



डीआरडीओ न्यूज़लैटर DRDO NEWSLETTER

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DRDO's Explosive Detection Kit launched in the US



Launch of Explosive Detection Kit

Explosive Detection Kit (EDK), developed by High Energy Materials Research Laboratory (HEMRL), a constituent laboratory of DRDO in Pune, was launched in the US on 2 August 2013. Crowe and Company, South Carolina, US, will manufacture and market the EDK.

The transfer of technology (ToT) of the EDK is a joint effort of DRDO and Federation of Indian Chambers of Commerce and Industry (FICCI) under the Accelerated Technology Assessment and Commercialisation (ATAC) programme to commercialise DRDO's indigenous technology in the domestic and international market. There are several technologies which have been transferred to the Indian companies under the ATAC programme. The launch of EDK, however, was a significant event since this is the first technology that has been transferred to a US company for manufacturing and supply to the international

market. DRDO-FICCI has entered into a licensing agreement with Crowe and Company.

The EDK is a unique and innovative product which detects all kinds of explosives very accurately in the field. The explosives could be of any combination of nitroesters, nitramines, trinitrotoluene, dynamite or black powder. Based on the principles of 'colour chemistry', the kit uses reagents that trigger chemical reactions to detect type of explosive by the resulting colour. A few drops or a

blast of atomised reagents on suspected explosive material can accurately confirm or deny the presence



Exchange of Expression of Intent between DRDO and Centre for Innovation, Arlington, USA



of explosives like TNT, PETN or RDX. The kit comes in various forms and sizes and is being widely used in India by law enforcement agencies. Crowe and Company is planning to introduce the EDK to the US Army and US homeland security forces

and in other global markets. The ToT of EDK has demonstrated that the technology transfer between

India and US can be a two way process also and that this was the beginning of many more entrepreneurial ventures between the countries that will fortify relations in other areas also.

The ToT function was attended by Nikki Hailey, Governor, South Carolina; Shri Avinash Chander, SA to RM, Secretary, Department of Defence R&D and DG, DRDO; Ms Nirupama Rao, Indian Ambassador in US; Dr John Holdren, Senior Adviser to the US President on S&T; Ron Somers, President USIBC; Dr A Didar Singh, Secretary General, FICCI; Ms Faye Crowe, CEO, Crowe & Co; Shri S Sundaresh, DS and CC R&D (ACE&SI), DRDO; Shri S Radhakrishnan, Director, Industry Interface and Technology Management (IITM), DRDO; Shri KVR Murty, IFA, R&D; Dr SN Asthana and Dr Rennie M Roy.

Successful user trials of Prithvi 2

The Strategic Forces Command (SFC) successfully test launched indigenously developed surface-to-surface/nuclear capable missile Prithvi 2 with a strike range of around 350 km from the Integrated Test Range (ITR), Balasore, off the coast Odisha on 12 August 2013. It was a perfect text-book launch and the missile, equipped with highly accurate indigenously developed navigation and manoeuvring system, achieved all its target and technical parameters set out for the launch. The missile trajectory was tracked by the DRDO radars, electro-optical tracking systems and telemetry stations located along the coast of Odisha. The downrange teams, on-board the ship, deployed near the designated impact point in the Bay of Bengal, monitored the terminal event and splash down.

Inducted into India's SFC in 2003, the Prithvi 2, the first missile to be developed by DRDO under India's prestigious Integrated Guided Missile Development Programme (IGMDP), is now a proven technology. The launch was part of a regular training exercise of the SFC and was monitored by DRDO scientists. Shri Adalat Ali, Programme Director, AD, and Shri N Siva Subramaniam, Project Director oversaw the launch operations. Shri G Satheesh Reddy, OS and Director, Research Centre Imarat (RCI), Hyderabad; Shri MVKV Prasad, Director, ITR and Shri R Appavuraj, Director, Proof and Experimental

Establishment (PXE), Chandipur, were also present during the launch. The missile, based on a mobile transporter erector launcher vehicle, is versatile and designed for quick manoeuvrability and high operational flexibility on the battlefield. Such successful training launches clearly indicate our operational readiness to meet any eventuality and also establishes the reliability of this deterrent component of India's strategic arsenal, quoted an SFC spokes person.

Hon'ble *Raksha Mantri* Shri AK Antony congratulated the Prithvi 2 team for the successful test launch.



