



# प ख नि समाचारपत्र

## AMD NEWSLETTER



परमाणु खनिज अन्वेषण एवं अनुसंधान निदेशालय (प ख नि) का वार्षिक प्रकाशन  
Annual publication of the Atomic Minerals Directorate for Exploration and Research (AMD)

खण्ड 24, जनवरी 2018  
Vol. 24, January 2018



### निदेशक का संदेश

#### MESSAGE FROM DIRECTOR

My dear colleagues,

Namaskaar. I wish you and your family a very good health, happiness, success and prosperity in all your endeavours, through this edition of Newsletter. It is an opportunity to rejuvenate ourselves with strength to keep moving forward. This is the time to reflect on our recent performance and achievements and rededicate ourselves to realise the vision of our Great Founder, Dr. Homi Bhabha for the continued development in the field of nuclear energy.

It is a matter of great pride that in the XII plan which concluded in March, 2017, 73,776 tonnes (t)  $U_3O_8$  was added against the target of 75,000t which is 98% achievement of the target. We have achieved >100% in most of our exploration activities like ground surveys and departmental drilling during the period.

During the last one year (January to December, 2017) alone AMD could augment 29,000t  $U_3O_8$ , thus updating our present uranium resources to 2,73,956t  $U_3O_8$  which, I believe is a commendable achievement. The resources of Beach Sand Minerals have also been rationalised and updated, which enhanced the resources by 108 million tonnes (mt) to 1,173mt. As a consequence of directed investigations for Rare Metals and Rare Earths (RMRE), several new geological domains were opened up besides exploration in the pegmatite belts. This clearly demonstrates and highlights our 'Team Work', wherein support has come readily from all sections. Here, I would like to exhort that, in these changing times, we have many more miles to go and we just cannot sit relaxed, gazing at our laurels.

The recent approval by the Central Government for construction of 10 units of indigenous PHWR as a single project of total installed capacity of 7,000 MW is among the most visionary steps taken by the Government of India to facilitate DAE in fulfilling its mandate for accelerated expansion of nuclear power in the country. An effective and timely implementation of the foreseen large increase in nuclear electricity generation by DAE will require quick augmentation of atomic minerals resources, especially uranium. In this context, AMD has formulated a comprehensive three-year action agenda (2017-18 to 2019-20) to prove additional resources of 80,000t  $U_3O_8$  and 60mt Beach Sand Minerals, besides recovery of 10t columbite-tantalite and 20t xenotime-bearing poly-mineral concentrate. It is extremely satisfactory that in this action agenda period we have already added 25,170t  $U_3O_8$  and I am confident that we will be able to achieve the target of 80,000t  $U_3O_8$  in three years. At this juncture, let us resolve to do our best for the success of our glorious Department and our great Nation.

I am extremely happy to observe the inclusive growth in all the spheres of AMD's activities, which have been enumerated in this Newsletter. I hope that the contents of this Newsletter will make an interesting and informative reading to everyone.



Heliborne Gravimeter (GT-1A) on board



Drilling operation in Kanchankayi

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## माननीय केंद्रीय राज्य मंत्री का पखनि में दौरा VISIT OF HON'BLE UNION MINISTER OF STATE TO AMD



Dr. **Jitendra Singh**, Hon'ble Union Minister of State (MoS) Ministry of Development of North Eastern Region, Prime Minister's Office, Personnel, Public Grievances and Pensions, Department of Atomic Energy and Department of Space visited AMD, Central Region, Nagpur on 3<sup>rd</sup> March, 2017. Shri **L.K. Nanda** Director, AMD, apprised Dr. Jitendra Singh, about the activities of AMD through a Power

Point presentation. Shri **C.K. Asnani**, Chairman and Managing Director, Uranium Corporation of India Limited, Shri **O.P. Yadav**, the then Regional Director and Shri **S. Srinivasan**, Regional Director, Central Region also participated in the presentation and follow up discussions. Dr. Jitendra Singh visited the museum and interacted with senior scientists of Central Region. A memento, symbolising nuclear research and exploration was presented to Dr. Jitendra Singh by Director, AMD.



## उपलब्धियाँ : वार्षिक कार्यक्रम 2016-17 ACHIEVEMENTS: ANNUAL PROGRAMME 2016-17

Atomic Minerals Directorate for Exploration and Research (AMD) accelerated the pace of exploration activities during the Annual Programme 2016-17 (November, 2016 to October, 2017) by integrated, multi-disciplinary methodology and judicious utilisation of manpower with a focussed approach for augmentation of uranium, thorium, rare metals and rare earth resources. The salient achievements are as follows:

- ❖ 25,689t in-situ uranium oxide ( $U_3O_8$ ) has been augmented from Tummalapalle and adjoining blocks, Kadapa district, Andhra Pradesh. The total uranium resource of the country has been updated to 2,70,636t  $U_3O_8$ .
- ❖ Reconnaissance (6,842 sq km) and detailed (324 sq km) surveys helped in locating significant uranium anomalies in (i) Quartzite of Shillong Group in Buriganga nadi section, Hojai district, Assam; (ii) Migmatite of Chhotanagpur Granite Gneiss Complex at Karke, Garhwa district, Jharkhand; (iii) Quartzite of Gulcheru Formation, Cuddapah basin at Kappatralla, Kurnool district, Andhra Pradesh; (iv) Leucogranite at Mastipuram, Wanaparthy district, Telangana; (v) Granite at Viraboyanapalli-Dindi-Singaram-Hajipur, Mahabubnagar and Nalgonda districts, Telangana; (vi) Sandstone of Motur Formation, Satpura Gondwana basin at Khapa-Jhapri, Betul district, Madhya Pradesh and (vii) Breccia / cataclasite near Jhapar, Singrauli district, Madhya Pradesh.
- ❖ 88,080m Departmental and 1,18,010m Contract drilling have been carried out for Uranium and RMRE Investigations (Total drilling 2,06,090m).
- ❖ Significant uranium mineralised intercepts / bands have been identified in boreholes drilled at Rambas, Haryana; Kanchankayi, Gogi (West) and Suldhhal-Gujanal, Yadgir and Belgaum districts, Karnataka; Tummalapalle and adjoining blocks (Kanampalle, Motnutalapalle, Gidankivaripalle), Kadapa district, Andhra Pradesh; Jaduguda (North), Turamdih (East), Singridungri-Banadungri, Rajdah and Bangurdih, Mahalimurup, East Singhbhum and Saraikela-Kharswan districts, Jharkhand; Wahkut-Kulang, Southwest Khasi Hills district, Meghalaya; Rohil (West), Narsinghpuri, Guman Singh ki Dhani, Barkhada, Karoi, Jahaz and Jamalpur, Sikar and Jhunjhunu districts, Rajasthan; Devri, Surajpur district, Chhattisgarh and Dharangmau, Betul district, Madhya Pradesh.
- ❖ New potential blocks have been identified at Naktu, Sonbhadra district, Uttar Pradesh; Rajpura, Una district, Himachal Pradesh; Kudada (Turamdih East extension), East Singhbhum district, Jharkhand; Kappatralla, Kurnool district, Andhra Pradesh and Mastipuram, Wanaparthy district, Telangana.

- ❖ Geochemical surveys (4,346 sq km) carried out in different parts of the country have delineated anomalous haloes near Barmer and Dhorimanna, Barmer district, Rajasthan and Rayavaram-Pincha-Reddivaripalle tract, Kadapa district, Andhra Pradesh.
- ❖ Ground geophysical surveys (Regional: 524 sq km and Detailed: 458 sq km) have delineated potential blocks associated with conductive zones in Umra, Udaipur district, Rajasthan; high chargeability zones in Sankadih-Galudih, Kharswan-Burughutu, Saraikela-Kharswan district, Jharkhand & Tirth-Tintini, Yadgir district, Karnataka and low magnetic zones in Hanspani, Karbi Anglong district, Assam & Ambadongar, Chhota Udepur district, Gujarat.
- ❖ Heliborne geophysical (TDEM, Magnetic and Gamma-ray spectrometric) surveys over 58,241.65 line km have been carried out in parts of Aravalli Fold Belt & North Delhi Fold Belt, Rajasthan; Chhattisgarh basin, Chhattisgarh; Satpura Gondwana basin, Madhya Pradesh and Cuddapah basin, Andhra Pradesh and Telangana. AMD successfully carried out heliborne gravity survey for the first time.
- ❖ Reconnaissance (1,020 sq km) and detailed (4 sq km) surveys resulted in location of significant concentrations of RMRE along Jogiyani, Chhattisgarh and Jangapara, Odisha. 1,106 kg columbite-tantalite has been estimated in Odisha and Chhattisgarh. 2,590 kg columbite-tantalite and 500 kg beryl as by-product were recovered in recovery units of Odisha and Karnataka. 6,500 kg xenotime bearing poly mineral concentrate was also recovered at Siri river plant, Jashpur district, Chhattisgarh. Reconnoitory core drilling (2,402m), on contract resulted in establishing the continuity of REE mineralisation in microgranite dykes over 1.2 km strike length in Phulan area, Siwana Ring Complex, Barmer district, Rajasthan.
- ❖ Reconnaissance (366 sq km) and detailed (12 sq km) surveys resulted in establishing potential heavy mineral zones mainly along the east coast of India. Significant zones of Total Heavy Minerals (THM) concentration have been located at Melekidaram-Seraikulam (up to 10%), Tamil Nadu; Thurpupalem – Vainateyam Godavari confluence (up to 28%), Chinavanka - Pallisaradhi (up to 44%), Bhavanapadu - Jogammapeta (up to 26%), Andhra Pradesh and Sana Arjapalli – Agastinuagaon (up to 68%), Odisha. The THM resources in Chinavanka - Pallisaradhi coast, Srikakulam district, Andhra Pradesh are estimated to be approximately 1.41 million tonnes.
- ❖ Various laboratories (Physics, Chemistry, XRD, XRF, Petrology, EPMA, Geochronology and Stable isotopes) provided effective analytical support to field investigations.
- ❖ Technology developed for removal of high concentration of uranium and arsenic from drinking water and other aqueous systems for societal benefits has been accepted by Technology Transfer and Collaboration Division, DAE for release in the public domain. An application for patent in India titled 'A filter with developed sorbent composite material for removing toxic metal contaminants from aqueous systems' has been filed.
- ❖ BARC Training School AMD Campus, Hyderabad continued its activity wherein 12 Trainee Scientific Officers (TSO) of the 7<sup>th</sup> batch (OCES-2016) (9 Geology & 3 Geophysics) completed induction training on 31<sup>st</sup> July, 2017. 15 TSOs (11 Geology & 4 Geophysics) of the 8<sup>th</sup> batch (OCES-2017) are undergoing induction training.
- ❖ Public awareness programmes were organised in various cities as well as in remote field areas. Activities related to human resource development continued with in-house and external training programmes for staff and officers. Research and Development assignments (41 no.) related to atomic mineral exploration have been continued in different field areas and laboratories. AMD Studentship programme and BRNS projects have also been continued.
- ❖ A Memorandum of Understanding (MoU) has been signed between Department of Fertilisers (DoF), National Remote Sensing Center (NRSC), Geological Survey of India (GSI) and AMD for "Mapping of surface exposures of rock phosphate using Earth Observation data, geochemical and field data".
- ❖ AMD in collaboration with GSI, submitted a report on 'Potential Rare Earth Deposits of India' to the Chairman, Expert Committee on 'Strategies for self-reliance in critical and strategic resources of rare earths' constituted by NITI Aayog.
- ❖ Swachh Bharat activities have been carried out at Headquarters and seven Regional Centers of AMD.



## प ख नि प्रबंधन परिषद का पुनर्गठन

### RECONSTITUTION OF COUNCIL OF MANAGEMENT OF AMD

1	Dr. Sekhar Basu, Chairman, AEC and Secretary, DAE	Chairman
2	Dr. A.K. Suri, Former Director, Materials Group, BARC	Co - Chairman
3	Shri M. A. Inbarasu, Joint Secretary (I&M), DAE	Member
4	Joint Secretary (F), DAE	Member
5	Shri C.K. Asnani, Chairman and Managing Director, UCIL	Member
6	Shri Deependra Singh, Chairman and Managing Director, IREL	Member
7	Dr. V.M. Tiwari, Director, National Geophysical Research Institute (NGRI)	Member
8	Shri R.M. Sinha, Former Director, AMD	Member
9	Shri Laxman Singh Shekhawat, Chief Operating Officer (Mines), HZL	Member
10	Dr. V.P. Dimri, Former Director, NGRI	Member
11	Shri Ravi Prakash Verma, Former Deputy Director General, GSI	Member
12	Director, Materials Group, BARC	Member
13	Dr. C.S. Viswanadham, Member, NCPW, DAE	Member
14	Shri L.K. Nanda, Director, AMD	Member
15	Shri M.B. Verma, Additional Director (Operations-I), AMD	Member
16	Shri R.K. Purohit, Additional Director (Operations-II), AMD	Member
17	Shri O.P. Yadav, Additional Director (Operations-III), AMD	Member
18	Additional Director (R&D), AMD	Member
19	Dr. S.N. Chaturvedi, Head, PMSG, AMD	Non-Member Secretary

## दीक्षांत समारोह GRADUATION CEREMONY

BARC Training School (BARCTS)-AMD Campus, Hyderabad is responsible for imparting specialised training on modern exploration methods in Geology and Geophysics disciplines. The Graduation Ceremony of 7<sup>th</sup> batch of OCES-2016 of BARCTS, Hyderabad was held on 3<sup>rd</sup> August, 2017. 12 Trainee Scientific Officers (TSO's) including 9 in Geology discipline and 3 in Geophysics discipline have graduated. Shri **C.K. Asnani**, Chairman and Managing Director, Uranium Corporation of India was the chief guest at the function and awarded the graduation certificates to the graduating officers and Homi Bhabha Medals to the toppers in Geology (Shri **Denzil Salvador Couto**) and Geophysics (Shri **Avadesh Kumar Shukla**).



