(larisa.logan@csagroup.org).

following results:

Registrations ~ 500 25 Sponsors of various categories + 6 Sister organizations with complimentary booths. 8 Keynotes, 20 Plenary Sessions, 115 introducers, chairs, speakers.

G4SR-4 in-person International Conference in 2022 - Delta Hotels, Toronto Airport & Conference Centre With international partners' participation, the G4SR-4 Technical Organizing Committee welcomes the submission of conference paper abstracts by March 18, 2022, for the following 11 track themes:

- · Safety assessment & licensing of advanced reactors and SMRs · Research & development (R&D) supporting advanced reactor and SMRs
- · Advanced reactor and SMR deployment · Decommissioning, waste management, and fuel cycle for advanced reactor & SMRs
- · SMR manufacturing and supply chain · SMR economics, financing, and business models

Visit the conference website for more details and registration >

- · Public policy & engagement · Skill development & nuclear knowledge management
- · Nuclear-hybrid energy systems and co-generation · Research reactors
- · Status of licensing and pre-licensing activities of advanced reactors and SMRs.

Visit the conference website for more details on Pre-conference Workshops, Plenary Program, Technical program, Registration, Hotel Venue, Sponsorship and Exhibit, Post Conference Tour >

## **CNS - STORI**

### Science and Technology of Radioisotopes (STORI) The chair is Chary Rangacharyulu (chary.r@usask.ca) and the co-chair is Andrea Armstrong (armst@mcmaster.ca)

Chary Rangachryulu is the co-chair of the upcoming 11th International Conference on Isotopes (ICI), TCU Place, Saskatoon, Saskatchewan, June 19-23, 2022, in-person, covid permitting. ICI is coordinated by the World Congress of Isotopes with headquarters in Seoul, Korea. This conference will cover diverse topics of isotopes (both unstable and stable): production, usage, regulations, supply etc. There will also be a track on isotopes in Cosmology and Astrophysics.

## **CNS-FEASTD**

## **Fusion Energy and Accelerator Science and Technology** (FEAST) Division

The chair is Blair P. Bromley (<u>Blair.Bromley@cnl.ca</u>); the vice-chair is Peter Schwanke (Peter.Schwanke@uoit.ca). As of May 4, 2021 there were 149 Registered Members (an increase from 112 Members in 2020).

The CNS-FEASTD has a mailing list with over 650 names maintained (including past members, friends. and others).

The website is: http://cns-snc.ca/CNS/fusion/. On a periodic basis, Fusion & Accelerator news, updates, newsletters, notifications were sent to members to keep members informed, and this has been the main activity for CNS-FEASTD. CWFEST-2021 (Canadian Workshop on Fusion Energy Science and Technology) was not held in 2021, but there are tentative plans to hold it in 2022 as an embedded event as a panel discussion at the CNS 2022 Annual Conference/Meeting in June, 2022, to be held as a virtual event. Tentatively, there is a longer term goal to hold CWASTA (Canada Workshop on Accelerator Science, Technology, and Applications) as a future stand-alone or embedded event. The PEENFA (Plasma Engineering for Energy and Nuclear Fusion Applications) virtual workshop was organized by Professor Hossam Gaber (Ontario Tech University) in Dec. 18, 2020. A followup event is expected in the fall of 2022. For more information, visit: https://faculty.ontariotechu.ca/gaber/PEENFA.htm. CNS-FEASTD members contributed to the independent peer review of technical papers submitted to various conferences, including TOFE 2020 (Technology of Fusion Energy), and AccApp2021 (Accelerator Applications). CNS-FEASTD members are also encouraged to join as members of the Fusion Energy Council of Canada (FECC) which was created in 2020. The FECC is an organization that evolved from the previous Alberta/Canada Fusion Technology Alliance (ACFTA). The FECC is an advocacy/lobbying organization, somewhat analogous to the Canadian Nuclear Association. For more information on the FECC, visit: <u>https://fusionenergycanada.ca/</u> CNS-FEASTD continues to welcome opportunities to cooperate and collaborate with other societies and organizations (such as FECC, ANS, CAP, IEEE-Canada, OCNI, etc.) to co-sponsor / co-organize meetings and events that are relevant to fusion and accelerator science and technology, and associated applications. Suggestions and volunteers are

## **CNS-NS&E**

welcome.