File photo

Prithvi 2

SA delivers Prof. Kothari Memorial Oration



Shri Avinash Chander, SA to RM, Secretary, Department of Defence R&D, and DG DRDO, delivered 21st Prof. DS Kothari Memorial Oration on 'Unmanned Future War: Technology Challenges' at Defence Laboratory, Jodhpur, on 8 July 2013. The function was presided by Ms Chandresh Kumari, hon'ble Union Minister for Culture. Dr G Malakondaiah, DS and CC R&D (HR&M) was the Guest of Honour. Various dignitaries of Jodhpur from academic, research and social institutions graced the occasion.

In his oration, Shri Avinash Chander summarised various DRDO programmes and international scenario in the field of unmanned defence technologies. He emphasised the necessity of unmanned technology for the present and future defence pertinence, especially due to the extension of war theatre from the traditional boundaries of land, sea and sky to space and cyber space. He attributed the advancements in various critical technologies like sensors, robotics, communication, advanced material and electronics for the development of unmanned warfare systems and said, "In future, there is scope for developing unattended sensors, micro unmanned air vehicles (UAVs), robot sentry, autonomous underwater vehicles, etc. The future warfare scenario

requires multiple functionality humanoids with human intelligence interface and ability to coordinate multiple systems in consonance." SA expressed that achieving these objectives demands high level of collaboration among scientific community, academia and industry.

Shri Avinash Chander also inaugurated the Ferrite Synthesis Powder Coating Laboratory (FSPCL) building at DL. The facility is the result of the joint venture between India and Belarus for bulk preparation of radar absorbing coating and ceramic tiles.



Shri Avinash Chander inaugurating FSPCL building



DIHAR celebrates 20th Ladakhi Kisan-Jawan-Vigyan Mela

DIHAR, the world's highest agro-animal laboratory, celebrated the 20th Ladakhi Kisan-Jawan-Vigyan Mela at its headquarter in Leh on 10 August 2013. Lt Gen Rakesh Sharma, AVSM, VSM, General Officer Commanding, HQ 14 Corps, inaugurated the mela. Shri Jaspal Singh, DIG, Indo-Tibetan Border Police (ITBP) and Dr RB Srivastava, OS and Director, DIHAR, were also present on the occasion. Addressing the gathering of more than 12,000 local farmers, soldiers and school children, Dr RB Srivastava informed

about the efforts and initiatives taken by DIHAR to address food, health and energy security in the region. Shri Jaspal Singh appreciated the contributions of DIHAR and proposed for stronger interactions between DIHAR and ITBP through establishment of green houses in forward locations. Speaking on the occasion



Lt Gen Rakesh Sharma addressing the gathering during the inaugural ceremony

Lt Gen Rakesh Sharma portrayed DIHAR as the face of DRDO in the strategic Ladakh region and emphasised that DIHAR should be taken as an example where the research done by the scientists in the laboratories gets translated to a phenomenal impact on the life of the troops in the region.

Climatic Test Centre inaugurated at ARDE

A new Climatic Test Centre (CTC) was inaugurated by Shri Anil M Datar, OS and Director, Armament Research and Development Establishment (ARDE), Pune, on 5 July 2013. The CTC caters for life assessment, altitude, air exposure, diurnal, salt mist, hot and cold (-70° to 150 °C) conditioning of the stores.

The CTC is one of the unique test facilities in DRDO for environmental testing of armament systems. The facility operates round the clock.



Shri Anil M Datar inaugurating the climatic test centre

National Library Day

Prof. SR Ranganathan (9 August 1892–27 September 1972) was an eminent mathematician and librarian from India. His most notable contributions to the field were his five laws of Library Science (1931) and the development of the first major analytico synthetic classification system. He is considered to be the father of library science, documentation and information science in India and is widely known throughout the rest of the world for his fundamental thinking in the field. Indian government honoured him for his contributions to the field with a rare title of 'National Research Professor' and later Padam Shri. His birthday is observed every year as the National Library Day (NLD). The following Technical Information Resource Centres (TIRCs) of DRDO also paid their tributes to this great visionary by organising NLD.

ASL, Hyderabad

Librarian's Day and a one-day seminar on DRDO Libraries 2020 was organised by Advanced Systems Laboratory (ASL), Hyderabad, on 12 August 2013. Around 30 library professionals from various Hyderabad-based DRDO Libraries participated in the seminar.