Shri Asnani delivered the convocation address and stressed upon the important role to be played by the youth in augmenting uranium resources of the country. He welcomed new TSOs of OCES-2017 (8<sup>th</sup> batch) consisting of 11 TSOs in Geology and 4 in Geophysics discipline. Shri Asnani presented the M. Tech Certificates to 11 officers of OCES-2013 batch of BARCTS on completion of their projects.



## प ख नि में मेरी यात्रा और अनुभव MY JOURNEY AND EXPERIENCES IN AMD

डा. ए. के. चतुर्वेदी Dr. A. K. Chaturvedi



**Dr. A. K. Chaturvedi** obtained M.Sc. from Lucknow University, M.Tech. from Indian Institute of Technology, Kanpur and Ph.D. from Osmania University, Hyderabad. He has experience of over 37 years in various aspects of Atomic Minerals exploration particularly in Aerial Survey and Remote Sensing. He has successfully implemented the heliborne geophysical survey programme of AMD during the last 10 years. He superannuated from illustrious service on 31<sup>st</sup> July, 2017 as Additional Director (Operations-1).

It took me quite some time to decide on what I should write as an article for AMD NEWSLETTER. I have so many memories of around 37 years related to different places in the country and abroad, which I could visit as part of my different work assignments.

After joining at Nagpur in December 1980, I got an opportunity to work in the tribal belt of Surguja and other parts of Chhattisgarh. Working in remote places, without any vehicular support, was really challenging but gave real satisfaction when we could locate some interesting uranium occurrences near Rasgandha / Belangi, which led to opening of enhanced activity in migmatites of Surguja, Chhattisgarh and adjoining areas of Uttar Pradesh. I still remember how enthusiastic and

motivated we were, after receiving an appreciation letter from our Section Incharge, Late Shri G. H. Sahasrabudhe. He was one of the most sincere, involved and hardworking geologists of AMD and getting appreciation from him was no less than getting an award. His punctuality, honesty, sincerity and hard work were big motivation for most of us and great lessons to learn in early part of the career. At Jajawal prospect, my association with mapping, drilling, exploratory mining and ore reserve estimation was very interesting, which provided a good opportunity to learn different aspects of exploration and associated challenges.

After seven years of association with similar assignments in different parts of the country, suddenly one day in 1987 the then Director Late Shri A.C. Saraswat on his visit to Nagpur, asked me whether I can join Aerial Survey Remote Sensing (ASRS) Group. In the light of associated risks and previous history of accidents, he gave me two days time to discuss at home and finalise. However, I accepted it almost immediately and was posted at ASRS, Nagpur. My first airborne survey assignment in 1987-88 was to acquire data over Tummalapalle and adjoining area, in Cuddapah basin, where we could trace continuity of uranium mineralisation for more than 100 km over Vempalle Limestone besides a number of uranium anomalies in basement granites. Flying at low altitude for about 6 hours in Dakota aircraft of World War II period was really exhausting and tested our physical and mental strengths. On a number of occasions, it looked as if it was going to be the last journey, but God is Great! and Capt. Tripathi of Air Survey Co., Kolkata was really a genius pilot. The incidence of emergency landing within 15 minutes of take-off with one engine operational and second engine on fire and rushing of Fire Brigade towards the aircraft at Ahmedabad airport was really scary. I whole heartedly thank Capt. Tripathi and other pilots for ensuring our safety as it was a real difficult task to fly so low and acquire data precisely with visual navigation.

Around 2006, AMD was under tremendous pressure to provide uranium to 'starving' nuclear reactors, which were not operating close to their capacity. It was the time, when DAE realised that AMD is one of the most important units in the Nuclear Fuel Cycle. Dr. Anil Kakodkar, the then Chairman, AEC and Secretary, DAE formed a committee on "Augmentation of Uranium Resources" (AUS) headed by Shri P.K. Lahiri, IAS (Retd.) with members from different geological organisations having expertise in geology, geophysics and mining. The report submitted by the committee suggested different action plans required to boost the exploration activities of AMD for augmentation of uranium resources in the country. Two major activities were on focus i.e. heliborne TDEM surveys and drilling.

Introduction of heliborne geophysical surveys, particularly use of TDEM technology, which is an important tool in finding concealed uranium deposits, was to be taken up for the first time in India. No organisation in the country had any experience and expertise on it. It was a real challenge for AMD, which was turned into an opportunity to bring out our best. A three pronged strategy was decided upon i.e. (i) AMD should first procure a heliborne system (ii) AMD should take up heliborne surveys, on contract, through multinational firms and NGRI and (iii) BARC and IGCAR should develop an in-house TDEM system. After detailed studies of technical specifications, VTEM of M/s. Geotech. was found to be the best TDEM system at that time. However M/s. Geotech. declined to sell the TDEM system. Later it was decided to contact the owner of the company, Mr. Ed Morrison, a well known geophysicist who had designed and developed the system. Ultimately, after lot of efforts, AMD procured it's first heliborne TDEM system along with magnetometer and gamma ray spectrometer.

Another major challenge was related to creation of a team, which could handle all the activities related to heliborne surveys. Team building process is a complicated issue and it begins with a commitment from management and designation of sponsorship. Sponsorship has a vital role in the development of any team as it allows for one point of contact within management. The sponsor has the ability to take the team in the right direction while at the same time allows others in the team to take decisions within the group. Empowerment of team members is another very important factor for success. Amalgamation of geological and geophysical knowledge was another dimension, which was stressed upon. The team building for heliborne surveys of AMD was done on the aforementioned factors.

This team has already acquired, processed and interpreted large volume of heliborne geophysical data and is the best team in the country for the job. The results, after interpretation, modelling and ground follow up, are very encouraging and need to be tested by exploratory drilling. A regular and meaningful discussion amongst people associated with exploration activities is very essential.

We have seen AMD maturing into a premier geo-scientific organisation of the country over these years. However, the major goal of establishing uranium deposits was always and continues to be, a challenge. Few aspects, related to exploration have changed during the course of time. But the relevant questions are 'Have we changed for the best? Are we doing enough and making appropriate efforts to meet future targets and goals of organisation?' Uranium reserves of the country are increasing to satisfactory level with the share of Tummalapalle deposit rising to more than 52%. Tummalapalle deposit has its own limitations and challenges. We require newer concealed deposits to be located and established. New technologies being used worldwide should be adopted to acquire different datasets and their integration with all available data from different techniques should be utilised to develop geological models for better understanding of geology and to enhance the success rate of locating new uranium deposits.

I firmly believe that AMD has earth scientists with good technical knowledge and they are capable to take up any challenge. The newer breed of scientists in AMD are energetic and we need to motivate them, give them real challenges and make their work more enjoyable. AMD was always 'Good' but we have to become 'Great'. Journey from 'Good to Great' requires putting the right people in the right slots and to debate vigorously in search of best answers without any parochial interests. We have all the capabilities to do that. I wish AMD and all my AMD colleagues all the best in their endeavours.

## प ख नि में एक उत्साही एवं घटनापूर्ण यात्रा AN ADVENTUROUS AND EVENTFUL JOURNEY IN AMD

जी. बी. जोशी G. B. Joshi



*Shri G. B. Joshi obtained M.Sc. (Geology) from Lucknow University, Uttar Pradesh. He has contributed immensely in the field of atomic mineral exploration in Southern Region, Northern Region, Northeastern Region and Planning and Management Services Group, during his career spanning over 37 years. He superannuated from illustrious service on 28<sup>th</sup> February, 2017 as Additional Director (Research and Development).*

I joined AMD on 15<sup>th</sup> December, 1980 at Patan Bhawan, Bangalore - a rented palatial building - as Scientific Officer - SB. I was immediately assigned field work around Moyar river area in Bandipur (Karnataka) and Mudumalai (Tamil Nadu) wild life sanctuaries. I was reporting to Shri S.G. Vasudeva, a pious, humble and sincere officer. Although he had just been transferred from Petrology laboratory, he was very meticulous in field work. The field work used to be for long spells, commencing early in the morning every day. A hard task-master in field, he was equally caring in camp. Having grown up in Lucknow in Hindi heartland of the country, communicating with locals was a real difficulty. Once I was on

a field traverse with my field guide - a local boy. We were negotiating with difficulty through dense forest along a track overgrown with elephant grass. Suddenly, we saw a group of people on tree branches shouting furiously. At the time, I did not understand a word of what they were saying. On reaching the camp, the boy narrated the incident to his acquaintances. It was through one of them, a person conversant in English, I came to know that they were workers in a nearby stone quarry, who on seeing continuous movement of grass blades in a particular direction mistook it for the presence of a tiger in the area!

In the next field season, I was assigned to work alone in the area around Srivilliputhur- Rajapalayam, Ramanathapuram district, Tamil Nadu. Initially, I camped at Pudupatti village, where the villagers were simple and



kind hearted. Being curious about me and the work, they would often invite me to their gathering and talk with the help of a School Principal. Once they even organised a picnic for me. In spite of the language barrier, they made my life comfortable. Subaiyya, a boy in his teens, was my field guide. One day, while on field work in nearby forest, he suddenly stopped and started shouting and staring at me. I was confused and frightened. Observing that I was unable to understand his gesture, he folded his body like an elephant and pointed directly ahead. When I looked up, I saw an elephant barely at 100 m from where I stood. We ran away as fast as we could without stopping till we reached safely to our camp. Later, I learned that the forest had a good population of elephants and bears.

Subsequently, during 1983, I was camping with my wife and two senior colleagues near Gadag town in Karnataka. Tents were pitched in a mango orchard. The nearby villagers, especially ladies, used to make a beeline around the camp ever since we unloaded our tents from a hired truck. It was winter and year end and two colleagues had gone on leave. One night it started raining heavily and the orchard was flooded. Our tents started folding up on us one by one! My wife and I were left holding the two pillar poles of our tent. The rain stopped only after midnight and sometime later we somehow managed to re-erect our tent. A unique experience it was.

The posting in Planning and Management Services Group provided me an opportunity to have abroad and overall view of AMD's mandate including all scientific, technical, administrative and financial domains. It was also a period of learning about decision making. Bringing out the first volume of AMD's Newsletter and close association with film making on AMD's activities were creatively very satisfying. A long tenure at NER, Shillong was a learning experience in human psychology and socio-political aspects. Meghalaya being sensitive to uranium mining, frequent meetings with Governor, Chief Minister, Ministers and social groups provided a new learning experience.

Technically, I had the opportunity to explore for all major types of uranium deposits. Defining palaeochannels with limited drilling at Tileli, Himachal Pradesh, upgrading Wakhyn-Wahkut deposit, Meghalaya to a 10k class, proving uranium mineralisation at ~ 400m depth in Kulang block, Meghalaya and at ~250m depth in Mohar caldera, Madhya Pradesh were most satisfying events in my career.

My journey in AMD was made memorable by traverses in mesmerising Western Ghats, magnificent Himalayas and serene forests of North East as well as by thousands of helping hands, many pure infectious smiles and innumerable suggestions. I will forever remain highly indebted to all my companions.

## खनिज अन्वेषण: पहेली, जोखिम एवं प्रतिफल MINERAL EXPLORATION: RIDDLE, RISK AND REWARD

प्रमोद कुमार Pramod Kumar



*Shri Pramod Kumar obtained M.Sc. (Applied Geology) from University of Roorkee, Uttarakhand (then Uttar Pradesh). He has experience of over 37 years in various aspects of Atomic Minerals exploration. He has contributed immensely in developing various geological domains in Southern Region, Eastern Region, Northeastern Region and Northern Region. He superannuated from illustrious service on 31<sup>st</sup> October, 2017 as Additional Director (Research and Development).*

Mineral exploration is a science of discovering the mineral wealth and assessing its total quantity, quality and economic potential. It is interesting to note that Kautilya (Chanakya of Arthashastra fame) emphasised that State should take the business of mineral wealth including mining. He declared that mines and mineral wealth are the very source from which spring all temporal power for the strength of the Government. History is replete with examples that many wars have been fought for acquiring the minerals and mines of enemy countries. The four

most commonly mined Conflict Minerals - also called 3TGs - are cassiterite (Tin), wolframite (Tungsten) and coltan (Tantalum) and of course Gold. Coal and oil have been the cause of conflict among various countries. The mineral exploration is, therefore, a very important dimension of wealth for a country.