### Nuclear Science and Engineering (NS&E) Division Report The chair is Wei Shen (wei.shen@candu.org) and the co-chair is Benjamin Rouben (Benjamin.rouben@sympatic.ca)

"Fundamentals of CANDU Reactor Physics", co-authored by Wei Shen of COG and Ben Rouben of UNENE, was published by the American Society of Mechanical Engineers (ASME) in 2021 June. With almost no mathematics or equations, this monograph is ideal as a reference for CANDU physicists, operators, regulatory staff, and for those who need to interact with reactor physicists at CANDU sites, nuclear laboratories, institutes, universities, or engineering companies.

During pandemic, Nuclear Science and Engineering (NS&E) Division has organized following four on-line courses which attracted over 400 registrants globally. The feedbacks on the course are very positive and encouraging. It is a great promotion of CNS and CANDU to the international colleagues. The first slice of the CNS CANDU Technology Online Course was successfully held on November

- 13, 2020. We got 150 registrants from which 122 from Canada, 24 from Europe, 2 from Korea, and 2 from USA. Registrants come from 38 different organizations locally and globally.
- The second slice of the CNS CANDU Technology Online Course was successfully held on March 22 and 23, 2021. We got 76 registrants from which 64 from Canada, 9 from Europe, 2 from Korea, and 1 from USA. Registrants come from 31 different organizations locally and globally • The third slice of the CNS CANDU Technology Online Course was successfully held on June 28 and
- 29, 2021. We got 79 registrants from which 62 from Canada, 13 from US (Westinghouse), 3 from Korea, and 1 from Europe (Framatome GmbH). Registrants come from 25 different organizations locally and globally.
- The second 2-full-day CNS Thermalhydraulics online Course has been successfully held on November 18-19, 2021. We got 96 registrants from which 87 from Canada, 3 from UK, 3 from Korea, 2 from Germany, and 1 from US. Registrants come from 34 different organizations locally and globally.

Due to pandemic, the 3-full-day CNS CANDU Technology and Safety in-person Course has been rescheduled to March 20-22, 2023 at the Courtyard by Marriott Downtown, Toronto.

A 2-day CNS CANDU Reactor Physics on-line course is tentatively scheduled in the middle of June 2022. International Conference on Mathematics Computational Methods Applied to Nuclear Science and Engineering (M&C-2023) will be held in Niagara Falls on August 13-17, 2023. The Call for the papers for M&C-2023 will be launched in 2022 February.

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## CNS – NOM

## **Nuclear Operations and Maintenance (NOM) Division**

The chair is Nathan Bruns (nbruns@bwxt.com) and the co-chairs are Andrew Brooks (Andrew.brooks@brucepower.com) and Moe Fadaee (moe.fadaee@cns.snc.ca)

The CNS Nuclear Operations and Maintenance Division is excited to be back in 2022 with our Maintenance and Nuclear Component Conference in November. The focus for this year's conference will be fostering innovative industry advancements across our aging nuclear fleets to ensure nuclear power generation remains a leading sustainable supplier of electricity. Strategic maintenance techniques allow plants to operate continuously in a more efficient safe manner to continue to deliver low-cost electricity.

The division will also run the 3rd International conference on AI, ML, DIET and other innovative technologies in Nuclear. This conference focuses on how individuals, groups and companies in the nuclear industry are turning to innovative technologies and methodologies to face their challenges. Artificial Intelligence, Machine Learning, Big Data and DIET are increasingly being utilized to obtain new insight, perform analysis more efficiently and more accurately, be more sustainable and improve safety. Other technologies such as Adaptive Manufacturing, Digital Twins and Virtual Reality are

being actively explored and implemented by those involved in nuclear activities and research.