Shri K Jayaraman, OS and Director, ASL, was the Chief Guest and Shri PVG Brahmanandam, Sc G, Chairman, Library Advisory Committee, ASL, was the Special Invite. Shri K Jayaraman, inaugurated the programme by lighting the lamp and by offering floral tribute to Dr Ranganathan. He highlighted the importance of reading and told to "read and lead the next generation". Shri T Ashok Babu, Vice President, IASLIC, gave welcome address. Shri M Prahalad Rao, Sc F, Defence Electronics Research Laboratory (DLRL), Hyderabad, enlightened the participants with the life and achievements of Dr SR Ranganathan.

Shri M Prahlada Rao, chaired the sessions on the theme of the seminar. Shri Hemant Kumar, Head, TIC, ASL; Dr K Nageswara Rao, Head, KC, Defence



Shri K Jayaraman delivering the inaugural speech

Research and Development Laboratory (DRDL); Shri N Venkatesh, Head TIRC, Research Centre Imarat (RCI), Hyderabad; Shri BN Rangaswamy, Head TIC, and Shri JRC Sharma, both from Defence Electronics Research Laboratory (DLRL); and Shri Rajeev Sharma, Shri MR Sahu, Shri Srinivas Rao, all from DRDL also shared their views on DRDO libraries in 2020. There was an active participation from the audience by way of questions and expert answers. Shri YKD Prasad acted as Chief Rapporteur. Shri Manoj Kumar Sahu, Technical Officer A, ASL, presented the vote of thanks.

INMAS, Delhi

In commemoration of the 121st birth anniversary of Prof. SR Ranganathan, Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi, celebrated NLD on 8 August 2013. The event began with a talk by Dr Rajeev Vij, Sc F, on Collection, Services, and Achievements of the TIRC, INMAS. Dr BS Dwarakanath, Officiating Director, INMAS, in his address, advised the scientific community not to remain depended solely on Internet, which has a lot of information from unreliable resources.



He also advised librarians to deliver user-oriented services in digital environment.

On the occasion, the 2nd Ranganathan Memorial Lecture was delivered by Dr AK Maini, OS and Director, Laser Science and Technology Centre (LASTEC), Delhi. In his lecture, he motivated library professionals to excel in their subject fields and prepare themselves for future challenges in 2050. Stressing on the need to enhance digital library services through information technology and need for promoting the importance

of library among the younger generation, Dr Maini suggested that workshop and training programme for library professionals should be organised regularly. Shri Suresh Kumar Jindal, Director, Defence Scientific Information and Documentation Centre (DESIDOC), Delhi, also delivered a talk on Digital Library Initiatives by DESIDOC. He stressed on the needs to prepare LIS professionals ready for the future.

The event was cosponsored by Allied Publisher Subscription Agency.

SAG Celebrates its Golden Jubilee

Scientific Analysis Group (SAG), Delhi, is celebrating its golden jubilee this year. In its journey of 50 years, SAG has evolved as an organisation rendering valuable support to the three services and paramilitary organisations.

Golden Jubilee celebrations started on a high note with a 'Hasya Kavi Sangosthi' organised at Bhagvantham Auditorium on 5 August 2013. Dr PK Saxena, OS and Director,



L to R: Shri Yusuf Bhardwaj, Ved Prakash Ved and Shri Mahendra Ajnabi being felicitated by Dr Saxena

SAG, inaugurated the the Sangoshti. Dr AK Maini, OS and Director, Laser Science and Technology Centre (LASTEC) and Shri SK Jindal, Director, Defence Scientific Information and Documentation Centre (DESIDOC), were also present on the occasion. Ms Anu Khosla, Sc G, Chairman Golden Jubilee Celebrations Committee, welcomed the guests.

Eminent poets, Mahendra Ajnabi, Ved Prakash Ved and Yusuf Bhardwaj regaled the packed auditorium by rendition of their rollicking poetry. The persistent laughter created an unforgettable experience for one and all, easing their worries and burden. Shri Vineet Dwivedi, Sc F, proposed the vote of thanks.