Exploration is probing into the unknown and it covers essentially the whole range of geological activities for discovering a workable deposit of economic importance. A very curious aspect in mineral exploration is that "Chance Find" was relied upon in not very distant past. In 1810 during "Gold Rush" of California, many prospectors traversed and discovered vast riches. They just worked with some common knowledge and little experience. In fact "Need", "Knife" and "Magnifying glass" were the only tools in their hands. They may have worked with some

geological hunches but “Chance” alone was the general detector of metallic rich in early times. Similarly “Uranium Rush” of 1950s saw many prospectors discovering uranium and minting fortunes. Grubstaking - a time honoured practice of raising funds for prospecting is said to have found many historical mines, especially gold. It worked on the premise that the fortunes would be shared on some equitable basis, after successful discovery of minerals, with the persons to whom the funds were loaned for discovering minerals. Howard Basley - a pioneer in the uranium prospecting during the days of Madam Curie, when her interest in radium sources of California was intense, has described how in 1969 he had grubstaked a man - Charles Snell - on the strength of a dream. After ten days Snell actually found yellow circles in a block of sandstone. It is said that at one point of time some 80% of uranium discoveries in the United States were made by amateur prospectors. In the lighter vein it was said that “geology is the foundation of prospecting (exploration) yet geologist did not make the best prospector”. Mark Twain – an American novelist was also a “Luck Prospector” before he took to writing. His series of failed attempts to strike a rich find perhaps led him to say “A (gold) mine is a hole in the ground with a liar at the top”.

The most fundamental question in modern world today is - have the conditions changed so much that the simple prospecting methods or exploration programmes cannot find a deposit? The answer is Yes! The days of simple prospecting with hunting of surface outcrops are over. Discovery is no longer the name of digging game.

The science of mineral exploration has grown over the decades and today it is the combination of various disciplines such as geology, geochemistry, geophysics, geobotany, airborne survey, remote sensing, exploratory drilling/sampling, evaluation, etc. The discovery of uranium or any other metal, in fact, follows a logical sequence of such tools of exploration. It can truly be called an exploration strategy. In the sequence of operations, there lies an element of risk and all exploration efforts are, therefore, riddled with certain amount of uncertainty. It is this risk and uncertainty that make an exploration geologist to plan his strategy under a well thought out plan. This risk and uncertainty, nevertheless, add to the ‘Thrill of Exploration’. Planning at each stage with due consideration of time, money and risk is the central theme of any exploration adventure.

Uranium exploration is a complex process involving many such techniques and the whole enterprise is more challenging when deposits are concealed in deep geological formations as they have very subtle surface signatures. The surface geochemical techniques widely employed during 1960s and 70s have proved effective for near surface uranium deposits. However all these are not adequate for locating deep and concealed deposits. Therefore, we must focus on rapidly growing integration technology and synthesising of data for holistic mineralisation model that can be tested for accuracy and validity. The deposits associated with Mesoproterozoic unconformity in the Athabasca basin could be located by the distinct response of the conductor zones to airborne and ground EM surveys. However, all conductors were not found to be mineralised. Geochemical haloes (the alteration haloes), boron enrichment in the host rock and anomalies of associated elements (As, Ni, Co, Cu, etc.) helped in discovering the concealed uranium deposits.

In the entire scheme of exploration, quality checks - both on field and laboratory data is a must. The accuracy starts right from initial stage and continues till end. It is, therefore, a dynamic process. One must watch the risk in exploration at all the times and maintain very high standard of quality control. Unbiased sampling to avoid all errors in estimation, contamination and concentration of metal content is of utmost importance. Geostatistics is a vital tool that must be applied to treat the data meaningfully and to gather information on the scatter and central tendency of the same. Mathematical modelling like Zipf’s curve can assist in dealing with the size and rank of the deposits and can help predict a bigger deposit in a known mineralised belt. However, limitations and the accuracy of data must be kept uppermost in mind. It is said that “there is no error if we know the error” meaning thereby that strength and weakness of the whole data should be well understood. All this should form the ‘Professional Ethics’ in exploration. In recent past, the example of Bre-X, which was involved in a major gold mining scandal when it reported that it had established an enormous gold deposit at Busang (Indonesia) by actually falsifying the data, is a case in point. The company collapsed in 1997 after the gold values were found to be fraudulent.

By sustained efforts in uranium exploration programme world over since 1960s, a good understanding has been made and as a consequence modern approach to uranium exploration has matured into a well thought out plan of activity involving various techniques – either singly or in combination, in a sequential and phased manner. The approach has become so realistic that based on all geological considerations coupled with exploratory tools, a virtual 3-D model can be visualised and then probed by other techniques for full understanding before commercial



exploitation. In spite of such a robust and multidisciplinary application of techniques, an exploration geologist must keep all the options open. Surprises may spring up anytime. Optimism and an open mind are the keys to success, despite a few set-backs in the process. The Century Mine of North West Queensland, Australia makes an interesting reading as to how continuous efforts, geological thinking and refined modelling can turn a place into a viable deposit. It was in 1890 that silver veins were first discovered and explored here. Exploration was abandoned later and then re-launched several times based on different set of models until 1990 - that is exactly after 100 years, when it was established as a major zinc deposit. Many such Century Hill deposits remain to be explored.

Not a single technique is the right choice. Combination of various techniques and convergence of evidence create a right model. Any model so conceived must be probed till a high level of confidence is developed. A mineral exploration programme does not provide us with a magic-wand for locating deposits. It requires continuous efforts, re-organisation of ideas when required, application of better instruments and high level of confidence. Rewards and dividends are bound to come.

India has approximately 5.7 lakh sq km area of Obvious Geological Potential (OGP) of which 90% is unexplored. Mining in India is only 2% of this OGP. Geologically, India and Australia are part of Gondwanaland but the emphasis of exploration in terms of drilling and expenditure is vastly meagre. Whereas the global share on exploration of Canada (14%) and Australia (13%) is very high, in India it is only 0.2%. For India, the ratio of minerals produced to minerals imported is 1:10, which needs to be promoted upwards. Therefore, we need a fresh, more effective, meaningful and implementable National Exploration Programme.

## उत्तर दिल्ली वलन पट्टी के भागों में यूरेनियम धातुजननीय प्रक्रिया - कुछ टिप्पणियाँ URANIUM METALLOGENY IN PARTS OF NORTH DELHI FOLD BELT – SOME OBSERVATIONS

जी. एस. यादव G.S. Yadav



*Shri G.S. Yadav, obtained M.Sc. (Geology) from M.D. University, Rohtak, Haryana. He has experience of over 36 years in various aspects of 'Atomic Minerals' exploration. He has contributed immensely to the exploration programmes in*

*Southern Region, Northern Region, Western Region and Eastern Region. He retired on 31<sup>st</sup> August, 2017 as Regional Director, Northern Region after attaining the age of superannuation.*

Aravalli Craton in northwestern India comprising the basement Archaean Banded Gneissic Complex (BGC), Palaeo to Meso Proterozoic Aravalli and Delhi Fold Belts and the Phanerozoic cover sequences depicts the only cratonic sequence of India, wherein most of the types of uranium deposits, from the oldest (QPC) to the youngest (calcrete), can be conceived to be present. The craton is dominated by NNE-SSW to N-S tectonic fabric which has also shaped the trend of Aravalli Mountains. Multiple phases of reactivation have been witnessed along the same trend. In fact, it is quite apparent that magmatism and metallogeny in Aravalli and Delhi Fold Belts are linked to this orogenic fabric.

North Delhi Fold Belt (NDFB) comprises three diachronous sub-basins i.e. Khetri, Alwar and Lalsot-Bayana, which have contrasting lithological and structural characteristics, metamorphism, deformation and therefore different style of metallogenesis. NDFB is affected by emplacement of ca. 1500-1700 Ma intrusive granitoids viz. Bairath, Saladipura, Udaipurwati, Chhapoli, Seoli, Jitala, Dabla, Dosi, Dhanota, etc., which are transected by deep seated shear zones. These Hudsonian-equivalent granitoids are considered to be significant carriers as well as mobilisers of uranium into and within the Palaeo to Mesoproterozoic ensemble of NDFB.

The ~220 km long curvilinear 'albitite line' of Northeastern Rajasthan between Nasirabad in the south and Dhanota-Dhancholi in the north is a unique domain and has emerged as a fundamental target for prospecting for uranium. Since its conceptualization in late 1980's, extensive detailed work has resulted in establishing two more sub-parallel zones of albititisation on either side of the main belt i.e. a parallel albitite zone about 30 km west of 'albitite line' near Arath and a linear albitite zone about 130 km in length and 5-12 km in width from Neorana in the north to Bichun-Nayagaon in the south. The Neorana-Bichun zone has a regional NE-SW trend and occurs about

20–40 km east of 'albitite line'. The albitite zones in Khetri sub basin are most significant for uranium metallogeny and are currently under exploration by AMD.

Polymetallic (U-Cu-Mo, REE, Bi, magnetite, fluorite, pyrite, pyrrhotite) mineralisation within the psammopelitic and carbonaceous metapelites traversed by Na-rich (albitite) bodies and granitic intrusives is noteworthy. A medium tonnage uranium deposit has been established at Rohil and active exploration is underway at Hurra Ki Dhani, Jahaz and Narshingpuri in Sikar and Jhunjhunu districts, Rajasthan. In Neorana – Bichun zone, intensive exploration is in progress around Geratiyon Ki Dhani and Ladi Ka Bas areas, Sikar district, Rajasthan. In addition, there are some important shear zones such as Raghunathgarh – Satkui, Meena Ka Nangal - Antribharipur and Brijnandpura – Nibor – Tasing which also host uranium mineralisation.

In Khetri sub-basin, albitites have been dated ~477 to 1,350 Ma indicating the reactivation of these zones over a long span. Mineral dates of uraninite and davidite also vary from ~819 to ~1,265 Ma. Thus multiple phases of remobilisation and concentration of uranium along these zones has taken place. The most favourable field guide for uranium exploration along these shear zones is the eastern limb of antiformal and synformal hill ranges of quartzite in contact with favourable lithologies such as biotite schist, amphibole schist, amphibole quartzite and calc - silicates with lenticles of carbonaceous phyllite and sulphides. Other important features are alterations such as aventurisation of albitite, chloritisation, kaolinisation, hematitisation and scapolitisation and presence of fluorite and veins of albite instead of massive albitite bodies.

In Alwar sub-basin, sandstone, shale and carbonate sequence is metamorphosed to amphibolite grade and is affected by emplacement of granites. Several sub-surface (mine faces) uranium anomalies have been delineated. Many N-S to NNE-SSW sympathetic shear zones have developed in the BGC proximal to the cover sequence of Alwar Basin. The Archaean shear at Dhani Basri area bears the imprints of hydrothermal Cu-U-Au mineralisation where anomalous uranium concentration associated with silicified quartz biotite schist and uranium-copper bands has been intercepted in the boreholes. This shear, concealed at most places within the BGC, transgresses into the psammopelitic sequences of the overlying Alwar Group further north of Dhani Basri. Here the BGC-Alwar unconformity surface has undergone profuse alteration in the form of kaolinisation, hematitisation as well as silicification. Favourable time-specific unconformity setting in combination with hydrothermal alteration features and anomalous concentration of uranium in the basement rocks indicate strong possibility of locating concealed uranium zones in this sector. Further, In continuity to above, it is noteworthy to mention that a similar brittle-ductile shear zone sympathetic to Dhani-Basri shear zone exhibits intermittent uranium mineralisation along ~1.3 km strike length at Kho-Dariba area. Hence these shear zones within Alwar basin also merit detailed subsurface investigations.

## रसायन वर्ग में मेरा योगदान

### MY CONTRIBUTIONS IN CHEMISTRY GROUP

डा. जी. चक्रपाणी Dr. G. Chakrapani



*Dr. G. Chakrapani, obtained M.Sc. (Inorganic Chemistry) from Karnataka University, Bengaluru and Ph.D. from Bangalore University, Bengaluru. He has contributed immensely in the field of analytical chemistry and has worked in Headquarters, Southern Region, Central Region and Northeastern Region. He retired on 28<sup>th</sup> February, 2017 as Head, Chemistry Group after attaining the age of superannuation.*

Chemistry Group of AMD was always active and vibrant in scientific pursuit and has contributed immensely to exploration for uranium and other atomic minerals in the country. Each and every sample that is being analysed is unique in its content. This wide variety of sample matrices and demanding analytical needs in each one of them gave an opportunity to pursue research in sample decomposition and analyte separation for determination using different analytical techniques. A kit was developed employing activated carbon from

preconcentration of about 25 trace elements in hydrogeochemical samples during those efforts.