## CNS – FT

## **CNS Fuel Technology Division (FT)**

The chair is Mukesh Tayal (tayal2000@gmail.com) and co-chair Andrew Prudil (Andrew.prudil@cnl.ca)

Following the success of the 14th conference held in Mississauga, Ontario in 2019, the 15th International Conference on CANDU Fuel to be held in Ajax, Ontario on August 21-24, **2022**, will once again bring together international nuclear fuel industry experts involved in research, design, fabrication, operations, fuel modelling, safety analysis and regulation. Under the theme

of "Advanced Fuel Manufacturing and SMR Initiatives for a Clean Energy Future", the technical sessions will cover topics on design, development, modelling, qualification, and manufacturing including CANDU and Small Modular Reactors (SMR) fuels. A session focused on experiences and lessons learned from non-CANDU fuel types has been added. The sessions will be composed of: A. Advanced Fuel Manufacturing: Fuel manufacturer experience, advances in manufacturing & inspection technologies, additive manufacturing, blending RU and DU, fuel manufacturing challenges and improvements.

B. SMR Fuel: Design, development, modelling, fabrication/synthesis and supply-chain.

fuel behaviour, LOCA initiatives and experimental simulation, fuel acceptance criteria, fuel

C. Fuel Performance: Fuel behaviour (normal operating conditions and extended burnup), station experience and Hot Cell work & capabilities. Common causes of fuel failure from other reactor designs are also welcome. D. Fuel Safety: Performance improvements, Licensing issues, accident studies, fission gas release,

deformation and dryout. E. Fuel Design & Development: Modifications to fuel designs and quality assurance in fuel design and development, MOX, inert matrices, DUPIC, slightly enriched uranium (SEU), recovered uranium (RU), Thoria fuel cycle, Gen IV Fuel Types, economical and societal implications of fuel cycles. F. Fuel Code Development: Predictive capability on thermal, mechanical, irradiation and fission-gas release behaviour under normal operating and accident conditions and predicting aerosol behaviour. Advanced code/model development, which may include radiation protection/ shielding. G. Fuel Management: Fuel management schemes, load following, fuel physics analysis and specific operational challenges. H. Fuel Bundle Thermal Hydraulics: Critical Heat Flux assessment, Computational Fluid Dynamics modelling, reactor aging, pressure tube performance and fuel simulation and testing. I. Used Fuel Management: Fuel handling technology, spent fuel storage, and in-storage fuel behaviour. J. Advanced Fuel Modelling and Code Development: Models that are being developed to further support fuel performance and safety assessment. Multi-physics/multi-scale simulation. Deadline for abstract submission is February 15, 2022. Visit the conference website for more details and registration > ....

## **CNS MCF Division** Materials, Chemistry & Fitness-for-Service (MCF) Division

The chair is Mohammadreza Baghbanan (m.baghbanan@utoronto.ca) and the co-chair is Daniel Gammage (Daniel.gammage@kinectrics.com) Ever increasing demands for fitness-for-service (FFS) demonstrations often require innovative and multidisciplinary solutions that involve elements of engineering from: materials,



chemistry, stress analysis, thermal-hydraulic analysis, probabilistic assessment methods, examination and inspection approaches, and operational strategies. This is the case for most major nuclear plant systems and components, regardless of reactor type.

The MCF Division's objectives are to provide a forum for exchanging views, ideas, and information relating to FFS demonstration, and to share technical engineering in support of life extension and refurbishment of nuclear plant major components. These objectives will be achieved through organizing conferences, seminars, and technical courses and soliciting articles for publication in the CNS Newsletter. **MCFD ACTIVITIES** 