Audience having a hilarious time at the Sangoshti

NSTL celebrates 44th Raising Day



Prof. Koneru Ramakrishna Rao addressing the gathering

Naval Science and Technological Laboratory (NSTL), Visakhapatnam, celebrated its 44th Raising Day on 20 August 2013 with a lot of fervor and enthusiasm.

Prof. Koneru Ramakrishna Rao, Chancellor, GITAM Uni-

versity, Visakhapatnam, was the Chief Guest of the function. He lauded the dedicated efforts and contributions made by the NSTL. Shri SV Rangarajan, OS and Director, NSTL, presented the detailed report on the activities of the laboratory in both technical and non-technical areas. Various laboratory-level DRDO Awards and Cash Awards were presented to the meritorious employees. The employees who completed 25 years of service were also felicitated.

On this occasion various cultural and sports competitions were also conducted in which a large number of employees participated with great zeal. Competitions were also conducted for NSTL fraternity especially for the school children of age group 6-10 years and 11-14 years in different categories. Selected sports events were also conducted for the Defence Security Corps (DSC) personnel.

Occasion also marked a blood donation camp with the help of Dr AS Raja. More than 100 persons donated blood in the camp.





Manpower Development Activities

Conferences/Seminars/Symposia/Training Courses/Meetings

Long-term Technology Perspective Plan Meet

Second meeting of the sub-committee for armaments and high energy materials to evolve Long-term Technology Perspective Plan (LTTPP) for DRDO under Long-term Integrated Perspective Plan (LTIPP) of the services was held on 31 July 2013 at **Armament Research and Development Establishment (ARDE), Pune**, under the chairmanship of Vice Admiral (Retd) Raman Puri. Dr SK Salwan, Chairman Armament Research Board (ARMREB); Dr Kota Harinarayana, Dr DS Kothari DRDO Chair; Shri AM Datar, OS and Director, ARDE; Dr Sudershan Kumar, OS and Director Centre for Fire, Explosives and Environment Safety (CFEES), Delhi; Maj Gen (Retd) Devendra Kapil, AVSM, Chairman, IDST; Shri Surendra Kumar, OS and former Director ARDE; Dr DK Kharat, Director of Armaments, DRDO HQ; Dr Manjit Singh, Director, Terminal Ballistics Research Laboratory (TBRL), Chandigarh, and Shri R Appavuraj, Director, Proof and Experimental Establishment (PXE), Chandipur, attended the meeting alongwith other senior officers of DRDO HQ and armament cluster of labs.

Research Council Meet

The 1st meeting of Research Council of **ARDE, Pune**, was held on 1 August 2013 under the chairmanship of Dr SK Salwan, Chairman, ARMREB to formulate futuristic R&D programme of the armament

labs and to suggest ways and means on networking with various stakeholders and to review R&D activities in enabling technologies, product cycle development and production plans. Eminent personalities from academia, DRDO and all the Directors of armament clusters of labs are the members of the Council. Dr SK Salwan gave a presentation on Future Trends in Armament Technology.

CEP on Supervisory Skills for Tomorrow

Institute of Nuclear Medicine and Allied Sciences (INMAS), Delhi, conducted a three-day special Continuing Education Programme (CEP) course on Supervisory Skills for Tomorrow for DRTC officers and staff from 29-31 July 2013. Dr Rajeev Vij, Course Director, briefed the participants about the objectives and purpose of the training program. Dr Rajesh Goyal, Director, Centre for Personnel Talent Management (CEPTAM), Delhi, was the Chief Guest of the function.



Dr Tripathi addressing the participants during the inaugural function

Dr RP Tripathi, OS and Director, INMAS, advised the participants to apply the knowledge gained from this interactive course at their work place. The topics covered during the course included strengthening communication, IT and supervisory skills. Dr Rajeev Vij, proposed the vote of thanks.

Workshop on Critical Issues in Project Management

Institute of Technology Management (ITM), Mussoorie, conducted a two-day workshop on Critical Issues in Project Management of DRDO at Technical Training Centre (TTC), Bengaluru, from 2-3 August 2013. The workshop was inaugurated by Dr S Christopher, DS and Director, Centre for Air Borne Systems (CABS), Bengaluru. The objective of the workshop was to bring awareness about the project management procedures among middle level scientists of DRDO so that the issues of cost and time overrun and user's dissatisfaction are well understood. Eminent persons like Prof. Parameshwar Iyer, Indian Institute of Science (IISc), Bengaluru; Shri Sanjay Burman, OS and Director, Centre for Artificial Intelligence and Robotics (CAIR), Bengaluru; and Dr SB Singh, Director, ITM, Mussoorie, presented their experiences on the objective. Thirty-three participants from south zone DRDO labs participated in the workshop.