Analytical Chemistry has wide range of applications in day to day life. As a part of the societal commitment, research was oriented towards development of remediation technologies for contaminated drinking water. A patent titled "A Filter with Developed Sorbent Composite Material for removing Toxic Metal Contaminants for Aqueous Systems"- was filed with the co-inventor, Mrs. Leela Gopal which was evaluated by DAE-IPR Cell

and assigned Indian Patent Application number. In addition to this "Uranium Removal Filter for Domestic Water Purification Technology" submitted to TT & CD, BARC was approved by TTSC and is available for transfer to suitable industries. Another first of its kind technology "Arsenic removal filter for domestic water purification", co-invented with Dr. (Mrs) Anitha Mary Thomas for arsenic remediation was transferred to M/s Stellarin Ventures Pvt. Ltd., Raipur. Novel granules synthesised removes both species of arsenic in one go and are superior to technologies available currently.

A National Seminar, 'SAP-2013' was organised at AMD, Hyderabad on the occasion of the 25 years of plasma techniques in AMD. This gave chemists an opportunity to present their work on flame and plasma techniques and also to interact with their peer group from other organisations. By that time about 430 research papers had already been presented/ published by the Chemistry Group. A Technical Bulletin (part-1) entitled "The growth of research in Chemistry Group of AMD with special reference to chemical characterisation of atomic minerals by plasma/flame techniques" could be brought out during this symposium. Subsequently "Analytical Research Reference Handbook" giving insight into essence of research work published by analytical chemists of AMD during 1979-2013 was also published. The compilation that was co-edited with Dr. A. Premadas is a ready reckoner for any researcher in the field of analytical geochemistry.

An international symposium, "Emerging Trends in Analytical Chemistry (ETAC-2016)" was organised in association with ISAS, Bangalore Chapter, where more than 100 papers were presented from research and academic backgrounds. Man behind machine is more important for producing good analytical results. In this context two orientation training programmes for newly recruited chemists of AMD were also co-organised.

With accreditation of Chemistry Laboratory, AMD, Hyderabad from NABL in accordance with the international standard ISO/IEC 17025:2005 for complying to the general requirements for the competence of testing and calibration laboratories in April 2016, Chemistry Group, AMD has crossed one more milestone. Finally we could also bring out a dedicated compilation "A Handbook on Chemical Characterisation of Atomic Minerals" useful to both novice and experienced analytical chemist included detailed treatment on dissolution, separation, preconcentration and instrumental parameters for accurate analysis. I am sure that the dedicated members of the Group will take it forward to towering heights.

## प ख नि में मेरे संस्मरण MY REMINISCENCES IN AMD डा. यमुना सिंह Dr. Yamuna Singh



**Dr. Yamuna Singh** obtained M.Sc. (Geology) from APS University, Rewa, Madhya Pradesh and Ph.D. from Nagpur University, Nagpur. He has contributed immensely in the field of Rare Metal Rare Earth exploration and mineralogical, petrological and geochemical studies related to atomic minerals exploration. He has worked in Headquarters and Central Region. He retired on 28<sup>th</sup> February, 2017 as Head, Mineralogy-Petrology-Geochemistry Group after attaining the age of superannuation.

The deciding factor in my life is undoubtedly my joining the Atomic Minerals Directorate for Exploration and Research (AMD) in 1981. AMD not only nurtured and enriched me, but also offered me an ideal platform to accomplish tasks assigned to me from time to time in entirely new field, the science of atomic minerals, a subject that, I feel, remained neglected by almost all the Indian Universities.

My work for augmentation and characterisation of atomic mineral resources drew upon the knowledge and experience of many 'Gurus' of AMD, who made significant contributions to my career, imparting professional field and laboratory trainings and upbringing and shaping my philosophy on radiometric surveys, exploration, evaluation and research for atomic minerals. They inculcated in me an integral view on research in my day-to-day systematic field and laboratory investigations and their insistence on "high-quality work" made a deep impression on me. I thank each one of them for their whole-hearted guidance, encouragement, and support in every conceivable situation and also for sharing their vast experiences with me in a variety of ways. I profusely thank all the illustrious Directors of AMD at different times since 1981 as every one of them influenced me differently and I learnt from each one of them over the years. The encouragement, guidance and challenging opportunities they provided, made me a better person.

The unflinching support, care, and blessings of my maternal grandparents and my mother and all my revered teachers have been instrumental in helping me reach from where I retired on attaining the age of superannuation.



The good wishes and timely help of my friends have been a constant source of encouragement and inspiration in times of distress. I profusely thank my wife and two sons for their all-round support and admirable patience in discharging my official duties in AMD.

I once again, with profound respect and reverence, remember all my 'AMD Gurus' at various stages of my learning and offer each one of them my rich tribute, and I also recall a famous 'shloka' which assigns the most laudable and sacred niche for the Guru:

“गुरुर्ब्रह्मा गुरुर्विष्णु गुरुर्देवो महेश्वरः गुरुर्शाक्षात् परब्रह्मा तस्मै श्रीगुरुवे नमः”

## डी टी - एल आई एफ के साथ मेरा जीवन एवं जल से शैल में यूरेनियम निर्धारण MY LIFE WITH DT-LIF : URANIUM DETERMINATION FROM WATER TO ROCKS

डा. मंजीत कुमार Dr. Manjeet Kumar



**Dr. Manjeet Kumar** obtained M.Sc. (Chemistry) from Agra University, Uttar Pradesh and Ph.D. from Indian Institute of Technology, Delhi. He has contributed immensely in the field of analytical chemistry and has worked in Headquarters, Western Region, Central Region, Northern Region and Northeastern Region. He retired on 30<sup>th</sup> September, 2017 as Head, Chemistry Group after attaining the age of superannuation.

It was a standard practice to analyse uranium in rock samples using conventional extraction fluorimetry (Pellet fluorimetry) using Optical Fluorimeter. However, the method is quite cumbersome involving solvent extraction and high temperature fusion with corrosive fluxes to prepare pellets prior to fluorescence intensity measurements. Later, with the introduction of Laser induced fluorimetry (LIF) a spectroscopic technique that involves the excitation of a uranyl molecular target in solution by a beam of UV N<sub>2</sub>-laser radiation followed by the detection of the subsequent fluorescence emission, was experimented for uranium determination in rock samples. The

advantages of LIF are the intense excitation source, simple non-corrosive reagents, rapidity and freedom from the above mentioned problems of pellet fluorimetry.

My journey with LIF began in 1981, the year I joined AMD. During my posting in Mobile Geo-Chemical Laboratory in Rajasthan and J&K for on-the-spot analysis of hydro-geochemical samples, uranium was analysed in water samples routinely by UA-3: Uranium Analyser (SCINTREX, Ontario, Canada) at pH 7. In 1985, at Nagpur along with my co-workers applied LIF to rock samples at pH 7, but realised that maintaining this pH was a very tedious task and if calcium is high; it creates turbidity with Fluorescence Enhancing Reagent (FER) and the glass pipettes used for dilution have inherent inaccuracies. We employed different FERs and finally identified NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub>-H<sub>3</sub>PO<sub>4</sub> combination which works at pH 2 as the most suitable one. Single push-button micropipettes, that combine superior accuracy and precision than glass pipettes, were used for dilution purpose. The initial outcome of seminal work on application of Differential Technique in-LIF (DT-LIF) for simple precise and direct determination of uranium in rocks and concentrates was published in peer reviewed journals during 2001. Subsequently, RRCAT, Indore came up with a digital LIF which helped in achieving better detection limits and precision.

With the advent of bright and more stable LED lights, fluorimeter based on this excitation source became available. With LED in the visible range (405 nm) replacing laser (337.1nm) in the UV range, an enhancement of tolerances to many interferents were re-defined to almost ten times. The application of DT-LIF was extended to diverse matrices like zircon, garnet, monazite, xenotime and Nb-Ta minerals directly with very good accuracy. DT-LIF was recommended as a reference measurement procedure for determination of total uranium content in ores and similar matrices published in the journal, Accreditation and Quality Assurance, 2012, 17(1), 75-84.

The simplicity, rapidity, freedom from matrix effects and separation, minimum generation of radioactive analytical waste, maximum throughput, and inherent high metrological quality are the significant features of the DT-LIF procedure. During last five years, several rock and borehole core samples from various uranium exploration areas have been analysed by Chemistry Group using DT-LIF to provide quick feedback of accurate data to exploration geoscientists. It gives me immense pleasure and satisfaction to be part of a group that developed and standardised the versatile technique for uranium determination in almost all types of geomaterials.

## स्वतंत्रता दिवस समारोह INDEPENDENCE DAY CELEBRATIONS

The 71<sup>st</sup> Independence Day was celebrated with great fervour in AMD Headquarters, Regional Centers and in the field camps. Glimpses of the celebrations are presented below:

### मुख्यालय Headquarters

On the 71<sup>st</sup> Independence Day, Shri **L.K. Nanda**, Director, unfurled the National Flag and received the guard-of-honour, in AMD, Hyderabad. In his address, he briefed about the activities and achievements of AMD during the year. He also emphasised that discipline in all spheres of life is important. This was followed by a colourful cultural programme organised by AMD Recreation Club, Hyderabad.



### क्षेत्रीय मुख्यालय Regional Headquarters



Eastern Region, Jamshedpur



Central Region, Nagpur



South Central Region, Hyderabad



Southern Region, Bengaluru



Northeastern Region, Shillong



Western Region, Jaipur



## पखनि - वार्षिक दिवस समारोह AMD - ANNUAL DAY CELEBRATIONS



The 68<sup>th</sup> Foundation Day celebrations of AMD were held on 28<sup>th</sup> July, 2017 at Headquarters, Hyderabad. The function was attended by many retired employees of AMD. Shri **Debasis Das**, Chairman and Managing Director, Electronics Corporation of India (ECIL) was the Chief Guest of the function and Dr. **Yamuna Singh**, former Head, Mineralogy-Petrology-Geochemistry Group,



Dr. **G. Nagendra Babu**, former Incharge, Material Management Group and Shri **A.S. Laxman Rao**, former Chief Administrative and Accounts Officer graced the occasion as guests of honour. Shri **L.K. Nanda**, Director, AMD presided over the function and briefed the audience about the achievements of AMD during the last one year.

Shri **Debasis Das**, delivered the Foundation day lecture describing the role of ECIL in the technological advancements of India. On the occasion Dr. K.K. Dwivedy, former Director, AMD and other retired employees shared their reminiscences. The programme concluded with colourful cultural performances by in-house talent.

Shri L.K. Nanda, Director, AMD presented the Rolling Trophy for the best performing drilling units for the year 2015-16. The trophies were presented to Drilling Unit Incharges and Senior Technicians. The profiles of the best performing drilling units are as follows.



### Best performing drilling units - Rolling Trophy

#### Mechanical Rig Category

**First Prize:** RD-30 (5) deployed in Singhbhum Shear Zone Investigations, Eastern Region. Shri **P.C.Naskar**, Incharge, along with his crew members achieved a drilling progress of 2,581.50m against the target of 1,400m. Congratulations!



**Second Prize:** DM-400 (4) deployed in Kaladgi Basin Investigations, Southern Region. Shri **Shriramachandra**, Incharge along with the crew members achieved a progress of 2,430.45m against the target of 1,350m. Congratulations!



**Third Prize:** DM-1000 deployed in North Delhi Fold Belt Investigations, Western Region. Shri **Kalyan Singh Meena**, Incharge along with the crew members achieved a progress of 2,264.00m against the target of 1,300m. Congratulations !



#### Hydrostatic Rig Category

**First Prize:** HDCD-400(6) deployed in Southern Cuddapah Basin Investigations, Southern Region. Shri **N. Venkatesh Babu**, Incharge along with the crew members achieved a progress of 4,737.30m against the target of 3,600m. Congratulations!

**Second Prize:** HDCD-400(4) deployed in Southern Cuddapah Basin Investigations, Southern Region. Shri **A. Nagaraju** and Shri **A. Ramakrishna Prasad**, Incharges along with the crew members achieved a progress of 4,325.70m against the target of 3,600m. Congratulations !





Annual Day celebrations were held in all the Regional Centers. Several retired employees attended the celebrations. Dr. Anjan Chaki, former Director, AMD and Shri D. Acharya, former CMD, UCIL attended the celebrations in Eastern Region. Dr. A.K. Rai, former Director, AMD attended the celebrations in Southern Region.