- The 2nd International Conference of Materials, Chemistry & Fitness-for-Service Solutions for Nuclear Systems to be a virtual conference, October 14-15, 2021. CANDU System Chemistry Course-Virtual, By Olga Palazhchenko (UNB-CNER) and Pam Yakabuskie (CNL), October 13, 2021.
- CANDU System Chemistry Course-Virtual, By Olga Palazhchenko (UNB-CNER), Jordan Lyons (UNB-CNER/PLNGS) and Pam Yakabuskie (CNL), Dec. 7, 2020
- Organized and Co-charied Gen IV Nuclear Materials Challenges Webinar, Oct 20 2020 (Event Recording)
- The 1st International Conference of Materials, Chemistry & Fitness-for-Service Solutions for Nuclear Systems to be held from May 15-17, 2019 in Hilton Toronto/Markham Suites Conference Centre. International Nuclear Components Conference, November 1-4, 2015 (INCC 2015).

The MCFD2019 and 2021 Conferences were very successful and attracted representatives from various sectors of the nuclear industry including material and equipment vendors, technical and engineering service providers, utility technical staff, regulators, designers, researchers, students, and academia. Stay tuned for information on the 3rd Intl Conf of Materials, Chemistry & Fitness-for-Service to be held in the fall 2023.

Website: https://www.cns-snc.ca/about-cns/divisions/mcfd/



## **CNS - New Brunswick Branch**

Branches' Corner

CNS New Brunswick Branch invites you to participate in the following virtual presentation:

Title: **OARO – Innovation in Mitigating Digital Security Risks** February 15, 2022 18:00-19:30 Atlantic Date/time: **Speakers:** Michele Lunney, Vice President of Business Development North America for OARO OARO Digital Security Solutions built for the Global Enterprise









Registration is free but required; we welcome CNS members, students and interested members of the broader community. Click here to register.

# **CNS - Sheridan Park Branch**

CNS Sheridan Park Branch invites you to participate in the following virtual presentation: Title: Canada's Small Modular Reactor (SMR) Action Plan

Date/time: Wednesday February 16, 2022, 3:30 PM to 4:30 PM

Speaker: Justin Hannah, Director, Nuclear Energy Division, Natural Resources Canada

Summary: An overview of Canada's SMR Action Plan will be presented. Canada's SMR Action Plan was launched on December 18th, 2020. The Action Plan is the result of a pan-Canadian effort bringing together key enablers from across Canada, including the federal government, provinces and territories, municipalities, Indigenous Peoples, power utilities, industry, innovators, laboratories, academia, and civil society. The SMR Action Plan currently has 513 commitments/actions made across the 117 partner organizations that are signatories to the SMR Action Plan. Each of these key enablers has contributed a chapter to the Action Plan that describes a concrete set of actions they are taking to seize the SMR opportunity for Canada. The Action Plan responds to all 53 recommendations in Canada's SMR Roadmap and also includes voluntary actions that go beyond the SMR Roadmap recommendations.

Registration: Registration is free but required; we welcome CNS members, students and interested members of the broader community. **Click here to register.** 

Member's Corner



## Doddy Kastanya

Senior Analyst at Kinectrics Inc. Some Incorrect Depictions of Nuclear Power Plant Operation in the Simpsons Series

"And Lord, we are especially thankful for nuclear power, the cleanest, safest energy source there is... except for solar which is just a pipe dream." Homer J. Simpson – Second Season

The Springfield Nuclear Power Plant (NPP) has been an integral part of the Simpsons series since the very beginning. It is where Homer Simpson works as the (that's right, "the" not "a") reactor operator. While it is good that the Simpsons series helps promoting nuclear power, there are some incorrect representations of nuclear power plant operation during the series' 32+ years on air which need to be corrected.