L to R: Dr SB Singh, Dr S Christopher and Shri T Prakash Rao during the inaugural function

Training Programme on Basics of Aerodynamics

A special training programme on Basics of Aerodynamics was conducted by **Research Centre Imarat (RCI), Hyderabad**, from 5-9 August 2013. The course was inaugurated by the Chief Guest Shri G Satheesh Reddy, OS and Director, RCI. In his inaugural address, Shri Reddy explained the need of the programme with respect to the ongoing projects scenario at RCI.



Shri Satheesh Reddy delivering inaugural address

The topics covered during the course included: Introduction to missile aerodynamics, lateral characteristics, aerodynamics design methodology, flight data analysis, etc. The faculty comprised experts from Defence Research and Development Laboratory (DRDL), Hyderabad, and RCI. Forty-seven participants attended the course. Dr P Theerthamalai, Sc G, DRDL, Hyderabad, distributed certificates to the participants in the valedictory function. Shri M Sankar Kishore, Sc G, was the Course Director.

In-house Seminar for Young Scientist

Gas Turbine Research Establishment (GTRE), Bengaluru, organised an in-house seminar for young scientist (INSYS), to create technology awareness among young scientists of the establishment. The seminar gives opportunities to junior scientists to discuss



Smt Tessa Thomas delivering keynote address

their research work. Three technical lectures on various topics are being organised on the first Saturday of every month, where a senior and a junior scientist deliver lectures in their field of specialisation. Besides, eminent guest speakers are also invited to deliver keynote address.

Smt Tessa Thomas, Project Director, Agni, delivered the keynote address on Missile Technologies in the 7th edition of the seminar on 3 August 2013. In her presentation, she discussed about various technological and programme management challenges that were overcome to achieve project goals and objectives. Smt Thomas, appraised how the technologies matured from the first version of Agni to the latest Agni 5 to make it a state-of-the-art missile system.

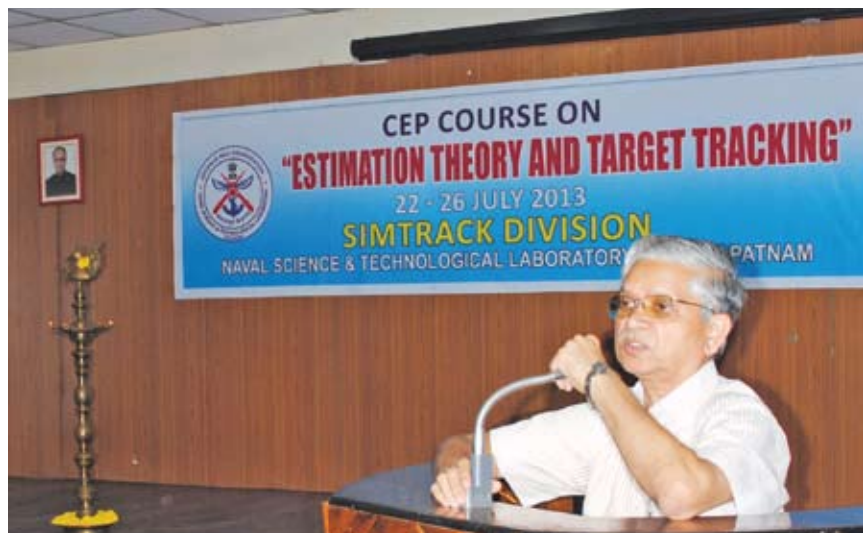
Under INSYS series Ms Vimala Narayanan, Sc G, and Ms Sangeetha Baxla, Sc C, made presentations on Starting Systems of Aero Gas Turbine Engine and Aero Engine Structural Analysis—Present Status and Future Plans, respectively.

CEP on Estimation Theory and Target Tracking

A CEP course on Estimation Theory and Target Tracking was organised by Naval Science and Technological Laboratory (NSTL), Visakhapatnam, from 22-26 July 2013. The course was inaugurated by Shri CD Malleswar, Sc G and Officiating Director, NSTL. The objective of the course was to provide

the scientists who are working in this field with the fundamental theories, philosophies, and applications of the Adaptive Estimation Theory. The direct relevance of the subject is seen in many applications like inertial navigation system, sonar as well as radar target tracking, adaptive array processing, active noise cancellation, etc. Eighteen scientists, including four from NSTL, participated in the course.