Northern Region, New Delhi



Western Region, Jaipur



Southern Region, Bengaluru



Eastern Region, Jamshedpur



Central Region, Nagpur

## निष्पन्नताएँ ACCOMPLISHMENTS



Shri **Kalyan Chakrabarti**, Scientific Officer-H, Incharge, Bhima Basin Investigations has been awarded the Ph.D. degree by the University of Calcutta for his research work titled 'Stratigraphy and Nature of Uranium Mineralization of the Precambrian Siliciclastic Succession around Mankarchua Area, Singhbhum Craton, Eastern India'. Congratulations!



Shri **L. Hanuma Reddy**, Technical Officer-C, Chemistry Group, Northeastern Region has been awarded the Ph.D. degree by the University of Hyderabad, Hyderabad for his research work titled 'Microwave assisted solution combustion synthesis of Ceria – based oxides for co-oxidation'. Congratulations!



Shri **T.S.P. Nair**, Sr. Technician-H, Geochronology and Stable Isotope Group, Hyderabad has been awarded the Ph.D. degree by the Osmania University, Hyderabad for his research work titled 'Heavy Mineral distribution in the palaeo sand dunes and their depositional conditions in Narsapur coast, Andhra Pradesh'. Congratulations!

## अंतर्राष्ट्रीय महिला दिवस समारोह INTERNATIONAL WOMENS' DAY CELEBRATIONS

International Womens' Day was celebrated in Headquarters and Regional Centers. In Eastern Region, a panel discussion on the theme "Be Bold for Change" was organised on 8<sup>th</sup> March, 2017. Smt. **Parul Singh**, Block Development Officer, Jamshedpur, Jharkhand graced the occasion as Chief Guest.



Headquarters, Hyderabad



Eastern Region, Jamshedpur

## राजभाषा समाचार

### राजभाषा संबंधी प्रमुख गतिविधियाँ :

पखनि मुख्यालय एवं सभी क्षेत्रीय कार्यालय, भारत सरकार के कार्यालय होने के नाते संघ सरकार की राजभाषा नीति तथा राजभाषा विभाग द्वारा प्रतिवर्ष जारी वार्षिक कार्यक्रम और पञ्चवि के मार्गदर्शन में संविधान में किये गये राजभाषा के प्रावधानों, राष्ट्रपति के आदेश, 1960, राजभाषा अधिनियम, 1963, के अनुच्छेदों, राजभाषा संकल्प, 1968, राजभाषा नियम, 1976 और समय-समय पर राजभाषा विभाग द्वारा जारी होने वाले आदेशों के अनुरूप राजभाषा हिंदी का कार्यान्वयन करने के लिए उत्तरदायी हैं।

प्रत्येक वर्ष की भाँति इस वर्ष भी वित्तीय वर्ष के प्रारंभ में मुख्यालय तथा सभी क्षेत्रीय कार्यालयों के लिए राजभाषा संबंधी सभी कार्यक्रमों का कैलण्डर तैयार कर तदनुरूप बजट आबंटित किया गया। मुख्यालय और सभी क्षेत्रीय कार्यालयों को सूचना जारी की गई की वे सभी अपने समस्त कार्यों के साथ-साथ राजभाषा के कार्यान्वयन में भी सतर्कता दिखाते हुए प्रगति की ओर अग्रसर हों तथा राजभाषा, विभाग द्वारा जारी वार्षिक कार्यक्रम में क्षेत्रानुसार निर्धारित विभिन्न मदों के लक्ष्य को प्राप्त करने की दिशा में कार्रवाई करें।

### मुख्यालय, हैदराबाद



मुख्यालय, हैदराबाद में राजभाषा कार्यान्वयन के लिए राजभाषा कार्यान्वयन समिति और हिन्दी अनुभाग ने लगातार प्रयास जारी रखा ताकि पत्राचार, हिन्दी प्रशिक्षण, कंप्यूटर पर हिन्दी में कार्य करने के लिए प्रशिक्षण, प्रशासन और लेखा के विभिन्न अनुभागों में राजभाषा का प्रगामी कार्यान्वयन सुचारु रूप से आगे बढ़े। इस दिशा में अब तक आयोजित हिन्दी कार्यशालाओं में 70 अधिकारियों / कर्मचारियों ने भाग लिया। कंप्यूटर पर हिन्दी टंकण प्रशिक्षण 12 प्रशासनिक कर्मचारियों को दिया गया। हिन्दी शिक्षण योजना के अंतर्गत आयोजित हिन्दी में बेसिक कंप्यूटर प्रशिक्षण की कक्षा में 09 प्रशासन लेखा कर्मचारियों को भेज कर प्रशिक्षित कराया गया।



विभाग की सलाह पर प्रतिवर्ष आयोजित किये जा रहे विश्व हिन्दी दिवस का इस वर्ष भी आयोजन किया गया। इस अवसर पर डॉ. राजीव जैन, वै.अ/जी, आर.आर.सी.ए.टी., इंदौर का व्याख्यान 'स्पंदित प्रकाश स्रोत और उनके अनुप्रयोग' विषय पर आयोजित किया गया। सितंबर माह में हिन्दी पखवाड़ा का आयोजन किया गया जिसमें आयोजित 11 प्रतियोगिताओं में 225 प्रतिभागियों ने भाग लिया। कुल 164 प्रतिभागियों को पुरस्कार प्रदान किये गये। इसी अवसर पर श्वेत पटल पर हिन्दी में अनुभागवार जानकारी – योजना के अनुसार उत्तम प्रस्तुति के लिए तकनीकी वर्ग में इलेक्ट्रॉन प्रोब सूक्ष्म विश्लेषण प्रयोगशाला और गैर – तकनीकी वर्ग में सामग्री प्रबंधन वर्ग एवं परमाणु खनिज क्रय इकाई अनुभागों को पुरस्कृत किया गया।



मुख्यालय के तीन मुख्य प्रकाशनों क्रमशः वार्षिक रिपोर्ट, उपलब्धियाँ और न्यूज लेटर में राजभाषा हिन्दी में उपयुक्त मात्रा में सामग्री का प्रकाशन किया गया। हिन्दी पखवाड़े के दौरान पखनि की गृह-पत्रिका 'खनिज भारती' का नवम अंक का लोकार्पण निदेशक एवं अन्य उच्चाधिकारियों ने किया।



### क्षेत्रीय कार्यालयों द्वारा हिन्दी के प्रचार-प्रसार में की गई कार्रवाई

**दक्षिण मध्यवर्ती क्षेत्र, हैदराबाद** कार्यालय ने हिन्दी अनुवादक की तैनाती न हो पाने के बावजूद क्षेत्रीय निदेशक के नेतृत्व में अपनी संपूर्ण गतिविधियों में राजभाषा कार्यान्वयन के समुचित प्रयास किए। इसके अंतर्गत आने वाले फील्ड – के.के.टांडा, विजयपुरी दक्षिण, गुरजाला शिविरों में हिन्दी सप्ताह का आयोजन किया गया। श्रीशैलम-कन्नूल अन्वेषण के शिविर नयनपल्ली के एक विद्यालय में हिन्दी सप्ताह का आयोजन किया गया। कार्यालय में राजभाषा के प्रभावी कार्यान्वयन के लिए वरिष्ठ अधिकारियों की बैठक आयोजित कर कार्यान्वयन हेतु मुख्य मदों को चिह्नित कर कार्रवाई की गई। मुख्यालय द्वारा निरीक्षण प्रश्नावली में सटीक सूचना उपलब्ध कराने में तत्परता से कार्रवाई की गई।

**दक्षिणी क्षेत्र, बेंगलूरु** ने भी राजभाषा के प्रभावी कार्यान्वयन की दिशा में काफी सक्रियता दिखाई। दिनांक 10.01.2017 को विश्व हिन्दी दिवस के उपलक्ष्य में आयोजित समारोह में श्री उमंग मफतलाल पारीक, प्रबंधक, इस्ट्राक, इसरो, बेंगलूरु द्वारा "टेलीमेट्री ट्रेकिंग एण्ड कमांड सर्विसेस फॉर इसरो सैटेलाइट एण्ड लांच मशीन्स" के संबंध में तकनीकी ज्ञानवर्धक व्याख्यान एवं डॉ.शैलजा, हिन्दी विभागाध्यक्षा, श्रीकृष्णा महाविद्यालय, बेंगलूरु द्वारा "समाज के लिए साहित्य की आवश्यकता" विषय पर रुचिपूर्ण व्याख्यान दिया गया। फील्ड यूनिटों एवं बेंगलूरु में हिन्दी कंप्यूटर कार्यशाला एवं अंशकालिक शब्द संसाधन कार्यक्रम, हिन्दी पखवाड़ा में विभिन्न प्रतियोगिताओं के आयोजन के अलावा नगर





राजभाषा कार्यान्वयन समिति की बैठक और उनके तत्वावधान में आयोजित प्रतियोगिताओं में कर्मचारियों ने प्रतिभागीता की तथा पुरस्कार विजेता बने। 08 फरवरी, 2017 को लोकप्रिय व्याख्यान आयोजित किया गया जिसमें श्रीमती गिरिजा राजेन्द्रन, प्रशिक्षित ग्राफोलॉजिस्ट, बेंगलूरु द्वारा "हस्तलेखन में सुधार द्वारा व्यक्तित्व विकास एवं अल्फा विश्रांति तकनीक" विषय पर व्याख्यान दिया गया। फील्ड क्षेत्र, उत्तरी कैंप, तमिलनाडु में 02.03.2017 को हिन्दी कार्यशाला एवं 03.03.2017 को हिन्दी अंशकालिक शब्द संसाधन कार्यक्रम आयोजित किया गया।

**मध्यवर्ती क्षेत्र, नागपुर** कार्यालय ने हिन्दी अनुवादक की तैनाती न हो पाने के बावजूद क्षेत्रीय निदेशक के नेतृत्व में विश्व हिन्दी दिवस के अवसर पर हिन्दी में दो व्याख्यानों तथा नियमित रूप से चार हिन्दी कार्यशालाओं का आयोजन किया। हिन्दी पखवाड़ा में विभिन्न प्रतियोगिताओं का आयोजन व विजेताओं को पुरस्कार प्रदान किए गए। 26 सितंबर 2017 को "परमाणु ऊर्जा-पर्यावरण अनुकूल स्वच्छ ऊर्जा" विषय पर एक दिवसीय वैज्ञानिक संगोष्ठी आयोजित की गई। 17 मार्च 2017 को 20 कर्मचारियों के लिए हिन्दी शब्द संसाधन का प्रशिक्षण कार्यक्रम सफलतापूर्वक आयोजित किया गया।



**उत्तरी क्षेत्र, दिल्ली** – विश्व हिन्दी दिवस के अवसर पर हिन्दी में दो व्याख्यानों तथा नियमित रूप से चार हिन्दी कार्यशालाओं का आयोजन किया गया। हिन्दी पखवाड़ा, 2017 के अंतर्गत विभिन्न प्रतियोगिताओं का आयोजन किया गया व विजेताओं को पुरस्कार प्रदान किए गए। तकनीकी एवं स्वास्थ्य वार्ताओं का आयोजन किया गया जिसमें उत्तरी क्षेत्र के सभी अधिकारियों व कर्मचारियों ने भाग लिया। पऊवि की प्रोत्साहन योजना के अंतर्गत 48 अधिकारियों एवं कर्मचारियों ने भाग लिया। सेवा-पंजियों में नियमित रूप से हिन्दी में प्रविष्टियाँ की जा रही हैं और प्रपत्रों को द्विभाषी रूप में बनाया गया।

**पश्चिमी क्षेत्र, जयपुर** – राजभाषा कार्यान्वयन समिति की नियमित बैठकें संपन्न की गईं, हिन्दी संबंधी नेमी प्रकार के सभी आयोजन समय-समय पर किये जैसे चार कार्यशालाएं, हिन्दी दिवस तथा विश्व हिन्दी दिवस के अवसर पर हिन्दी में दो व्याख्यान। लोकप्रिय व्याख्यान आयोजित किया गया जिसमें श्री आर.पी.विश्वकर्मा, पूर्व संयुक्त निदेशक(रा.भा), भा.प. अ.के. ने "संसदीय राजभाषा की प्रश्रावली कैसे भरें विषय पर व्याख्यान प्रस्तुत किया।

**पूर्वी क्षेत्र, जमशेदपुर** – हिन्दी पखवाड़ा व सप्ताह के अतिरिक्त 04 हिन्दी कार्यशालाओं, 01 लोकप्रिय व्याख्यान, 01 हिन्दी शब्द संसाधन प्रशिक्षण, फील्ड में हिन्दी सप्ताह एवं विश्व हिन्दी दिवस का सफल आयोजन किया गया।