- 1. Maintenance is an important aspect for safely running a nuclear power plant In the fourth episode of the second season of the Simpsons series ("Two Cars in Every Garage and Three Eyes on Every Fish"), the Springfield NPP had a surprise visit from the regulatory body. The inspection resulting in 342 violations, some of them were mentioned in the episode such as: the use of gum to seal a crack in the cooling tower, a platinum rod used as paperweight, leaky pipes, and the monitoring station unmanned since the operator (Homer) "resting his eyes" on the job. This is so far removed from reality since in order to keep the license to operate a plant, the utility has to make sure that all components of the plant are well-maintained if they want to continue operating the plant.
- 2. Nuclear power plants will not cause mutations Blinky the Three-Eyed Fish is a three-eyed orange fish species found in the bodies of water around the Springfield NPP. This is simply based on a misconception that a NPP can cause mutation. In reality, one will not see these mutated creatures because safely operating NPPs do not release any pollutant, including radioactive materials, to the environment.
- 3. Controlling the reactor is a team effort Homer is the only person manning the control room (i.e., Sector 7-G). This is not the practice adopted at any operating NPP. According to IAEA TECDOC-1502, the following individuals should be in the control room: (i) Supervisor (i.e., the shift member(s) designated to directly supervise
- operation of the plant or of the unit and who decides on safety related measures during normal operation, incidents or accidents, gives commands to the shift and is responsible for the safe performance of the unit); and, (ii) Operators who handle safety related instrumentation and control equipment.

4. Plutonium is not readily accessible in a nuclear power plant

science project about the history of nuclear physics. She was building a scale model of the first nuclear reactor. To help Lisa make the model more realistic, Homer decided to steal plutonium from the Springfield NPP. He simply took a plutonium rod from an array of rods stored in a 'secured' room. Again, this cannot happen in the real world. Firstly, plutonium will be created as a part of irradiating the fuel and cannot be accessed without going through rather complicated process. Secondly, plutonium is highly radioactive material and cannot simply be handled without special tools.

In the fifth episode of the sixteenth season ("Fat Man and Little Boy"), Homer helped Lisa in her

- 5. An operator cannot work from home In the seventh episode of the seventh season ("King-Size Homer"), Homer gains a significant amount of weight which qualifies him to work from home. However, Homer's job at the Springfield NPP is the control room operator. In the real world, the task of controlling the reactor cannot be done away from the control room. So, this is clearly a fiction.
- 6. Radioactive tomatoes In the fifth episode of the eleventh season ("E-I-E-I-D'oh"), Homer somehow became a farmer. Since the plants were not growing well, Homer decided to boost the growth by using plutonium. He accidentally mixed tomato seeds with tobacco seeds which due to the presence of plutonium somehow becomes a new mutated crop called "Tomacco". The idea of using of radiation to alter the genetic characteristics of certain crops is legit. However, this cannot be accomplished by
- simply putting radioactive materials on the ground next to the crops, as depicted in the episode. 7. The cooling tower is not the reactor building Finally, in the ninth episode of the fifth season ("The Last Temptation of Homer"), Homer somehow became attracted to a female employee named Mindy. He did not want this, since he was a married man. So, in one scene, they were riding an elevator alone and Homer got very

uncomfortable. He pressed the button to get out of the elevator and, in the next scene, he slid down the cooling tower. This is a typical misconception where people think that the cooling tower is the reactor building. There are likely many other small incorrect depictions of the nuclear power plant in the series, but I am pretty sure that I have captured the major ones, so far. I certainly hope you enjoy this little diversion

from our serious lives into the world of animated series. Anyway, as a nuclear engineer, I have a responsibility to make sure that the public have the correct perception of nuclear power, even if it means that I have to criticize the show that I love.

If you have a column to share in our Member's corner, send us an email at cns\_office@cns-snc.ca.



Latest News

# **From CNA Briefing:**

**ORANGE COUNTY REGISTER** 3 magic keys to unlock a permanent home for nuclear waste February 10. 2022

In Finland, a permanent repository for spent nuclear waste is licensed and under construction. In Sweden, the government has given its blessing to a final resting place. France has identified a site, Canada is in the final stages of choosing one, Japan and Switzerland have started geologic and other investigations. Read more

## WASHINGTON EXAMINER

Nuclear waste can become the motherlode of clean energy February 12, 2022

There are endless polarizing debates including how and where to store nuclear waste safely for 10,000plus years (due to radiation levels harmful to humans). But little attention is given to the fact that only 4% of the energy value has been consumed from our used nuclear fuel, which is actually a national treasure. In fact, the amount of untapped energy in America's used nuclear fuel could power the world for almost 20 years. That's the motherlode of clean energy. Read more