The faculty was drawn from various IITs, NAL and from other DRDO labs. Shri Sukhendu Sharma, Sc F, was the Course Director.



Shri CD Malleswar delivering inaugural address

Visits to DRDO Labs/Estts

CABS, Bengaluru

✂ Dr G Malakondaiah, DS & CC R&D (HR & M) and Dr AK Singh, Director, DoP, DRDO HQ, visited Centre for Air Borne Systems (CABS) on 12 August 2013. They were briefed about the progress of the Airborne Early Warning and Control (AEW&C) programme. They also interacted with the young scientists of the laboratory.



Dr Malakondaiah (standing second from left) being given demo of operator workstation of the AEW&C system

✂ Shri Ajay Singh, Chief Executive (CW&E) along with Brig. JK Rao, Chief Engineer (R&D), Secunderabad, Shri MVS Subrahmanyam, Addl CCE and Shri MG Thimmaya, Project Manager, visited CABS on 12 August 2013. The team visited various facilities in the CABS campus. Dr S Christopher, DS and Director, CABS, apprised the team of the programme undertaken and future plans on various civil works related issues. The CE expressed his happiness assured continuous and timely support in future.

✂ Shri Avinash Chander, SA to RM, Secretary Department of Defence R&D, DG DRDO, visited CABS

on 21 August 2013. He was accompanied by Shri Ravi Kumar Gupta, Director, DPI. Dr S Christopher, DS and Director CABS, briefed SA on the progress of the AEW&C programme and flight testing being carried out at CABS. He was also taken around the various facilities at CABS. SA also undertook a sortie in the AEW&C aircraft along with Dr S Christopher, and Shri SP Dash, DS and Director, Defence Electronics Research Laboratory (DLRL), Hyderabad.



Shri Avinash Chander (sitting left) on-board AEW&C aircraft

DIHAR, Leh

Shri Shyam Sharan, Chairman, National Security Advisory Board (NSAB), visited Defence Institute of High Altitude Research (DIHAR), Leh, on 7 August 2013 along with Lt Gen (Retd) PC Bharadwaj and Lt Gen (Retd) Prabash Menon, both member NSAB. Dr RB Srivastava, OS and Director, DIHAR, apprised the members about the contributions of DIHAR for food, health and energy security of troops in Ladakh sector. Lt Gen Bharadwaj appreciated the progress of the research activities over the years. Shri Shyam Sharan congratulated DIHAR for its excellent contributions and



Dr RB Srivastava welcoming Shri Shyam Sharan (right)

credited the laboratory to be a good example of achieving scientific outcomes which are useful and commercially viable for the soldiers and the society.

DLRL, Hyderabad

Air Vice Marshal PP Khandelkar, Director, Military Institute of Training, Pune visited Defence Electronics Research Laboratory (DLRL), Hyderabad, on 16 July 2013. Shri SP Dash, DS and Director, DLRL, briefed him about the various technical activities of the lab. He was later shown some of the products designed and developed by the DLRL.



Dr CP Ramanarayanan and Dr Tamilmani presenting cheque to RRM

GTRE, Bengaluru

Hon'ble *Raksha Rajya Mantri* (RRM), Shri Jitendra Singh, visited Gas Turbine Research Establishment (GTRE), Bengaluru, on 22 July

2013. Dr K Tamilmani, DS and CC R&D (Aero) also accompanied the hon'ble minister. Dr CP Ramanarayanan, OS and Director, GTRE, briefed RRM about the on-going projects and various activities of the lab. RRM visited Engine assembly hangar where engine and its critical components were displayed. He also witnessed engine testing at

GTRE engine test bed.

On this occasion, hon'ble minister was presented a cheque of Rs 6,88,961/- towards Prime Minister's National Relief Fund. The contribution was voluntarily raised by the employees of GTRE for the relief work of flood affected Uttarakhand.

HEMRL, Pune

Shri Avinash Chander, SA to RM, Secretary Department of Defence R&D and DG DRDO, on 4 July 2013.

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