दिनांक 11.09.2017 से 25.09.2017 तक हिन्दी पखवाड़ा का आयोजन किया गया जिसमें श्री दुर्योधन सिंह, उप-संपादक, प्रभात खबर मुख्य अतिथि थे। डॉ. मृदुला सिन्हा द्वारा रचित गीत "हिन्दी भारत माँ की बिंदी" की प्रस्तुति की गयी। क्षेत्रीय निदेशक डॉ. दीपक कुमार सिन्हा ने हिन्दी के लिए सभी की सक्रिय भागीदारी के साथ बढ़ती जागरूकता की सराहना की। छः व्याख्यानों की प्रस्तुति के साथ-साथ विभिन्न प्रतियोगिताएं – शब्द पहली, वाद-विवाद, तत्काल भाषण, काव्य पाठ, निबंध, कहानी पाठ, तकनीकी शब्दों का द्विभाषिकरण आदि आयोजित की गईं। जाने-माने साहित्यकार श्री राजदेव सिन्हा, श्री दिनेश्वर प्रसाद सिंह, डॉ. सुभास चन्द्र गुप्त, प्राध्यापक करीम सिटि कॉलेज, डॉ. अहमद बद्र, डॉ. त्रिपुरा झा द्वारा दिए गए व्याख्यानों ने सभी को मंत्र मुग्ध एवं लाभान्वित किया।



हिन्दी कार्यशाला (27.09.2017) के दौरान क्षेत्रीय निदेशक डॉ. दीपक कुमार सिन्हा ने दैनिक शासकीय कार्य में हिन्दी के अधिकाधिक प्रयोग का आह्वान दिया। उन्होंने ऑफिस मेनुअल, टिप्पण एवं आलेखन के संबंध में विस्तृत जानकारी दी।

दिनांक 02.08.2017 को नगर राजभाषा समिति के तत्वावधान में एक दिवसीय कार्यशाला में श्री अनिरुद्ध मिश्रा, उप-क्षेत्रीय प्रबंधक, बैंक ऑफ इंडिया, श्री एस.आई. जबीउल्ला, सहायक निदेशक (राजभाषा) तथा डॉ. पुरुषोत्तम कुमार, सदस्य सचिव, नराकास उपस्थित थे।

दिनांक 19.06.2017 को कैंप नरवा पहाड़ में आयोजित कार्यशाला में "संगठनात्मक उत्कृष्टता के लिए आत्म-विकास" विषय पर प्रशिक्षण दिया गया जिसका उद्देश्य हिन्दी में जटिल विषयों को समझने एवं समझाने का प्रयास था। पूर्वी क्षेत्र ने राजभाषा हिन्दी में कामकाज का औसत सदैव (प्रत्येक तिमाही) वृद्धिमान बनाए रखा है। इसके लिए कार्मिकों को प्रोत्साहन योजना के अंतर्गत पुरस्कृत किया गया।

**पूर्वोत्तर क्षेत्र, शिलांग**- सुदूर पूर्वोत्तर क्षेत्र स्थित परमाणु खनिज निदेशालय वैज्ञानिक एवं तकनीकी क्रियाकलापों के साथ-साथ राजभाषा हिन्दी के प्रसार में भी संलग्न है।



विश्व हिन्दी दिवस, हिन्दी कार्यशालाओं का आयोजन, राजभाषा हिन्दी में टंकण प्रशिक्षण और हिन्दी पखवाड़े का आयोजन किया गया। "परमाणु खनिज अन्वेषण : वैज्ञानिक चुनौतियां एवं समग्र विकास" विषय पर आयोजित एक अखिल भारतीय अंतर-विभागीय राजभाषा हिन्दी वैज्ञानिक संगोष्ठी का सफल आयोजन किया गया जिसमें 25 उल्लेखनीय शोध-पत्र प्रस्तुत किए गए व इन सभी शोध-पत्रों का संकलन स्मारिका के रूप में प्रकाशित किया गया। विश्व हिन्दी दिवस के अवसर पर वैज्ञानिक कार्यक्षेत्र में "हिन्दी का प्रयोग : सहज एवं सरल" व सामान्य विषय पर व्याख्यान के अंतर्गत 'योग-स्वास्थ्य' विषय पर व्याख्यान का आयोजन किया गया। पूर्वोत्तर क्षेत्र को वर्ष 2016-17 में हिन्दी में सर्वश्रेष्ठ कार्य के लिए नराकास, शिलांग द्वारा प्रथम पुरस्कार के रूप में राजभाषा शील्ड प्रदान की गयी। श्री संदीप हैमिल्टन, क्षेत्रीय निदेशक ने इस पुरस्कार को ग्रहण किया।



## राष्ट्रीय विज्ञान दिवस NATIONAL SCIENCE DAY

National Science Day with the focal theme "Science and Technology for Specially Abled Persons" was celebrated in AMD Headquarters, Regional Centers, Sectional Headquarters and in various field camps commemorating the legacy of **Sir C.V. Raman**. Glimpses of the activities are given below:



### Headquarters, Hyderabad:

Public awareness programmes were conducted at Akshay Akruthi deaf and dumb school, Hyderabad on 2<sup>nd</sup> March, 2017 and Devnar school for the blind, Hyderabad on 3<sup>rd</sup> March, 2017. On these occasion lecture on "Nuclear Energy in India" was delivered by Shri **M.B.Verma**, Additional Director (Operations-1). A sign language interpreter conveyed the mandate of AMD and DAE to deaf and dumb children. AMD Infosheet was converted in BRAILLE and distributed and a lecture on "Radioactivity, Health and Society" was also delivered.



Various programmes were conducted at AMD premises, Hyderabad on 6<sup>th</sup> March, 2017 which included visit of specially abled persons to AMD from three schools (Medho Sampathi School for the specially abled, Akshay Akruthi deaf and dumb school and



Devnar school for the blind), popular science lecture by Dr. **P.C. Jain**, DMRL on "Multidimension of Science and Technology for Societal Growth", was delivered. Elocution and quiz competitions for students of Devnar school for the blind, Hyderabad were also arranged.



**Northern Region, New Delhi:** Lecture, projection of film on AMD's exploration programme and exhibition on activities of AMD and atomic energy programme of India were conducted for students of Sarvodaya Vidyalaya, Sector-12, New Delhi during 28<sup>th</sup> February to 3<sup>rd</sup> March, 2017 and Tamanna Special School for autistic children, New Delhi on 3<sup>rd</sup> March 2017. Lectures and exhibition on nuclear power and exploration for atomic minerals were organised in Camp: Narnaul, Haryana during 7-8 March, 2017.



**Southern Region, Bengaluru:** Open day science exhibition on "Nuclear Energy, Clean Energy, Green Energy" was organised at AMD, Bengaluru on 28<sup>th</sup> February, 2017. The exhibition was inaugurated by Prof. (Dr.) **R. Venkata Rao**, Vice Chancellor, National Law School of India University. About 1,200 people including



students and teachers from various Engineering & Science colleges in Bengaluru visited the exhibition.

**Eastern Region, Jamshedpur:** A scientific exhibition, an invited lecture by Dr. **K.C. Dey**, Chairman, Science and Engineering, Jharkhand and power point presentation on various activities of AMD and DAE were organised on 27<sup>th</sup> February, 2017 in the office premises of Eastern Region, Jamshedpur. More than 200 students from various schools and colleges of Jamshedpur participated in the programme. Various competitions were conducted for the students and prizes were awarded.



**Northeastern Region, Shillong:** AMD, Northeastern Region participated in "National Science Day" at Shillong organised on 28<sup>th</sup> February, 2017. Dr. **R. C. Laloo**, Deputy Chief Minister, Meghalaya inaugurated the AMD stall. Exhibition on nuclear power and exploration for atomic minerals and essay writing, poster and science quiz competitions were conducted in the office premises during 6-7 March, 2017. Exhibition on nuclear power and exploration for atomic minerals was organised in State Central Library, Shillong during 28<sup>th</sup> February to 2<sup>nd</sup> March, 2017. A public awareness programme was conducted in School and Centre for the Hearing Impaired, Shillong on 3<sup>rd</sup> March, 2017.



**Western Region, Jaipur:** Lectures and exhibition on nuclear power and exploration for atomic minerals were conducted during 27<sup>th</sup> February to 3<sup>rd</sup> March, 2017 in office premises, Jaipur. Students of Seth Anandilal Poddar Deaf and Dumb Government Institute, Jaipur and Disha-Bahul Vikalang Sansadhan Kendra and Castle Convent School, Jaipur participated in the programmes. Exhibition on nuclear power and exploration for atomic minerals and projection of film on AMD's exploration programme were organised at Vivekanand Senior Secondary School, Khandela, Rajasthan and Swami Vivekanand Rajakiya Model School, Siwana, Rajasthan on 2<sup>nd</sup> March, 2017.



**Central Region, Nagpur:** Science Exhibition depicting activities of DAE and AMD and science quiz competition were organised in the AMD office premises, Nagpur on 27<sup>th</sup> February, 2017 which were attended by more than 650 students from 12 different schools and colleges of Nagpur. Quiz and drawing competitions



were conducted for the students of Blind School, Shradhanandpeth, Nagpur and Deaf and Dumb School, Shankar Nagar on 25<sup>th</sup> February, 2017. Lecture on peaceful uses of nuclear energy, exhibition on nuclear power and exploration for atomic minerals were conducted in Somalwar High School, Nagpur, Government Higher Secondary School, Bhoura, Madhya Pradesh and Government Kalidas Mahavidhyalaya, Pratappur (Dhabi Prospect), Chhattisgarh on 28<sup>th</sup> February, 2017.



**South Central Region, Hyderabad:** Exhibition on nuclear power and exploration for atomic minerals, quiz, essay writing and elocution competitions were organised at AMD office premises at Cherlapalle, Hyderabad during 27<sup>th</sup> February to 3<sup>rd</sup> March, 2017. Exhibition on nuclear power and exploration for



atomic minerals and interactive session were conducted in Anurag Rehabilitation Centre, Hyderabad on 2<sup>nd</sup> March, 2017.

**BSOI, Visakhapatnam:** Lecture on Science and Technology for specially abled persons, projection of film on AMD's exploration programme, exhibition and elocution competition were organised at BSOI office premises, Visakhapatnam on 28<sup>th</sup> February, 2017.

**BSOI, Thiruvananthapuram:** Lectures on Paleomagnetism and Science & Technology for specially abled persons and exhibition on nuclear power and exploration for atomic minerals were organised at BSOI office premises Thiruvananthapuram, on 1<sup>st</sup> March, 2017.



## जनजागरूकता कार्यक्रम PUBLIC AWARENESS PROGRAMME Headquarters : Hyderabad



A public awareness programme was conducted in Gokaraju Rangaraju Engineering College, Nizampet on 11<sup>th</sup> January, 2017. The programme included a lecture by Shri **M.B. Verma**, Additional Director (Operations-1) on "Energy Budget of India vis-a-vis Nuclear Energy", exhibition and elocution competition. An awareness programme was organised in St. Francis College, Begumpet, Hyderabad on 20<sup>th</sup> January, 2017.

AMD participated in the "NUMAISH" organised by Exhibition Society, Hyderabad during 8-10 February, 2017 at exhibition grounds, Nampally, Hyderabad. More than 3,000 people visited the AMD Pavilion, which won the "Special Jury Award". The award was presented by Hon'ble Shri **Md. Mahmood Ali**, Deputy Chief Minister, Government of Telangana to Mrs. **K. Shobhita**, Member Secretary, Public Awareness Programme, Hyderabad. Shri **Nayani Narsimha Reddy**, Home Minister and Shri **Eatala Rajender**, Finance Minister, Government of Telangana graced the occasion.



Public awareness programmes including lectures, exhibition and elocution competition was conducted in MVSR College, Badangpet, Hyderabad on 16<sup>th</sup> March, 2017. AMD exhibition was organised in Department of Geology, Kakatiya University, Warangal during 30-31 March, 2017 on the occasion of national seminar on "Strategic Trends and Future Perspectives in the Development of Natural Resources of Telangana State - A Geoscientific Approach". A public awareness programme was conducted in National Geophysical Research Institute, Hyderabad during 3-5 December, 2017 on the occasion of 54<sup>th</sup> Annual Convention of Indian Geophysical Union.

### Northern Region, New Delhi

An exhibition on the activities of AMD and DAE was conducted in Department of Geology, Aligarh Muslim University on 27<sup>th</sup> February, 2017. Public awareness programmes were conducted in Narnaul, Haryana during 7-8, March, 2017, National Institute of Technology and Subhash Chandra Bose College, Hamirpur, Himachal Pradesh during 27-28, March, 2017. A lecture on "Various techniques for exploration and technologies (including indigenous) used to extract minerals" was delivered by Shri **Pradeep Pandey**, Deputy Regional Director, Northern Region in Ram Lal Anand College, Delhi University on 24<sup>th</sup> August, 2017.



### Southern Region, Bengaluru

AMD, Southern Region participated in the 104<sup>th</sup> Indian Science Congress held at Sri Venkateswara University, Tirupati, Andhra Pradesh during 3-7 January, 2017. A science expo cum public awareness programme was organised at Narayana EM School, Pulivendula, Andhra Pradesh on 23<sup>rd</sup> February, 2017. Public



awareness programmes were conducted in Arts and Science College, Periyar University, Tamil Nadu on 23<sup>rd</sup> March, 2017 and Bangalore Institute of Technology, Bengaluru on 12<sup>th</sup> May, 2017.