## **BUSINESS LIVE**

The mini nuclear reactor that could be providing heat energy to your factory within a decade February 12, 2022

£50m reactors the size of five-storey office blocks could one day power heavy industry across the UK. Read more **VOICE OF AMERICA** 

IAEA Reviews Water Release From Damaged Japan Nuclear Plant February 14, 2022

A team from the International Atomic Energy Agency on Monday began its review of Japan's plan to begin releasing more than a million tons of treated radioactive water into the sea from the wrecked Fukushima nuclear plant. Read more

## **INVESTOR INTEL**

Azincourt Energy Provides Update on Drilling Progress at the East Preston Uranium Project February 14, 2022

Azincourt Energy Corporation has provided an update on the 2022 exploration program at the East Preston uranium project, located in the western Athabasca Basin, Saskatchewan, Canada. **Read more** 

## **INVESTING NEWS**

**Consolidated Uranium Announces Record Date for the Spin-Out of Labrador Uranium** February 14, 2022

Consolidated Uranium Inc. provides an update on the previously announced proposed spin-out of Labrador Uranium Inc. through a plan of arrangement under the Business Corporations Act Read more

### **BLACKBURN NEWS** Energy storage a multi-billion dollar opportunity February 14, 2022

A new report explores how large scale energy storage, in combination with clean electricity from Bruce Power, presents a \$4-billion opportunity for Bruce, Grey and Huron counties. Read more

## BLOOMBERG

Finland's New Nuclear Reactor Start Date Pushed Back to March February 12, 2022 The launch date for Finland's newest nuclear reactor has been delayed until March as the unit's automation undergoes modifications.

## **INVESTING NEWS**

Read more

### NuScale, KGHM agree to deploy SMRs in Poland February 14, 2022

NuScale Power and Polish copper and silver producer KGHM Polska Miedź SA have signed a definitive agreement to initiate work towards deploying a first NuScale VOYGR small modular reactor (SMR) power plant in Poland as early as 2029. Read more

## **AL JAZEERA**

Should nuclear power be labelled green? February 12, 2022

Industry supporters say atomic power has negligible carbon emissions and it can be more reliable than renewables in keeping the lights on. They insist it is for a good reason - because the sun does not always shine and the wind does not always blow. Read more

### OCNI The Leaders Series: Jerry Hopwood, President (UNENE)

Friday Feb 18 2022, 1:00 PM - 2:00 PM

Nuclear Engineering (UNENE).

**Details** 

Join us on February 18, 2022, for a new episode of our Leaders Series when OCNI's President and CEO Ron Oberth will be chatting with Jerry Hopwood, President of the University Network of Excellence in

## **IN-MEMORIAM**



William Schneider Obituary (2022) - Cambridge, ON - Waterloo Region Record <u>(legacy.com)</u>





### Roger McKenzie February 17, 1931 – December 2021 Former New Brunswick Power, Vice President of Engineering and Construction.

https://castlefh.ca/tribute/details/28050/A-Roger-McKenzie/obituary.html Anybody who had been associated with the Late Mr. Roger Mackenzie since the early 1960's felt deeply grieved having lost a true mentor, champion of nuclear power, a thorough gentleman and a world known figure having managed Point Lepreau to be the top performing nuclear power station in the world continuously for more than ten years since start-up. Roger passed away while in his sleep in the hospital on December 9, 2021. In addition to his other career accomplishments, as station manager for Point Lepreau during the construction and early days of station Operation, Roger's leadership was instrumental in the establishment of a strong capable and sustainable workforce and nuclear program achieving world class results. He left an indelible positive mark on all those who worked with and for him. Ever, the gentlemen and mentor, Roger will be sorely missed. May God grant Peace to his soul and strength to his family!



Paul Thompson/Kamal Verma