### Eastern Region, Jamshedpur

Public awareness programmes were conducted in Kedo High School, Kedo, Jamshedpur on 27<sup>th</sup> January, 2017, Rajkiya High School, Kharswan, Jharkhand on 30<sup>th</sup> January, 2017. A scientific lecture on "Atomic energy & its prospects in the development of the country"





and a public awareness programme were conducted in Atomic Energy Central School, Turamdih, Jharkhand during 22 - 23 February, 2017. The programmes included lectures, exhibition and elocution competitions. Interschool competitions were conducted in the office premises of Eastern Region during 24-25 January, 2017.



### Northeastern Region, Shillong

Public awareness programmes were conducted in St Mary's College, Shillong on 13<sup>th</sup> February, 2017; State Council of Science, Technology and Environment, Shillong on 2<sup>nd</sup> March, 2017; St. John Bosco Secondary School, Mawpat, Meghalaya on 16<sup>th</sup> March,



2017; Langrin Government Upper Primary School, Langrin, Meghalaya on 17<sup>th</sup> March, 2017; Udmari High School, Nagoan District, Assam on 22<sup>nd</sup> March, 2017; Burjuri High School, Assam on 23<sup>rd</sup> March, 2017; New and Renewable Energy Development Agency, Shillong during 28-29 March, 2017; Government Higher Secondary School, Yomcha, Arunachal Pradesh on 31<sup>st</sup> March 31, 2017 and Fernando Speech and Hearing Centre Umniuh Khwan and Umiam, Meghalaya on 21<sup>st</sup> April, 2017. The programmes included lectures, exhibition and elocution competitions. Northeastern Region conducted 'Departmental Social Responsibility' activities in and around Domiasiat. Six (6) missions namely, Infrastructural Development, Health, Education, Sports, Public Awareness and Swachh Bharat were implemented around Mawthabah, Nongbahjynarin, Nongtnger, Nongmalang, Langurlied, Langmyndia, Mawiwlang, Kullang and Umsur villages.



### Western Region, Jaipur

Public awareness programmes were conducted in Mody University, Laxmangarh, Rajasthan on 23<sup>rd</sup> March, 2017 and Government Senior Secondary School Siwana, Rajasthan on 28<sup>th</sup> March, 2017. The programmes included lectures, exhibition and elocution competition.

### Central Region, Nagpur

Central Region participated in the Science Expo-17 held at Raman Science Center, Nagpur, during 18 to 22 January, 2017. A lecture on "Nuclear energy: rock to reactor and beyond" under popular science lecture series was delivered. More than 50,000 people visited AMD gallery during the exhibition.



## संविधान दिवस CONSTITUTION DAY



Constitution Day was observed in Headquarters and Regional Centers on the occasion of 125<sup>th</sup> birth anniversary of Dr. B.R. Ambedkar on 26<sup>th</sup> November, 2017. The programmes

included reading of the Preamble of the Indian Constitution and essay writing competition on the Indian constitution.

## सड़क सुरक्षा दिवस ROAD SAFETY DAY

Road Safety Day and related awareness programme were organised in Eastern Region on 13<sup>th</sup> January, 2017. On this occasion, reflectors were affixed on all passing bicycles on the main road in front of the Office. Local Police officials supported the event.



## पुरस्कार तथा सम्मान AWARDS AND RECOGNITIONS



Shri / Dr. **A. K. Chaturvedi**, SO / H+ (Retd.), **A. Markandeyulu**, SO/G, **V. Ramesh Babu**, SO/G and **Sailesh Tripathi**, SO/F have been conferred with the “**National Geoscience Award - 2016**” instituted by the Ministry of Mines. The award was presented to them by Hon’ble President of India Shri **Pranab Mukherjee** on 12<sup>th</sup> April, 2017, during the ceremony held at Rashtrapati Bhavan, New Delhi. The award was presented for the team’s approach to the thematic integrated interpretation of large data sets by adopting innovative processing and interpretation techniques, which resulted in identification of potential target zones for concealed uranium deposits in different geologic environs of the country.



The Indian Society of Applied Geochemists (ISAG) conferred “**Life time Achievement Award**” on Shri **L.K. Nanda**, Director, AMD, “**Prof. J. S. R. Krishna Rao - Dr. R. Dhana Raju Medal 2017**” on Shri **Kamlesh Kumar**, SO/H and “**Dr. G.R.Udas - Dr. K.K.Dwivedi Medal**” on Dr. **Minati Roy**, SO/G. The awards were presented to them on the occasion of Annual General Body meeting of the Society held on 16<sup>th</sup> September, 2017, at Solapur University, Maharashtra.



Shri **L.K.Nanda**, Director, AMD has been conferred with the prestigious “**DAE-Homi Bhabha Science & Technology award for the year 2016**” for his outstanding contribution in the field of Exploration for Atomic Minerals. The award was presented to him by Prof. **K. Vijay Raghavan**, Secretary, Department of Biotechnology, Ministry of Science and Technology, Government of India on 30<sup>th</sup> October, 2017 on the occasion of BARC Founder’s Day celebration at BARC, Mumbai. Shri **K.N. Vyas**, Director, BARC and other dignitaries graced the occasion.



**DAE Group Achievement Award - 2016** has been conferred on Dr/ Shri **L. K. Nanda**, Outstanding Scientist, **R. K. Purohit**, SO/H+, **O. P. Yadav**, SO/H+, **M. K. Khandelwal**, SO/H+, **A. K. Bhatt**, SO/H+, **Dheeraj Pande**, SO/H, **R. C. Jain**, SO/G, **Sujit Kumar Dash**, SO/G, **Ajoy Kumar Padhi**, SO/F, **Suresh Kumar**, SO/E and **Harmesh Chand**, SA/E for their outstanding contribution in “Augmentation of uranium resource from Rohil uranium deposit and its environs” and Dr/Shri/ Smt. **Manjeet Kumar**, SO/G (Retd.), **Alok Pandey**, SO/E, **Sanjay Kumar**, SO/E, **Amit Kumar Jain**, SO/E, **M. Krishna Kumar**, SO/D, **Kalpna Bahuguna**, SO/D, **P. Chakraborty**, SO/D, **V. V. Hanuman**, SO/D and **Satyaprakash**, SA/G for their outstanding contribution in “Simple, rapid, accurate and green analytical method for analysis of uranium from ppb to percentage levels in rocks, minerals and beneficiation products”. The award was presented by Prof. **K. Vijay Raghavan**, Secretary, Department of Biotechnology, Ministry of Science and Technology, Government of India on 30<sup>th</sup> October, 2017 on the occasion of BARC Founders Day celebration at BARC, Mumbai. Shri **K. N. Vyas**, Director, BARC and other dignitaries graced the occasion.



## संक्षिप्त समाचार NEWS IN BRIEF



AMD, Central Region in collaboration with Technology Transfer Division of BARC, Mumbai created 'AKRUTI' ('Advanced Knowledge and RUral Technology Implementation') node at its drilling prospect at Dhabi in Chhattisgarh. The objective of AKRUTI is to encourage techno-entrepreneurship at all levels in society, with specific emphasis on prosperity-growth in rural India. The equipments donated by BARC were at display which included soil organic carbon & fluoride detection and testing kit, vibrothermal disinfestor, foldable solar dryer and domestic water purifier. Several villagers participated in the demonstration.

Technology transfer agreement on "Arsenic Removal Filter for Domestic Water Purification - WT19 AMD", was signed on 7<sup>th</sup> December, 2017 at BARC, Mumbai. Technology Transfer Agreement (TTA) was handed over to M/s Stellarin Ventures Pvt. Ltd., Raipur, Chhattisgarh by Shri. R. K. Purohit, Additional Director, Operations-II in the presence of Inventors (Dr. G. Chakrapani, former Head, Chemistry Group and Dr. Anitha Mary Thomas, SO-F) and Head, TT&CD.



Shri M.A. Inbarasu, Joint Secretary (Industries and Minerals), Department of Atomic Energy along with Shri L.K. Nanda, Director, AMD visited Rohil area, Sikar district, Rajasthan on 2<sup>nd</sup> November, 2017 and Northeastern Region, Shillong on 23<sup>rd</sup> September, 2017. Dr. M.K.Khandelwal, Regional Director, Shri



D.K. Choudhury, Incharge, North Delhi Fold Belt Investigations-I and other senior officers of AMD, Western Region were present during the visit to Rohil area. In Shillong Shri Sandeep Hamilton, Regional Director apprised the dignitaries about the exploration activities carried out in Northeastern Region.

Shri M.A. Inbarasu, Joint Secretary (Industries and Minerals), DAE and Shri O.P. Yadav, Additional Director visited Koppunuru Prospect, South Central Region on 29<sup>th</sup> September, 2017. Dr. A.V. Jeyagopal, Regional Director apprised them about the exploration activities carried out in Palnad basin. Dr. B.S. Bisht, Incharge, Srisailam-Kurnool Investigations and other senior officers were present on the occasion.



कु. एस. कपिला, सहायक कार्मिक अधिकारी, परमाणु खनिज अन्वेषण एवं अनुसन्धान निदेशालय, बेंगलूरु को अंतरिक्ष विभाग / इसरो मुख्यालय बेंगलूरु द्वारा नगर राजभाषा कार्यान्वयन समिति, बेंगलूरु के तत्वावधान में आयोजित काव्य गोष्ठी में श्रेष्ठ कविता हेतु द्वितीय पुरस्कार प्राप्त हुआ है |



डॉ. राघवेंद्र ठाकुर, वैज्ञानिक अधिकारी-एफ, रसायन प्रयोगशाला, पखनि, पूर्वी क्षेत्र ने नगर राजभाषा कार्यान्वयन समिति (बैंक), रांची के तत्वावधान में नवम्बर 2017 में आयोजित 'अखिल झारखंड अंतर कार्यालय निबंध लेखन प्रतियोगिता-2017' में प्रथम पुरस्कार से सम्मानित किया गया।

*"Life and Time are the world's best teachers.  
Life teaches us to make good use of Time and  
Time teaches us the value of Life"* - Dr. A.P.J. Abdul Kalam





## स्वच्छता पखवाड़ा SWACHHATA PAKHWADA

“Swachhata Pakhwada” was observed in AMD Headquarters, all the Regional Centres and Sectional Headquarters during 1-15 April and 1-15 June, 2017. Glimpses of the activities are given below.



Headquarters, Hyderabad

Northern Region, New Delhi



Southern Region, Bengaluru and Camp M.C. Palle, A.P.

Eastern Region, Jamshedpur



South Central Region, Hyderabad

Central Region, Nagpur

Western Region, Jaipur

Northeastern Region, Shillong

## प्रतिनियुक्तियाँ DEPUTATIONS

Shri **L.K. Nanda**, Director, AMD, attended 3<sup>rd</sup> Mongolia-India Joint Working Group meeting held at Ulaanbaatar, Mongolia during 29-31 March, 2017.

Shri **L.K. Nanda**, Director, AMD, Shri **S. Srinivasan**, Regional Director, Central Region, Nagpur and Shri **A. Markandeyulu**, Scientific Officer-G, Airborne Survey and Remote Sensing Group, Hyderabad attended “Exploration-17, Decennial Mining Exploration Conference (DMEC)” held at Toronto, Canada during 21-27 October, 2017.

Shri **L.K. Nanda**, Director, AMD attended the 54<sup>th</sup> OECD-NEA/IAEA Uranium Group Meeting held at Paris, France during 15-17 November, 2017.



## सतर्कता जागरूकता सप्ताह VIGILANCE AWARENESS WEEK



Vigilance Awareness Week – 2017 was observed in AMD Headquarters and Regional Centers during 30<sup>th</sup> October, 2017 to 3<sup>rd</sup> November, 2017. A pledge was taken by all the employees of AMD Headquarters, Regional Offices and Field Units on 30<sup>th</sup> October, 2017. In Headquarters, an essay writing competition for the students of Maharshi Junior College for Girls, Begumpet, Hyderabad on the topic “My Vision-Corruption Free India”, Workshop on vigilance / anti-corruption related topics, elocution competition, slogan writing competition, skit titled “Nagar Sadak Palika” and lecture by Shri **Pendyala Krishna Sastry**, IPS, on the topic “Security & Cyber Information – Infrastructure Protection” were organised. The winners of the competitions were awarded by Shri R.K.Purohit, Additional Director, (Operations-II) and Shri O.P. Yadav, Additional Director, (Operations-III).



## कौमी एकता सप्ताह NATIONAL INTEGRATION WEEK

National Integration Week was observed during 19 – 25 November, 2017 in Headquarters and Regional Centers. The objective of the programme is to foster the spirit of communal harmony, national integration and pride to our composite culture and nationhood. The occasion provides us an opportunity to reaffirm our traditions and faith in the values of tolerance, coexistence and brotherhood in a multi-cultural and multi-religious society. This will help to highlight the inherent strength and resilience of our nation to withstand actual and potential threats to the eclectic and secular fabric of our country and nurture a spirit of communal harmony in its widest sense. A pledge was administered to all the employees.



## अंतर्राष्ट्रीय योग दिवस INTERNATIONAL YOGA DAY

3<sup>rd</sup> international Yoga Day was observed in Headquarters and the Regional Centers and in field camps on 21<sup>st</sup> June, 2017.



## स्वजन KITH AND KIN

Shri **A. Adithya**, son of Shri H. Ananda, Driver Grade I, Southern Region, Bengaluru participated as a player in the Team IBSA in the "1<sup>st</sup> International Baseball Championship Malaysia, 2017" held at Universiti Putra Malaysia, Serdang, Selangor Darul Ehsan, Malaysia during 10 -15 October, 2017. His team won the championship (Gold medal) in the tournament.



Kum. **Aastha Negi**, daughter of Shri Rakesh Mohan, Scientific Officer-F, Airborne Survey and Remote Sensing Group, Hyderabad won the third prize in Telangana state level drawing competition held on the eve of "National Energy Conservation Day". She also represented the state in the national level drawing competition held on 14<sup>th</sup> December, 2017 at New Delhi and won consolation prize.

*AMD wishes them all the best in their career. Congratulations !*

## पिकनिक PICNIC



**Southern Region :** Kaiwara-Kailashgiri, Chinhamani district, Karnataka 29<sup>th</sup> October, 2017.



**Eastern Region:** Damodih, Patharbanga, Jamshedpur on 12<sup>th</sup> February, 2017.



**Western Region:** Nahargarh Biological Park, Jaipur, on 12<sup>th</sup> February, 2017.

## खेलकूद SPORTS

AMD, Southern Region, Bengaluru organised a cricket tournament for AMD employees and their family members on 23<sup>rd</sup> & 30<sup>th</sup> July, 2017 at Dr. Y.N. Rama Rao sports ground at Southern Region, Bengaluru.



Shri **Triveni Yadav**, Security Guard, Eastern Region, Jamshedpur was adjudged the best athlete in the outdoor activities conducted as part of the Induction Training Programme for the newly recruited security guards held at ATI, Mumbai during 30<sup>th</sup> October to 15<sup>th</sup> December, 2017.

## ट्रेकिंग अभियान TREKKING EXPEDITION

S/Shri **A.V.S. Subrahmanyeswarudu, N. Murali, Y.V. Seshagri Rao, C.V.M. Rajaram, M. Rajender and K. Venugopala Raju** from Headquarters, Hyderabad participated in the 28<sup>th</sup> Girisanchar – the Annual All India Trekking Expedition conducted by DAE Sports & Cultural Council during 16-22 January, 2016. The trekking was conducted in Bandardara-Ratangad, Sandhan Valley-Dehne-Ghadghar-Alang-Kalsubai-Bari in Ahmadnagar, Nasik and Thane districts, Maharashtra.





## श्रद्धांजलि OBITUARY

### Shri A.C. Saraswat (14-03-1930 to 21-01-2017)

Shri A.C.Saraswat, our former Director left for heavenly abode on 21<sup>st</sup> January, 2017 at New Delhi after a brief illness. He is survived by his wife, son daughter and four grandchildren. He was the 6<sup>th</sup> Director of AMD and served during the period 01-05-1987 to 31-03-1990. He contributed immensely in the field of uranium exploration in Himalayas, North Delhi Fold Belt, Singhbhum Shear Zone and Mahadek Basin. Shri Saraswat was soft spoken, courteous and affectionate scientist.



AMD pays homage to the departed soul.



### Dr. S. Viswanathan (23-03-1933 to 16-03-2017)

Dr. S. Viswanathan, our former Director and a renowned geochemist in geological fraternity of India passed away on 16<sup>th</sup> March, 2017 at Hyderabad after a brief illness. He is survived by his wife and only son. He was the 8<sup>th</sup> Director of AMD and served during the period 01-04-1992 to 31-03-1993. He contributed immensely in the field of Atomic Minerals exploration and was instrumental in bringing about changes in the analytical facilities in AMD. Dr. S. Viswanathan, was a cheerful, soft spoken and dynamic scientist.

AMD pays homage to the departed soul.

## नई भर्तियाँ NEW RECRUITMENTS

वर्ष 2017 के दौरान नए भर्ती/कार्यभार ग्रहण किए निम्नलिखित पदाधिकारियों का पखनि में स्वागत है. उनके वृत्ति-विकास के लिए शुभकामनाएँ

Name (Shri/Smt.)	Designation	Name (Shri/Smt.)	Designation	Name (Shri/Smt.)	Designation
Sreejita Chatterjee (Ms)	SO C	Kumar Guaurav	Technician B	Sankar Boyina	Work Asst A
Surya Sankara Subramanian	SO C	John Jesuraj A	Work Asst A	Shibu Pramanik	Work Asst A
Rahul Jaiswal	SO C	Seshadri K	Work Asst A	Durga Prasad P	Work Asst A
Denzil Salvador Couto	SO C	Rohini Gaddipati (Ms)	Work Asst A	Pankaj Kumar	Security Guard
Parvej Alam	SO C	Monika Sharma (Ms)	Work Asst A	Arvind Kumar M	Security Guard
Subhadip Paul	SO C	Ram Lal Dhayal	Work Asst A	Channamallappa	Security Guard
Soumendra Nayak	SO C	Shaik Iliyas	Work Asst A	Adari Hari Mohan Rao	Security Guard
Sudhiranjan Swain	SO C	Abhishek Kumar	Work Asst A	Kashanna V	Security Guard
Soumya Sarkar	SO C	Amar Nayak	Work Asst A	Punuru Subba Reddy	Security Guard
Amaresh Kumar	SO C	Ujjal Mondal	Work Asst A	Rakesh Kumar	Security Guard
Avadesh Kumar Shukla	SO C	Priyanka Srivastava (Ms)	Work Asst A	Malyala Jeevan Kumar	Security Guard
Dipayan Saha	SO C	Beronika Kindo (Ms)	Work Asst A	Koushik Gupta	Security Guard
Preeti Mangla (Ms)	SO C	Brijesh Kumar	Work Asst A	Bidyabat Singh	Security Guard
Ayan Mukherjee	SO C	Sunita Yadav (Ms)	Work Asst A	Sanderajula Rajashekhar	Security Guard
Komal Chauhan (Ms)	SO C	Prabhat M Mendhe	Work Asst A	Pavullluri Sudhakar	Security Guard
Siva Sumandhir Nadh Ch	ASO (A)	Samujjal Biswas	Work Asst A	Mritunjay Jumar Sharma	Security Guard
Arul Kumar M	Technician B	Samresh Kumar Mondal	Work Asst A		
Sreekanth Bisai	Technician B	Deep Kamal P R	Work Asst A		

## सेवानिवृत्ति SUPERANNUATION

Name (Dr./Shri/Smt)	Designation	Name (Dr./Shri/Smt)	Designation	Name (Dr./Shri/Smt)	Designation
Chaturvedi A K Dr.	SO H+	Gokul Ramesh	Steno Gr I	Mathukutty K V	Work Asst B
Chakrapani G Dr.	SO H+	Rajeswara Rao S P P	Steno Gr I	Laxman Pradhan	Work Asst B
Joshi Govind Ballabh	SO H+	Nalinakshan M K	Steno Gr I	Sakamma	Work Asst B
Pramod Kumar	SO H+	Ganga Ram	Technician G	Mohan Singh	Driver(Spl Grd)
Yadav G S	SO H+	Dev Raj	Technician G	Patnaik R N	Driver(Spl Grd)
Syed Zakauila Dr	SO H+	Bhandari S S	Technician G	Kedar Paswan	Driver Gr II
Yamuna Singh Dr.	SO H	Subal Chandra Jana	Technician G	Vijay Kumar B V	Driver Gr II
Rajagopalan V	SO H	Gurunath Singh	Technician G	Ambadare M D	Driver Gr I
Bangroo P N Dr.	SO H	Bhattacharjee A K	Technician G	Nandanwar Y Y	Driver Gr I
Akhilshwar Tiwary Dr.	SO G	Albel Kujur	Technician G	Ahmed S I	Driver Gr I
Arun Kumar Singh	SO G	Ajit Pratap Singh	Technician G	Jayadev N	Driver(Ord Grd)
Bikash Sen Gupta	SO G	Bhagilal Sahu	Technician G	Sanjeeva Rao E S	Head Sec. Guard
Dash Jugal Kumar	SO G	Radhakrishnan C	Technician G	Mohan Prasad	Head Sec. Guard
Manjeet Kumar Dr.	SO G	Ram Lal Ram	Technician F	Santosh Pradhan	Sr Sec. Guard
Ratna Reddy N	SO G	Shankarlal Sahu	Technician F	Prem Lal Meshram	Sr Sec. Guard
Tarafdar P K Dr.	SO G	Sreenivasulu B	Technician F	Sadaram	Sr Sec. Guard
Virag Saran	SO F	Somkuwar B N	Technician F	Pritam Chand	Sr Sec. Guard
Vijaya Kumar K	SO F	Bhado Pal	Technician F	Vittal Rao J	Sr Sec. Guard
Sharma S K	SO F	Ashok Kumar E	Steno Gr II	Kumar Say Koma	Sr Sec. Guard
Anjaneyulu T S P	SO E	Boraiah S	Technician D	Satyanarayana T	Sr Sec. Guard
Santosh Singh	SO E	Ajab Ram Sahu	Technician D	Gangaraju Y	Security Guard
Curve P K	SO D	Balakrishna A K	Technician D	Prem Sai	Security Guard
Sathyamurthy R	JC(F&A)	Shailendra Kumar	Technician C	Yengamuni E	Security Guard
Krishna Murty V	SAG	Narasappa Ch	Technician C	Rajnath Prasad	Security Guard
Chaitulal Mahato	Sr Technician H	Sunderlal	Technician C	Sushil Kumar Singh	Security Guard
Abhay Adhikary	Sr Technician H	Pia Lal	Technician C	Pedda Peeraiah S	Security Guard
Satya Savithri V (Ms)	Sr Technician H	Rajagopal B	ASO (B)	Manohar Lal	Security Guard
Raj Singh Duhan	Sr Technician H	Prabhakar P	Asst Acctt	Guha Ram	Security Guard
Prit Ram	Sr Technician H	Sarbans Singh	Senior Clerk		
Chandra Sai	Sr Technician H	Singh B K	Senior Clerk		
Arjun Kumar	Sr Technician H	Rajaiah S	Senior Clerk		
Dina Nath Ram	Sr Technician H	Mool Raj D	Senior Clerk		
Amar Singh Sardar	Sr Technician H	Aole A M	Senior Clerk		
Mohurle G S	Sr Technician H	Sameer Minz	Work Asst C		
Pal D K	Sr Technician H	Punamchand Mohale	Work Asst C		
George M F	Sr Technician H	Jayamma (Ms)	Work Asst B		
Ashok Kumar K	Sr Technician H	Joga	Work Asst B		

### स्वैच्छिक सेवानिवृत्ति

### VOLUNTARY RETIREMENT

Rathaiah Y V	SO G
Saibaba M	SO F
Chakrapani S (Ms)	Pvt. Secy. (NS)
Nimai Singh	Driver Gr I
Dineswar Prasad	Driver Gr I
Bikash Mukharjee	Head Sec. Guard

मंगलमय सेवानिवृत्त जीवन की हार्दिक शुभकामनाएं

## श्रद्धांजलि OBITUARY

Name (Dr./Shri/Smt)	Designation	Name (Dr./Shri/Smt)	Designation	Name (Dr./Shri/Smt)	Designation
Koteswara Rao M	SO F	Ram Jattan	Sr Sec. Guard	Rakesh Kumar	Work Asst B
Aman Tuli	Senior Clerk	Suresh Kumar	Work Asst C	Kishori Lal	Work Asst B
Surender Singh Negi	UDC	Munimarappa	Work Asst C	Arjun Ram	Work Asst B
Birendra Kumar Jha	Driver Gr I	Charan Tudu	Work Asst B	Lal Sai Ram	Work Asst B
Krishna	Driver Gr I	Dillip Das	Work Asst B	Hanuman Sahai Verma	Work Asst B
Ananda Nanda Kumar	Driver(Ord Grd)	Januka Rana (Ms)	Work Asst B	Bhagya Laxmi C (Ms)	Work Asst A

हम दिवंगत आत्मा की शांति के लिए प्रार्थना करते हैं

## परमाणु खनिज अन्वेषण एवं अनुसंधान निदेशालय

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(मात्र निजी परिचालन हेतु)

